QGIS User Guide

Publicación 2.6

QGIS Project

22 de May de 2015

Índice general

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.

CAPÍTULO 1

Preámbulo

Este documento es la guía de usuario original del software QGIS que se describe. El software y el hardware descritos en este documento son el la mayoría de los casos marcas registradas y por lo tanto están sujetos a requisitos legales. QGIS está sujeto a la Licencia Pública General GNU. Encontrará más información en la página de QGIS, http://www.qgis.org.

Los detalles, datos y resultados en este documento han sido escritos y verificados con el mejor de los conocimientos y responsabilidad de los autores y editores. Sin embargo, son posibles errores en el contenido.

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Este documento ha sido compuesto con reStructuredText. Está disponible como código fuente reST vía github y en línea como HTML y PDF en http://www.qgis.org/en/docs/. También se pueden descargar versiones traducidas de este documento en varios formatos en el área de documentación del proyecto QGIS. Para mayor información sobre contribuir a este documento y acerca de la traducción, por favor visite http://www.qgis.org/wiki/.

Enlaces en este documento

Este documento contiene enlaces internos y externos. Pulsando un enlace interno navega dentro del documento, mientras que pulsando un enlace externo abre una dirección de Internet. En formato PDF, los enlaces internos y externos son mostrados en azul y son manejados por el navegador del sistema. En formato HTML, el navegador muestra y maneja ambos de manera idéntica.

Autores y Editores de las Guías de Usuario, Instalación y Programación:

Tara Athan	Radim Blazek	Godofredo Contreras	Otto Dassau	Martin Dobias
Peter Ersts	Anne Ghisla	Stephan Holl	N. Horning	Magnus Homann
Werner Macho	Carson J.Q. Farmer	Tyler Mitchell	K. Koy	Lars Luthman
Claudia A. Engel	Brendan Morely	David Willis	Jürgen E. Fischer	Marco Hugentobler
Larissa Junek	Diethard Jansen	Paolo Corti	Gavin Macaulay	Gary E. Sherman
Tim Sutton	Alex Bruy	Raymond Nijssen	Richard Duivenvoorde	Andreas Neumann
Astrid Emde	Yves Jacolin	Alexandre Neto	Andy Schmid	Hien Tran-Quang

Internet: http://www.qgis.org

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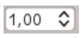
Convenciones

Esta sección describe los estilos homogéneos que se utilizarán a lo largo de este manual.

2.1 Convenciones de la Interfaz Gráfica o GUI

Las convenciones de estilo del GUI están destinadas a imitar la apariencia de la interfaz gráfica de usuario. En general, un estilo reflejará la apariencia simplificada, por lo que un usuario puede escanear visualmente el GUI para encontrar algo que se parece a lo mostrado en el manual.

- Menú Opciones: *Capa* → *Añadir capa ráster* o *Preferencias* → *Barra de Herramientas* → *Digitalizacion*
- Herramienta:  Añadir capa ráster
- Boton : **[Guardar como]**
- Título del Cuadro de Diálogo: *Propiedades de capa*
- Pestaña: *General*
- Selección:  *Renderizar*
- Botón de selección:  *Postgis SRID*  *EPSG ID*
- Seleccionar un número: 

- Seleccionar una cadena: 
- Buscar un archivo: 
- Seleccione un color: 

- Barra de desplazamiento: 
- Texto de Entrada: 

El sombreado muestra un componente de la interfaz que el usuario puede pulsar.

2.2 Convenciones de Texto o Teclado

Este manual también incluye estilos relacionadas con el texto, los comandos de teclado y codificación para indicar diferentes entidades, como las clases o métodos. Estos estilos no se corresponden con la apariencia real de cualquier texto o codificación dentro QGIS.

- Hiperenlaces: http://qgis.org
- Combinaciones de Teclas: Pulsar `Ctrl+B`, significa mantener pulsada la tecla Ctrl y pulsar la letra B.
- Nombre de un Archivo: `lakes.shp`

- Nombre de una Clase: **NewLayer**
- Método: *classFactory*
- Servidor: *myhost.de*
- Texto para el Usuario: `qgis --help`

Las líneas de código se muestran con una fuente de ancho fijo:

```
PROJCS["NAD_1927_Albers",
  GEOGCS["GCS_North_American_1927",
```

2.3 Instrucciones específicas de cada plataforma

Algunas secuencias GUI y pequeñas cantidades de texto pueden ser formateados en línea : Haga clic :menuselection: *Archivo* *QGIS → Salir para cerrar QGIS*. Esto indica que en Linux , Unix y plataformas Windows, debe hacer clic en el menú Archivo, y luego en Salir, mientras que en Macintosh OS X, debe hacer clic en el Menú QGIS primero, y luego en Salir.

Las cantidades mayores de texto se pueden formatear como listas:

- Hacer esto
- Hacer aquello
- Hacer otra cosa

o como párrafos:

Hacer esto y esto y esto. Entonces hacer esto y esto y esto, y esto y esto y esto, y esto y esto y esto.

Hacer eso. Entonces hacer eso y eso y eso, y eso y eso y eso y eso, y eso y eso y eso, y eso y eso y eso, y eso y eso y eso.

Las capturas de pantalls que aparecen a lo largo de la guía de usuario han sido creadas en diferentes plataformas; éstas se indicarán por el icono específico para cada una al final del pie de imagen.

.

CAPÍTULO 3

Prólogo

¡Bienvenido al maravilloso mundo de los Sistemas de Información Geográfica (SIG)!

QGIS es un Sistema de Información Geográfica de código abierto. El proyecto nació en mayo de 2002 y se estableció como un proyecto en SourceForge en junio del mismo año. Hemos trabajado duro para hacer que el software SIG (tradicionalmente software propietario caro) esté al alcance de cualquiera con acceso básico a un ordenador personal. QGIS actualmente funciona en la mayoría de plataformas Unix, Windows y OS X. QGIS se desarrolla usando el kit de herramientas Qt (http://qt.digia.com) y C++. Esto significa que QGIS es ligero y tiene una interfaz gráfica de usuario (GUI) agradable y fácil de usar.

QGIS pretende ser un SIG amigable, proporcionando funciones y características comunes. El objetivo inicial del proyecto era proporcionar un visor de datos SIG. QGIS ha alcanzado un punto en su evolución en el que está siendo usado por muchos para sus necesidades diarias de visualización de datos SIG. QGIS admite diversos formatos de datos ráster y vectoriales, pudiendo añadir nuevos formatos usando la arquitectura de complementos.

QGIS se distribuye bajo la Licencia Pública General GNU (GPL). El desarrollo de QGIS bajo esta licencia significa que se puede revisar y modificar el código fuente y garantiza que usted, nuestro feliz usuario, siempre tendrá acceso a un programa de SIG que es libre de costo y puede ser libremente modificado. Debería haber recibido una copia completa de la licencia con su copia de QGIS, y también podrá encontrarla en el Apéndice :ref:gpl_appendix.

Truco: Documentación al día

La última versión de este documento siempre se puede encontrar en el área de documentación de la web de QGIS en http://www.qgis.org/en/docs/.

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CAPÍTULO 4

Características

QGIS offers many common GIS functionalities provided by core features and plugins. A short summary of six general categories of features and plugins is presented below, followed by first insights into the integrated Python console.

4.1 Ver datos

You can view and overlay vector and raster data in different formats and projections without conversion to an internal or common format. Supported formats include:

- Spatially-enabled tables and views using PostGIS, SpatiaLite and MS SQL Spatial, Oracle Spatial, vector formats supported by the installed OGR library, including ESRI shapefiles, MapInfo, SDTS, GML and many more. See section *Trabajar con catos vectoriales*.
- Raster and imagery formats supported by the installed GDAL (Geospatial Data Abstraction Library) library, such as GeoTIFF, ERDAS IMG, ArcInfo ASCII GRID, JPEG, PNG and many more. See section *Trabajar con catos raster*.
- GRASS raster and vector data from GRASS databases (location/mapset). See section *GRASS GIS Integration*.
- Online spatial data served as OGC Web Services, including WMS, WMTS, WCS, WFS, and WFS-T. See section *Trabajar con datos OGC*.

4.2 Explorar datos y componer mapas

You can compose maps and interactively explore spatial data with a friendly GUI. The many helpful tools available in the GUI include:

- Explorador QGIS
- Reproyección al vuelo
- Gestor de Base de Datos
- Diseñador de mapas
- Panel de vista general
- Marcadores espaciales
- Herramientas de anotaciones
- Identify/select features
- Editar/ver/buscar atributos
- Data-defined feature labeling

- Data-defined vector and raster symbology tools
- Atlas map composition with graticule layers
- North arrow scale bar and copyright label for maps
- Support for saving and restoring projects

4.3 Crear, editar, gestionar y exportar datos

You can create, edit, manage and export vector and raster layers in several formats. QGIS offers the following:

- Digitizing tools for OGR-supported formats and GRASS vector layers
- Ability to create and edit shapefiles and GRASS vector layers
- Georeferencer plugin to geocode images
- GPS tools to import and export GPX format, and convert other GPS formats to GPX or down/upload directly to a GPS unit (On Linux, usb: has been added to list of GPS devices.)
- Support for visualizing and editing OpenStreetMap data
- Ability to create spatial database tables from shapefiles with DB Manager plugin
- Improved handling of spatial database tables
- Tools for managing vector attribute tables
- Option to save screenshots as georeferenced images

4.4 Analizar datos

You can perform spatial data analysis on spatial databases and other OGR- supported formats. QGIS currently offers vector analysis, sampling, geoprocessing, geometry and database management tools. You can also use the integrated GRASS tools, which include the complete GRASS functionality of more than 400 modules. (See section *GRASS GIS Integration*.) Or, you can work with the Processing Plugin, which provides a powerful geospatial analysis framework to call native and third-party algorithms from QGIS, such as GDAL, SAGA, GRASS, fTools and more. (See section *Introducción*.)

4.5 Publicar mapas en Internet

QGIS can be used as a WMS, WMTS, WMS-C or WFS and WFS-T client, and as a WMS, WCS or WFS server. (See section *Trabajar con datos OGC*.) Additionally, you can publish your data on the Internet using a webserver with UMN MapServer or GeoServer installed.

4.6 Extend QGIS functionality through plugins

QGIS can be adapted to your special needs with the extensible plugin architecture and libraries that can be used to create plugins. You can even create new applications with C++ or Python!

4.6.1 Complementos del Núcleo

Los complementos del núcleo incluyen:

1. Coordinate Capture (Capture mouse coordinates in different CRSs)
2. DB Manager (Exchange, edit and view layers and tables; execute SQL queries)

3. Diagram Overlay (Place diagrams on vector layers)
4. Dxf2Shp Converter (Convert DXF files to shapefiles)
5. eVIS (Visualizar eventos)
6. fTools (Analyze and manage vector data)
7. GDALTools (Integrate GDAL Tools into QGIS)
8. Georeferencer GDAL (Add projection information to rasters using GDAL)
9. Herramientas GPS (cargar e importar datos de GPS)
10. GRASS (integrar el SIG GRASS)
11. Heatmap (Generate raster heatmaps from point data)
12. Interpolation Plugin (Interpolate based on vertices of a vector layer)
13. Offline Editing (Allow offline editing and synchronizing with databases)
14. GeoRaster Espacial de Oracle
15. Procesamiento (antiguamente SEXTANTE)
16. Raster Terrain Analysis (Analyze raster-based terrain)
17. Road Graph Plugin (Analyze a shortest-path network)
18. Complemento de consulta espacial
19. SPIT (Import shapefiles to PostgreSQL/PostGIS)
20. SQL Anywhere Plugin (Store vector layers within a SQL Anywhere database)
21. Topology Checker (Find topological errors in vector layers)
22. Zonal Statistics Plugin (Calculate count, sum, and mean of a raster for each polygon of a vector layer)

4.6.2 Complementos externos de Python

QGIS offers a growing number of external Python plugins that are provided by the community. These plugins reside in the official Plugins Repository and can be easily installed using the Python Plugin Installer. See Section *El diálogo de complementos*.

4.7 Consola de Python

For scripting, it is possible to take advantage of an integrated Python console, which can be opened from menu: *Plugins* → *Python Console*. The console opens as a non-modal utility window. For interaction with the QGIS environment, there is the `qgis.utils.iface` variable, which is an instance of `QgsInterface`. This interface allows access to the map canvas, menus, toolbars and other parts of the QGIS application.

For further information about working with the Python console and programming QGIS plugins and applications, please refer to http://www.qgis.org/html/en/docs/pyqgis_developer_cookbook/index.html.

4.8 Problemas Conocidos

4.8.1 Limitación en el número de archivos abiertos

If you are opening a large QGIS project and you are sure that all layers are valid, but some layers are flagged as bad, you are probably faced with this issue. Linux (and other OSs, likewise) has a limit of opened files by process. Resource limits are per-process and inherited. The `ulimit` command, which is a shell built-in, changes the limits only for the current shell process; the new limit will be inherited by any child processes.

You can see all current ulimit info by typing

```
user@host:~$ ulimit -aS
```

You can see the current allowed number of opened files per proccess with the following command on a console

```
user@host:~$ ulimit -Sn
```

To change the limits for an **existing session**, you may be able to use something like

```
user@host:~$ ulimit -Sn #number_of_allowed_open_files
user@host:~$ ulimit -Sn
user@host:~$ qgis
```

To fix it forever

On most Linux systems, resource limits are set on login by the `pam_limits` module according to the settings contained in `/etc/security/limits.conf` or `/etc/security/limits.d/*.conf`. You should be able to edit those files if you have root privilege (also via sudo), but you will need to log in again before any changes take effect.

Más información:

http://www.cyberciti.biz/faq/linux-increase-the-maximum-number-of-open-files/ http://linuxaria.com/article/open-files-in-linux?lang=en

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Qué es lo nuevo en QGIS 2.6

Esta versión contiene nuevas características y se extiende la interfaz de programación con respecto a versiones anteriores. Le recomendamos que utilice esta versión sobre las versiones anteriores.

Esta versión incluye cientos de correcciones de errores y muchas nuevas características y mejoras que se describen en este manual. También puede revisar la lista de cambios visuales en http://changelog.linfiniti.com/qgis/version/2.6.0/.

5.1 Aplicación y Opciones del proyecto

- **Nombre de archivo del proyecto en propiedades**: Ahora puede ver la ruta completa para el archivo de proyecto de QGIS en el diálogo de propiedades del proyecto.

5.2 Proveedor de datos

- **Mejoras en la herramienta de Exportar DXF**:
  - Vista de árbol y la selección de atributos para la capa asignada en el diálogo
  - apoyo de llenado a polígonos/HATCH
  - representar textos como MTEXT en lugar de TEXT (incluyendo la fuente, inclinación y peso)
  - apoyo a los colores RGB cuando no hay coincidencia exacta del color
  - utilizar AutoCAD 2000 DXF (R15) en lugar de R12

5.3 Diseñador de impresión de Mapa

- **Actualizar extensión del lienzo del mapa desde la extensión del diseñador de mapa: En el artículo**
  propiedades de un elemento de mapa en la actualidad hay dos botones adicionales que le permiten (1) establece la extensión del lienzo de mapa de acuerdo con la extensión de su elemento y (2) la vista en vista del mapa, actualmente la extensión se establece en su elemento Mapa.
- **Múltiple soporte de red **: Ahora es posible tener más de una cuadrícula de su elemento de mapa. Cada red es totalmente personalizable y se puede asignar a un SRC distinto. Esto significa, por ejemplo, ahora se puede tener un diseño de mapa con cuadrícula tanto geográfica como proyectada.
- ** Exportación selectiva **: Para todos los elementos de su diseño de impresión de mapa, bajo Opciones de representación, puede excluir ese objeto de exportaciones de mapa.

5.4 Servidor QGIS

5.5 Simbología

5.6 Interfaz de Usuario

.

CAPÍTULO 6

Comenzar

Este capítulo da una vista general rápida sobre la instalación de QGIS, algunos datos de ejemplo de la web de QGIS y ejecutar una primera sesión sencilla visualizando capas ráster y vectoriales.

6.1 Instalación

La instalación de QGIS es muy sencilla. Hay disponibles paquetes de instalación estándar para MS Windows y Mac OS X. Se proporcionan paquetes binarios (rpm y deb) o repositorios de software para añadir a su gestor de paquetes para muchos sabores de GNU/Linux. Consiga la última información sobre paquetes binarios en la web de QGIS en http://download.qgis.org.

6.1.1 Instalación a partir de las fuentes

Si necesita compilar QGIS a partir de las fuentes, por favor consulte las instrucciones de instalación. Se distribuyen con el código fuente de QGIS en un archivo llamado `INSTALL`. También puede encontrarlas en línea en http://htmlpreview.github.io/?https://raw.github.com/qgis/QGIS/master/doc/INSTALL.html

6.1.2 Instalación en medios extraíbles

QGIS le permite definir una opción `--configpath` que suplanta la ruta predeterminada para la configuración de usuario (ej.: `~/.qgis2` bajo Linux) y fuerza a **QSettings** a usar ese directorio. Esto le permite, por ejemplo, llevar una instalación de QGIS en una memoria flash junto con todos los complementos y la configuración. Vea la sección *Menú Sistema* para información adicional.

6.2 Datos de ejemplo

La guía de usuario contiene ejemplos basados en el conjunto de datos de ejemplo de QGIS.

El instalador de Windows tiene una opción para descargar el conjunto de datos de muestra de QGIS. Si se marca, los datos se decargarán en su carpeta `Mis Documentos` y se colocarán en una carpeta llamada `GIS Database`. Puede usar el Explorador de Windows para mover esta carpeta a una ubicación adecuada. Si no marcó la casilla de verificación para instalar el conjunto de datos de muestra durante la instalación inicial de QGIS, puede hacer algo de lo siguiente:

- Usar datos SIG que ya tenga
- Descargar datos de muestra de http://download.osgeo.org/qgis/data/qgis_sample_data.zip
- Desinstalar QGIS y volver a instalarlo con la opción de descarga de datos marcada (sólo recomendado si las soluciones anteriores no funcionaron).

Para GNU/Linux y Mac OS X, aún no hay disponibles paquetes de instalación del conjunto de datos en forma de rpm, deb o dmg. Para usar el conjunto de datos de muestra descargue el archivo `qgis_sample_data` como un archivo ZIP de http://download.osgeo.org/qgis/data/qgis_sample_data.zip y descomprima el archivo en su equipo.

El conjunto de datos de Alaska incluye todos los datos SIG que se usan para los ejemplos y capturas de pantalla de la guía de usuario; también incluye una pequeña base de datos de GRASS. La proyección del conjunto de datos de QGIS es Alaska Albers Equal Area con unidades en pies. El código EPSG es 2964.

```
PROJCS["Albers Equal Area",
GEOGCS["NAD27",
DATUM["North_American_Datum_1927",
SPHEROID["Clarke 1866",6378206.4,294.978698213898,
AUTHORITY["EPSG","7008"]],
TOWGS84[-3,142,183,0,0,0,0],
AUTHORITY["EPSG","6267"]],
PRIMEM["Greenwich",0,
AUTHORITY["EPSG","8901"]],
UNIT["degree",0.0174532925199433,
AUTHORITY["EPSG","9108"]],
AUTHORITY["EPSG","4267"]],
PROJECTION["Albers_Conic_Equal_Area"],
PARAMETER["standard_parallel_1",55],
PARAMETER["standard_parallel_2",65],
PARAMETER["latitude_of_center",50],
PARAMETER["longitude_of_center",-154],
PARAMETER["false_easting",0],
PARAMETER["false_northing",0],
UNIT["us_survey_feet",0.3048006096012192]]
```

Si pretende usar QGIS como un visor gráfico para GRASS, puede encontrar una selección de localizaciones de ejemplo (ej.., Spearfish o Dakota de Sur) en la web oficial de GRASS GIS, http://grass.osgeo.org/download/sample-data/.

6.3 Sesión de ejemplo

Ahora que tiene QGIS instalado y un dispone de un conjunto de datos, nos gustaría mostrarle una sesión de muestra de QGIS corta y sencilla. Visualizaremos una capa ráster y otra vectorial. Usaremos la capa ráster `landcover`, `qgis_sample_data/raster/landcover.img` y la capa vectorial `lakes`, `qgis_sample_data/gml/lakes.gml`.

6.3.1 Iniciar QGIS

- Arranque QGIS tecleando "QGIS" en la línea de órdenes o si usa un binario precompilado, usando el menú Aplicaciones.
- Iniciar QGIS usando el menú Inicio o accesos directos en el escritorio o haciendo doble clic en un archivo de proyecto de QGIS.
- Hacer doble clic en el icono de su carpeta Aplicaciones.

6.3.2 Cargar capas ráster y vectoriales del conjunto de datos de ejemplo

1. Clic en el icono Cargar ráster.
2. Navegue a la carpeta `qgis_sample_data/raster/`, seleccione el archivo ERDAS IMG `landcover.img` y haga clic en **[Abrir]**.

3. Si el archivo no está en la lista, compruebe si el listado *Tipo de archivos* en la parte inferior del cuadro de diálogo se encuentra en el tipo correcto, en este caso "Erdas Imagine Images" (*.img, *.IMG)".
4. Ahora hacer clic en el icono Cargar vectorial.
5. *Archivo* debería estar seleccionado como *Tipo de origien* en el nuevo diálogo *Añadir capa vectorial*. Ahora haga clic en **[Explorar]** para seleccionar la capa vectorial.
6. Navegue en la carpeta `qgis_sample_data/gml/`, seleccione 'Geography Markup Language [GML] [OGR] (.gml,.GML)' de la lista *Tipo de archivos* , a continuación seleccione el archivo GML `lakes.gml` y haga clic **[Abrir]**. En el diálogo *Añadir capa vectorial*, haga clic **[Abrir]**. El diálogo *Selector del Sistema de Referencia de Coordenadas* se abrirá con *NAD27 / Alaska Alberts* seleccionado, haga clic **[Aceptar]**.
7. Acerque el zoom un poco a la zona que prefiera con algunos lagos.
8. Haga doble clic en la capa `lakes` en el panel Capas para abrir el diálogo *Propiedades*.
9. Clic en la pestaña *Estilo* y seleccionar un azul como color de relleno.
10. Haga clic en la pestaña *Etiquetas'y marque la casilla |checkbox| :guilabel:'Etiquetar esta capa con* para habilitar el etiquetado. Seleccione el campo "NAMES" como el campo que contiene las etiquetas.
11. Para mejorar la lectura de las etiquetas, puede añadir una zona blanca a su alrededor haciendo clic en "Margen" en la lista de la izquierda, marcando *Dibujar buffer de texto* y eligiendo 3 como tamaño de buffer.
12. Haga clik en **[Aplicar]**. Compruebe si el resultado le gusta y finalmente pulse **[Aceptar]**.

Puede ver lo fácil que es visualizar capas ráster y vectoriales en QGIS. Vayamos a las secciones que siguen para aprender más sobre las funcionalidades, características y configuración disponibles y cómo usarlas.

6.4 Iniciar y cerrar QGIS

En la sección *Sesión de ejemplo* ya aprendió como iniciar QGIS. Repetiremos esto aquí y verá que QGIS también proporciona otras opciones de línea de órdenes.

- Asumiendo que QGIS está instalado en el PATH, puede iniciar QGIS tecleando `qgis` en la consola o haciendo doble clic en el enlace (o acceso directo) a la aplicación QGIS en el escritorio o en el menú Aplicaciones.
- Iniciar QGIS usando el menú Inicio o accesos directos en el escritorio o haciendo doble clic en un archivo de proyecto de QGIS.
- Haga doble clic en el icono en su carpeta Aplicaciones. Si necesita iniciar QGIS en una consola, ejecute `/path-to-installation-executable/Contents/MacOS/Qgis`.

Para detener QGIS, haga clic en la opción de menú *Archivo* *QGIS* → *Salir*, o use use el atajo `Ctrl+Q`.

6.5 Opciones de la línea de órdenes

QGIS admite diversas opciones cuando se arranca desde la línea de órdenes. Para obteter una lista de las opciones, introduzca `qgis --help` en la línea de órdenes. La sentencia de uso para QGIS es:

```
qgis --help
QGIS - 2.6.0-Brighton 'Brighton' (exported)
QGIS is a user friendly Open Source Geographic Information System.
Usage: /usr/bin/qgis.bin [OPTION] [FILE]
OPTION:
      [--snapshot filename]   emit snapshot of loaded datasets to given file
      [--width width] width of snapshot to emit
```

```
      [--height height]       height of snapshot to emit
      [--lang language]       use language for interface text
      [--project projectfile] load the given QGIS project
      [--extent xmin,ymin,xmax,ymax]  set initial map extent
      [--nologo]      hide splash screen
      [--noplugins]   don't restore plugins on startup
      [--nocustomization]     don't apply GUI customization
      [--customizationfile]   use the given ini file as GUI customization
      [--optionspath path]    use the given QSettings path
      [--configpath path]     use the given path for all user configuration
      [--code path]   run the given python file on load
      [--defaultui]   start by resetting user ui settings to default
      [--help]                this text

FILE:
  Files specified on the command line can include rasters,
  vectors, and QGIS project files (.qgs):
   1. Rasters - supported formats include GeoTiff, DEM
      and others supported by GDAL
   2. Vectors - supported formats include ESRI Shapefiles
      and others supported by OGR and PostgreSQL layers using
      the PostGIS extension
```

Truco: Ejemplo usando argumentos de la línea de órdenes

Puede iniciar QGIS especificando uno o más archivos de datos en la línea de órdenes. Por ejemplo, asumiendo que está en el directorio `qgis_sample_data`, podría iniciar QGIS con una capa vectorial y un archivo ráster establecidos para que se carguen al inicio usando la siguiente orden: `qgis ./raster/landcover.img ./gml/lakes.gml`

Opción de la línea de órdenes `--snapshot`

Esta opción permite crear una captura de pantalla en formato PNG de la vista actual. Esto es práctico cuando tiene muchos proyectos y quiere generar capturas de pantalla de sus datos.

Actualmente genera un archivo PNG con 800x600 píxeles. Esto se puede ajustar usando los argumentos‘‘–width‘‘ y `--height` en la línea de órdenes. Se puede añadir un nombre de archivo después de `--snapshot`.

Opción de la línea de órdenes `--lang`

Basado en su configuración local, QGIS selecciona el idioma correcto. Si desea cambiar su idioma, puede especificar un código de idioma. Por ejemplo, `--lang=it` inicia QGIS en una localización italiana. En http://hub.qgis.org/wiki/quantum-gis/GUI_Translation_Progress se proporciona una lista de los idiomas actualmente soportados con el código de idioma y su estado.

Opción de la línea de órdenes `--project`

También es posible iniciar QGIS con un archivo de proyecto existente. Solamente agregue la opción `--project` a la línea de comando, seguida por el nombre de su proyecto y QGIS se abrirá con todas las capas del archivo indicado cargadas.

Opción de la línea de órdenes `--extent`

Use esta opción para iniciar con una extensión de mapa específica. Necesita añadir el cuadro delimitador de su extensión en el siguiente orden, separado por una coma:

```
--extent xmin,ymin,xmax,ymax
```

Opción de la línea de órdenes `--nologo`

Este argumento de línea de órdenes oculta la pantalla de bienvenida cuando inicia QGIS.

Opción de la línea de órdenes `--noplugins`

Si tiene problemas con los complementos al iniciar, puede evitar cargarlos con ésta opción. Estarán aún disponibles después en el administrador de complementos.

Opciónde la línea de órdenes `--customizationfile`

Utilizando este argumento de línea de órdenes puede definir un archivo de personalizacion de la GUI, que se utilizará al iniciar.

Opción de la línea de órdenes `--nocustomization`

Utilizando este argumento de línea de órdenes no se aplicará la personalización existente de la GUI.

Opción de la línea de órdenes `--optionspath`

Puede tener varias configuraciones y decidir cual utilizar al iniciar QGIS con esta opción. Véase *Opciones* para confirmar donde almacena los archivos de configuración el sistema operativo. Actualmente, no hay forma de especificar un archivo para escribir la configuración; por lo tanto puede crear una copia del archivo de configuración original y cambiarle el nombre. La opción especifica la ruta al directorio con los ajustes. Por ejemplo, para utilizar el archivo de configuración /path/to/config/QGIS/QGIS2.ini , use la opción.

```
--optionspath /path/to/config/
```

Opción de la línea de órdenes `--configpath`

Esta opción es similar al anterior, pero además anula la ruta predeterminada para la configuración del usuario (`~/.qgis2`) y fuerza **QSettings** para usar también este directorio. Esto permite a los usuarios, por ejemplo, llevar la instalación de QGIS en una unidad flash junto con todos los complementos y configuraciones.

Opción de línea de comandos `--código`

Esta opción se puede utilizar para ejecutar un archivo python dado directamente después de que QGIS ha iniciado.

Por ejemplo, cuando se tiene un archivo python llamado `load_alaska.py` con el siguiente contenido:

```
from qgis.utils import iface
raster_file = "/home/gisadmin/Documents/qgis_sample_data/raster/landcover.img"
layer_name = "Alaska"
iface.addRasterLayer(raster_file, layer_name)
```

Suponiendo que esta en el directorio donde el archivo `load_alaska.py` se encuentra, puede iniciar QGIS, cargue el archivo raster `landcover.img` y de a la capa el nombre 'Alaska' utilizando el siguiente comando: `qgis --code load_alaska.py`

6.6 Proyectos

El estado de su sesión de QGIS es considerado un proyecto. QGIS trabaja en un proyecto cada vez. La configuración está considerada por proyecto o como predeterminada para nuevos proyectos (ver sección *Opciones*). QGIS puede guardar el estado de su espacio de trabajo dentro de un archivo de proyecto, usando las opciones de menú *Proyecto* → *Guardar* o *Proyecto* → *Guardar como...*.

Cargar los proyectos guardados en una sesión de QGIS usando *Proyecto*→ *Abrir...*, *Proyecto* → *Nuevo a partir de plantilla* o *Proyecto* → *Abrir reciente* →.

Si desea limpiar su sesión e iniciar una fresca, seleccione *Proyecto* → *Nuevo*. Cualquiera de estas opciones le pedirá que guarde el proyecto existente si se han hecho cambios desde que se abrió o se guardó por última vez.

El tipo de información guardada en el archivo de proyecto incluye:

- Las capas añadidas
- Las propiedades de las capas, incluyendo la simbolización
- Proyección de la vista del mapa
- Última extensión vista

El archivo del proyecto se guarda en formato XML, así es posible editarlo fuera de QGIS, si sabe lo que está haciendo. El formato del archivo ha sido actualizado varias veces comparado con otras versiones de QGIS. Los archivos de proyecto de versiones anteriores puede que ya no funcionen correctamente. Para estar al tanto de esto, en la pestaña *General* bajo *Configuración* → *Opciones* se puede seleccionar:

- *Preguntar si guardar cambios en el proyecto y la fuente de datos cuando sea necesario*
- *Avisar al abrir un proyecto guardado con una versión anterior de QGIS*

Siempre que guarde un proyecto en QGIS 2.2, ahora se hace una copia de seguridad del proyecto.

6.7 Salida

Hay muchas maneras de generar una salida desde su sesión QGIS. Ya hemos presentado una en la sección *Proyectos*, guardando como un archivo de proyecto. Aquí hay una muestra de otras formas de producir archivos de salida:

- La opción de menú *Proyecto* → Guardar como imagen abre un diálogo de archivo en el que seleccionar el nombre, ruta y tipo de imagen (formato PNG o JPG). Un archivo world con extensión PNGW o JPGW guardado en la misma carpeta almacenará la referencia espacial de la imagen.
- La opción de menú *Proyecto* → *Exportar a DXF...* abre un diálogo en donde puede definir el 'Modo de simbologia', la 'Escala de simbología' y las capas vectoriales que desea exportar a formato DXF.
- La opción del menú: menuselection:*Proyecto –>* *Nuevo diseñador de impresión* abre un nuevo diálogo en donde puede diseñar e imprimir el lienzo de mapa actual (vea sección *Diseñadores de impresión*).

.

QGIS GUI

Cuando QGIS inicia, se le presenta la interfaz gráfica de usuario, como se muestra en la figura (los números del 1 al 5 en círculos amarillos se analiza más adelante).

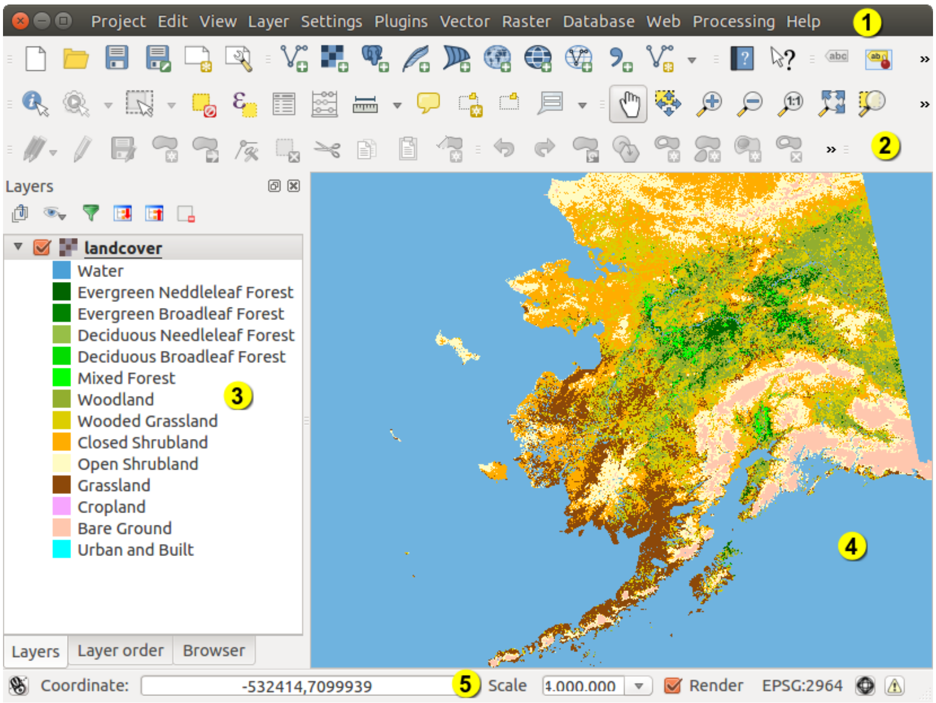

Figura 7.1: QGIS GUI con datos de ejemplo de Alaska

Nota: Las decoraciones de las ventanas (barra de título, etc.) pueden ser distintas dependiendo de su sistema operativo y su gestor de ventanas.

La GUI QGIS se divide en cinco zonas:

1. Barra de Menú
2. Barra de Herramientas
3. Leyenda del mapa
4. Vista del mapa
5. Barra de Estado

Estos cinco componentes de la interfaz de QGIS se describen con más detalle en la siguiente sección. Dos secciones más presentan atajos de teclado y ayuda contextual.

7.1 Barra de Menú

La barra de menú permite el acceso a varias características de QGIS mediante un menú jerárquico estándar. Los menús de nivel superior y un resumen de algunas opciones de menú se enumeran a continuación, junto con los iconos asociados a medida que aparecen en la barra de herramientas, y los atajos de teclado. Los atajos de teclado presentados en esta sección son los predeterminados; sin embargo, los atajos de teclado también se pueden configurar manualmente utilizando el diálogo *Configurar atajos del teclado*, abrir desde *Configuración* → *Configurar atajos de teclado...*.

Aunque la mayoría de las opciones tiene una herramienta correspondiente y viceversa, los menús no están organizados exactamente como las barras de herramientas. La barra de herramientas que contiene la herramienta esta listada después de cada opción de menú como una entrada de casilla de verificación. Algunas opciones de menú sólo aparecen si se carga el complemento correspondiente. Para obtener más información acerca de herramientas y barra de herramientas, ver la sección *Barra de herramietas*.

7.1.1 Proyecto

Menú Opción	Atajos	Referencia	Barra de herramietas
Nuevo	`Ctrl+N`	ver *Proyectos*	*Proyecto*
Abrir	`Ctrl+O`	ver *Proyectos*	*Proyecto*
Nuevo a partir de plantilla →		ver *Proyectos*	*Proyecto*
Abrir recientes →		ver *Proyectos*	
Guardar	`Ctrl+S`	ver *Proyectos*	*Proyecto*
Guardar como...	`Ctrl+Shift+S`	ver *Proyectos*	*Proyecto*
Guardar como imagen...		ver *Salida*	
Exportar DXF ...		ver *Salida*	
Nuevo diseñador de impresión	`Ctrl+P`	ver *Diseñadores de impresión*	*Proyecto*
Administrador de diseñadores ...		ver *Diseñadores de impresión*	*Proyecto*
Diseñadores de impresión →		ver *Diseñadores de impresión*	
Salir de QGIS	`Ctrl+Q`		

7.1.2 Editar

Menú Opción	Atajos	Referencia	Barra de herramietas
Deshacer	`Ctrl+Z`	ver *Advanced digitizing*	*Digitalización Avanzada*
Rehacer	`Ctrl+Shift+Z`	ver *Advanced digitizing*	*Digitalización Avanzada*
Cortar objetos espaciales	`Ctrl+X`	ver *Digitizing an existing layer*	*Digitalización*
Copiar objetos espaciales	`Ctrl+C`	ver *Digitizing an existing layer*	*Digitalización*
Pegar objetos espaciales	`Ctrl+V`	ver *Digitizing an existing layer*	*Digitalización*
Pegar objetos espaciales como →		ver *Working with the Attribute Table*	
Añadir objetos espaciales	`Ctrl+.`	ver *Digitizing an existing layer*	*Digitalización*
Mover objeto(s) espaciales		ver *Digitizing an existing layer*	*Digitalización*
Borrar seleccionados		ver *Digitizing an existing layer*	*Digitalización*
Girar objetos espacial(es)		ver *Advanced digitizing*	*Digitalización Avanzada*
Simplificar objeto espacial		ver *Advanced digitizing*	*Digitalización Avanzada*
Añadir anillo		ver *Advanced digitizing*	*Digitalización Avanzada*
Añadir parte		ver *Advanced digitizing*	*Digitalización Avanzada*
Rellenar anillo		ver *Advanced digitizing*	*Digitalización Avanzada*
Borrar anillo		ver *Advanced digitizing*	*Digitalización Avanzada*
Borrar parte		ver *Advanced digitizing*	*Digitalización Avanzada*
Remodelar objetos espaciales		ver *Advanced digitizing*	*Digitalización Avanzada*
Desplazar curva		ver *Advanced digitizing*	*Digitalización Avanzada*
Dividir objetos espaciales		ver *Advanced digitizing*	*Digitalización Avanzada*
Dividir partes		ver *Advanced digitizing*	*Digitalización Avanzada*
Combinar objetos espaciales seleccionados		ver *Advanced digitizing*	*Digitalización Avanzada*
Combinar los atributos de los objetos espaciales seleccionados		ver *Advanced digitizing*	*Digitalización Avanzada*
Herramienta de nodos		ver *Digitizing an existing layer*	*Digitalización*

Después de activar el modo Conmutar edición de una capa, encontrará el icono `Añadir objeto espacial` en el menú *Edición* dependiendo del tipo de capa (punto, línea o polígono).

7.1.3 Edición (extra)

Menú Opción	Atajos	Referencia	Barra de herramietas
Añadir objetos espaciales		ver *Digitizing an existing layer*	*Digitalización*
Añadir objeto espacial		ver *Digitizing an existing layer*	*Digitalización*
Añadir objeto espacial		ver *Digitizing an existing layer*	*Digitalización*

7.1.4 Ver

Menú Opción	Atajos	Referencia	Barra de herramietas
Desplazar mapa			*Navegación de mapas*
Desplazar mapa a la selección			*Navegación de mapas*
Acercar zum	`Ctrl++`		*Navegación de mapas*
Alejar zum	`Ctrl+-`		*Navegación de mapas*
Seleccionar →		ver *Seleccionar y deseleccionar objetos espaciales*	*Atributos*
Identificar objetos espaciales	`Ctrl+Shift+I`		*Atributos*
Medir →		ver *Mediciones*	*Atributos*
Zum General	`Ctrl+Shift+F`		*Navegación de mapas*
Zum a la capa			*Navegación de mapas*
Zum a la selección	`Ctrl+J`		*Navegación de mapas*
Zum anterior			*Navegación de mapas*
Zum siguiente			*Navegación de mapas*
Zum al tamaño real			*Navegación de mapas*
Ilustraciones →		ver *Elementos decorativos*	
Avisos del mapa			*Atributos*
Nuevo marcador	`Ctrl+B`	ver *Marcadores espaciales*	*Atributos*
Mostrar marcadores	`Ctrl+Shift+B`	ver *Marcadores espaciales*	*Atributos*
Actualizar	`Ctrl+R`		*Navegación de mapas*

7.1.5 Capa

Menú Opción	Atajos	Referencia	Bar
Nueva→		ver *Creating new Vector layers*	*Adn*
Empotrar capas y grupos ...		ver *Anidar proyectos*	
Añadir capa vectorial	`Ctrl+Shift+V`	ver *Trabajar con catos vectoriales*	*Adn*
Añadir capa ráster	`Ctrl+Shift+R`	ver *Loading raster data in QGIS*	*Adn*
Añadir capa PostGIS	`Ctrl+Shift+D`	ver *PostGIS Layers*	*Adn*
Añadir capa SpatiaLite	`Ctrl+Shift+L`	ver *SpatiaLite Layers*	*Adn*
Añadir capa MSSQL Spatial	`Ctrl+Shift+M`	ver *MSSQL Spatial Layers*	*Adn*
Añadir capa GeoRaster de Oracle GeoRaster		ver *Complemento GeoRaster espacial de Oracle*	*Adn*
Añadir capa SQL Anywhere		ver *Complemento SQL Anywhere*	*Adn*
Añadir capa WMS/WMTS	`Ctrl+Shift+W`	ver *Cliente WMS/WMTS*	*Adn*
Añadir capa WCS		ver *WCT Cliente*	*Adn*
Añadir capa WFS		ver *Cliente WFS y WFS-T*	*Adn*
Añadir capa de texto delimitado		ver *Delimited Text Files*	*Adn*
Copiar estilo		ver *Style Menu*	
Pegar estilo		ver *Style Menu*	
Abrir Tabla de atributos		ver *Working with the Attribute Table*	*Atri*
Conmutar edición		ver *Digitizing an existing layer*	*Dig*
Guardar cambios de la capa		ver *Digitizing an existing layer*	*Dig*
Ediciones actuales →		ver *Digitizing an existing layer*	*Dig*
Guardar como...			
Guardar selección como archivo vectorial...		Ver *Working with the Attribute Table*	
Eliminar capa(s)	`Ctrl+D`		
Duplicar capa(s)			
Establecer el SRC de la capa(s)	`Ctrl+Shift+C`		
Establecer SRC del proyecto a partir de capa			
Propiedades			
Consulta...			
Etiquetado			
Añadir a la vista general	`Ctrl+Shift+O`		*Adn*
Añadir todo a la vista general			
Eliminar todo de la vista general			
Mostrar todas las capas	`Ctrl+Shift+U`		*Adn*
Ocultar todas las capas	`Ctrl+Shift+H`		*Adn*

7.1.6 Configuración

Menú Opción	Atajos	Referencia	Barra de herramietas
Paneles →		ver *Paneles y Barras de Herramientas*	
Barras de herramientas→		ver *Paneles y Barras de Herramientas*	
Alternar el modo de pantalla completa	`F 11`		
Propiedades del proyecto...	`Ctrl+Shift+P`	ver *Proyectos*	
SRC Personalizado ...		ver *Custom Coordinate Reference System*	
Administrador de estilos...		ver *Presentation*	
Configurar atajos de teclado ...			
Personalización ...		ver *Personalización*	
Opciones ...		ver *Opciones*	
Opciones de autoensamblado ...			

7.1.7 Complementos

Menú Opción	Atajos	Referencia	Barra de herramietas
Administrar e instalar complementos		ver *El diálogo de complementos*	
Consola de Python			

Cuando inicie QGIS por primera vez no se cargan todos los complementos básicos.

7.1.8 Vectorial

Menú Opción	Atajos	Referencia	Barra de herramietas
menuselection:*Open Street Map –>*		ver *Loading OpenStreetMap Vectors*	
Herramientas de análisis →		ver *Complemento fTools*	
Herramientas de investigación →		ver *Complemento fTools*	
Herramientas de Geoproceso →		ver *Complemento fTools*	
Herramientas de geometría →		ver *Complemento fTools*	
Herramientas de gestión de datos →		ver *Complemento fTools*	

Cuando inicie QGIS por primera vez no se cargan todos los complementos básicos.

7.1.9 Ráster

Menú Opción	Atajos	Referencia	Barra de herramietas
Calculadora ráster...		ver *Calculadora Ráster*	

Cuando inicie QGIS por primera vez no se cargan todos los complementos básicos.

7.1.10 Procesado

Menú Opción	Atajos	Referencia	Barra de herramietas
Caja de herramientas de procesado		ver *The toolbox*	
Modelador gráfico		ver *&Modelador gráfico...*	
Historial y registro		ver *El administrador del historial*	
Opciones y configuración		ver *Configurar el entorno de trabajo de procesamiento*	
Visor de resultados		ver *Configurar aplicaciones externas*	
Comandos	`Ctrl+Alt+M`	ver *Los Comandos QGIS*	

Cuando inicie QGIS por primera vez no se cargan todos los complementos básicos.

7.1.11 Ayuda

Menú Opción	Atajos	Referencia	Barra de herramietas
Contenido de la ayuda	`F1`		*Ayuda*
¿Qué es esto?	`Shift+F1`		*Ayuda*
Documentación de la API			
¿Necesita soporte comercial?			
Página web de QGIS	`Ctrl+H`		
Comprobar versión de QGIS			
Acerca de			
Patrocinadores de QGIS			

Tenga en cuenta que para Linux, los elementos de la barra de menú mencionados anteriormente están de manera predeterminada en la ventada de administrador KDE. En GNOME, el menú *Configuración* tiene diferente contenido y los elementos que se encuentran aquí:

Propiedades del proyecto	*Proyecto*
Opciones	*Editar*
Configurar teclas de atajo	*Editar*
Administrador de estilos	*Editar*
SRC personalizado	*Editar*
Paneles →	*Ver*
Barras de herramientas→	*Ver*
Alternar el modo de pantalla completa	*Ver*
Escala de tesela	*Ver*
Seguimiento GPS en vivo	*Ver*

7.2 Barra de herramietas

La barra de herramientas proporciona acceso a la mayoría de las mismas funciones como las de los menús, y herramientas adicionales para interactuar con el mapa. Cada elemento de la barra de herramientas tiene ayuda emergente disponible. Mantenga el puntero del ratón sobre el elemento y una breve descripción del propósito de la herramienta se mostrará.

Cada barra de menú se puede mover de acuerdo a sus necesidades. Además cada barra de menú se puede apagar utilizando el menú contextual del botón derecho del ratón, sosteniendo el ratón sobre la barra de herramientas (leer también *Paneles y Barras de Herramientas*).

Truco: Restauración de barras de herramientas

Si ha ocultado accidentalmente todas las barras de herramientas, puede recuperarlos eligiendo la opción del menú *Configuración* → *Barra de herramientas* →. Si una barra de herramientas desaparece bajo Windows, que parece ser un problema en QGIS de vez en cuando, tiene que quitar la clave `\HKEY_CURRENT_USER\Software\QGIS\qgis\UI\state` en el registro. Cuando reinicie QGIS, la clave se escribirá de nuevo con el estado por defecto y todas las barras de herramientas serán visibles de nuevo.

7.3 Leyenda del mapa

La zona de la leyenda del mapa registra todas las capas en el proyecto. La casilla de verificación de cada entrada de leyenda se puede utilizar para mostrar u ocultar la capa. La barra de herramientas de leyenda en la leyenda del mapa esta lista le permite **Añadir grupo**, **Manejo de visibilidad de la capa** de todas las capas o manejo de combinación de capas predefinidas, **Filtrar leyenda por contenido de mapa**, **Expandir todo** o **Comprimir todo** y **Eliminar capa de grupo**. El botón le permite añadir vistas **Preestablecidos** en la leyenda. Esto significa que puede elegir por mostrar alguna capa con categorización específica y añadir esta vista a la lista de **Preestablecidos**. Para añadir una vista preestablecida simplemente haga clic en , elija *Añadir preestablecido...* desde el menú desplegable y de un nombre al preestablecido. Después verá una lista con todos los preestablecidos que puede llamar pulsando el botón .

Todos los preestablecidos añadidos están presentes en el diseño de impresión con el fin de permitirle crear un diseño de mapa en base a sus puntos de vista específicos (ver *Propiedades principales*).

Una capa se puede seleccionar y arrastrar hacia arriba o hacia abajo en la leyenda para cambiar el orden. El orden-z significa que las capas enlistadas más cerca de la parte superior de la leyenda son dibujadas sobre las capas que figuran más abajo en la leyenda.

Nota: Este funcionamiento puede ser anulado por el panel 'Orden de la capa'

Las capas en la ventana de leyenda se pueden organizar en grupos. Hay dos formas de hacer esto:

1. Pulse el icono para añadir un nuevo grupo. Escriba un nombre para el grupo y pulse `Enter`. Ahora haga clic en una capa existente y arrástrelo al grupo.
2. Seleccionar algunas capas, al hacer clic derecho en la ventana de la leyenda y elegir *Grupo Seleccionado*. Las capas seleccionadas serán colocadas automáticamente en un nuevo grupo.

Para llevar una capa fuera de un grupo, puede arrastrar hacia afuera , o haga clic derecho sobre él y elija *Subir elemento al nivel superior*.

La casilla de verificación para un grupo mostrará u ocultará todas las capas en el grupo al hacer clic.

El contenido del menú contextual del botón derecho depende si el elemento de leyenda seleccionada es un ráster o una capa vectorial. Para las capas vectoriales de GRASS , Botón de edición no está disponible. Vea la sección *Digitizing and editing a GRASS vector layer* para obtener información sobre la edición de capas vectoriales de GRASS.

El menú del boton derecho del raton para capas ráster

- *Zum a la extensión de la capa*
- *Mostrar en la vista general*
- *Zum a la mejor escala (100 %)*

- *Extender utilizando extensión actual*
- *Eliminar*
- *Duplicar*
- *Establecer escala de visibilidad de la capa*
- *Establecer SRC de la capa*
- *Establecer SRC del proyecto a partir de capa*
- *Guardar como ...*
- *Guardar como Estilo de definición de capa*
- *Propiedades*
- *Cambiar nombre*
- *Copiar estilo*

Además, de acuerdo con la posición y la selección de la capa

- *Subir el elemento al nivel superior*
- *Grupo seleccionado*

Menú del botón derecho del ratón para las capas vectoriales

- *Zum a la extensión de la capa*
- *Mostrar en la vista general*
- *Eliminar*
- *Duplicar*
- *Establecer escala de visibilidad de la capa*
- *Establecer SRC de la capa*
- *Establecer SRC del proyecto a partir de capa*
- *Abrir tabla de atributos*
- *Conmutar edición* (no disponible para capas GRASS)
- *Guardar como ...*
- *Guardar como Estilo de definición de capa*
- *Filtrar*
- *Mostrar el conteo de objetos espaciales*
- *Propiedades*
- *Cambiar nombre*
- *Copiar estilo*

Además, de acuerdo con la posición y la selección de la capa

- *Subir el elemento al nivel superior*
- *Grupo seleccionado*

Menú del botón derecho del ratón para grupo de capas

- *Zum al grupo*
- *Eliminar*
- *Establecer SRC del grupo*
- *Cambiar nombre*

- *Añadir grupo*

Es posible seleccionar mas de una capa o grupo al mismo tiempo manteniendo presionada la tecla `Ctrl` mientras selecciona las capas con el botón izquierdo del ratón. Después puede mover todas las capas a un nuevo grupo al mismo tiempo.

También puede eliminar más de una capa o un grupo a la vez seleccionando varias capas con la tecla `Ctrl` y presionando `Ctrl+D` después. De esta manera, todas las capas o grupos seleccionados será eliminado de la lista de capas.

7.3.1 Trabajar con el orden de la leyenda de la capa independiente

Hay un panel que le permite definir un orden dibujo independiente para la leyenda del mapa. Puede activarlo en el menú *Configuración*→ *Paneles* → *Orden de Capas*. Esta característica le permite, por ejemplo, ordenar sus capas en orden de importancia, pero aún mostrarlas en el orden correcto (ver figure_layer_order) . Comprobación de la caja *Orden de control del renderizado* debajo de la lista de capas causará una reversión en el comportamiento predeterminado .

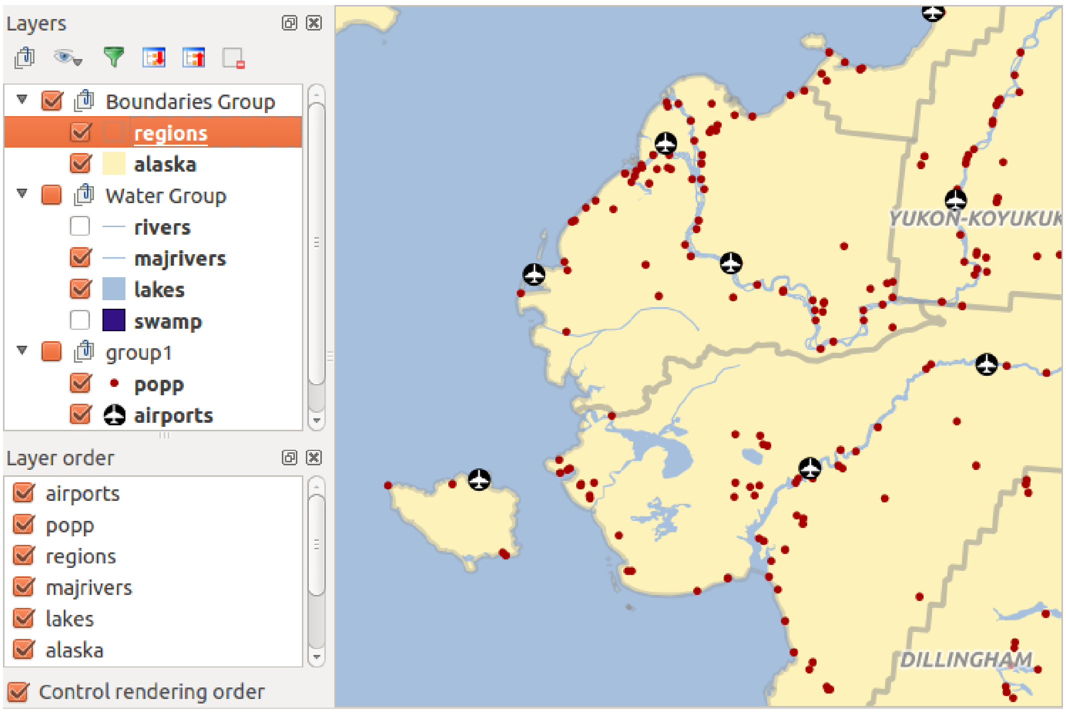

Figura 7.2: Definir el orden de la leyenda de una capa independiente

7.4 Vista del mapa

Este es el "final del negocio" de QGIS — ¡los mapas son desplegados en esta zona! El mapa que se muestra en esta ventana dependerá de las capas vectoriales y ráster que ha elegido cargar (ver secciones siguientes para obtener más información sobre cómo cargar capas). La vista del mapa se puede desplazar, cambiar el enfoque de la pantalla del mapa a otra región, y que se puede hacer zum dentro y fuera. Varias otras operaciones se pueden realizar en el mapa como esta descrito en la descripción de la barra de herramientas anteriormente. La vista del mapa y la leyenda están estrechamente vinculados entre sí — los mapas en vista reflejan los cambios que realice en el área de leyenda .

Truco: Zum al mapa con la rueda del ratón

Puede utilizar la rueda del ratón para acercar y alejar zum en el mapa. Coloque el cursor del ratón dentro del mapa y gire la rueda hacia adelante (hacia la derecha) para acercar y hacia atrás (hacia usted) para alejarlo. El zum se centra en la posición del cursor del ratón. Puede personalizar el comportamiento del zum de la rueda del ratón usando la pestaña *Herramientas del mapa* bajo el menú *Configuración→ Opciones*

Truco: Desplazar el mapa con las teclas de dirección y barra de espaciadora

Puede utilizar las teclas de flechas para desplazar el mapa. Coloque el cursor dentro del mapa y haga clic en la tecla de flecha a la derecha para desplazarse al este, tecla de flecha izquierda para el oeste, flecha arriba para el norte y flecha abajo al sur. Puede también desplazar el mapa utilizando la barra espaciadora o al hacer clic en la rueda del ratón: basta con mover el ratón mientras mantiene pulsada la barra espaciadora o haga clic en la rueda del ratón.

7.5 Barra de Estado

La barra de estado muestra la posición actual en coordenadas de mapa (por ejemplo, metros o grados decimales) como el puntero del ratón se mueve a través de la vista del mapa. A la izquierda de la pantalla de coordenadas en la barra de estado es un botón pequeño que alterna entre mostrar la posición en coordenadas y la extensión del la vista del mapa como como desplazar, acercar y alejar zum.

Junto a la visualización de coordenadas se encuentra la visualización de la escala. Este muestra la escala de la vista del mapa. Si acercar o alejar zum, QGIS muestra la escala actual. Hay un selector de escala, lo que le permite elegir entre las escalas predefinidas de 1:500 a 1:1000000.

Una barra de progreso en la barra de estado muestra el progreso de representación, ya que cada capa se dibuja a la vista del mapa. En algunos casos, como en la recopilación de estadísticas en capas ráster, la barra de progreso se utiliza para mostrar el estado de las operaciones largas.

S un nuevo complemento o una actualizacion de complemento disponible, verá un mensaje en el extremo izquierdo de la barra de estado. En el lado derecho de la barra de estado, hay una pequeña casilla de verificación que se puede utilizar para evitar temporalmente capas siendo represtados a la vista del mapa (ver sección *Renderizado* abajo). El icono detiene inmediatamente el proceso de representación del mapa actual.

A la derecha de las funciones de representación, vera el código EPSG de la actual proyección SRC y un icono de proyector. Haga clic en este para abrir las propiedades de proyección del actual proyecto.

Truco: Calcular la escala correcta de su lienzo de mapa

Al iniciar QGIS, las unidades predeterminadas son grados, y eso significa que QGIS interpretará cualquier coordenada en su capa como se especifica en grados. Para obtener valores de escala correctos, puede cambiar esta configuración a metros manualmente en la pestaña *General* bajo el menú *Configuración → Propiedades del Proyecto*, o puede seleccionar un proyecto SRC al hacer clic sobre el el icono Estado SRC en la esquina inferior derecha de la barra de estado. En el último caso, las unidades se establecen en lo que está previsto por la proyección del proyecto (por ejemplo , '+unidades=m').

.

Herramientas generales

8.1 Teclas de acceso rápido

QGIS proporciona atajos de teclado predeterminados para muchas características. Puede encontrarlos en la sección *Barra de Menú*. Además, la opción de menú *Configuración* → *Configurar atajos de teclado...* permite cambiar los atajos de teclado predeterminados y agregar otros nuevos a las características de QGIS .

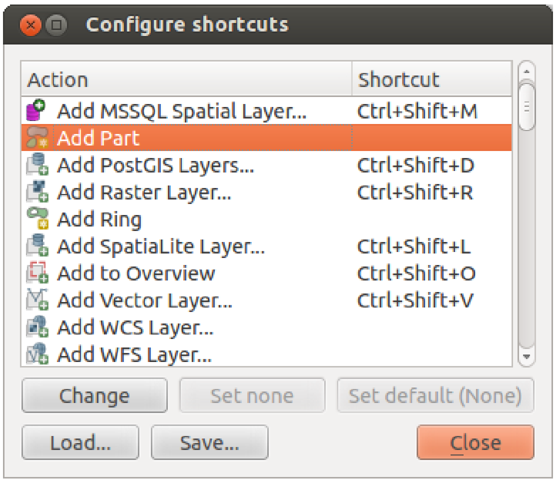

Figura 8.1: Definir opciones de atajos (Gnome)

La configuración es muy simple. Solo seleccione una entidad de la lista y haga clic en **[Cambiar]**, **[Establecer a ninguno]** o **[Establecer predeterminado]**. Una vez finalizada la configuración, se puede guardar como un archivo XML y cargarlo en otra instalación de QGIS.

8.2 Ayuda de contexto

Cuando necesite ayuda sobre un tema especifico, puede acceder a la ayuda de contexto mediante el botón **[Ayuda]** disponible en la mayoría de diálogos – tenga en cuenta que los complementos de terceros pueden apuntar a paginas web dedicadas.

8.3 Renderizado

Por omisión, QGIS representa todas las capas visibles siempre que se actualiza la vista del mapa. Los eventos que desencadena una actualización de la vista del mapa incluyen:

- Añadir una capa
- Desplazar o hacer zoom
- Redimensionar la ventana de QGIS
- Cambiar la visibilidad de una o varias capas

QGIS permite controlar el proceso de renderizado de diversas formas.

8.3.1 Renderizado dependiente de la escala

El renderizado dependiente de la escala le permite especificar las escalas mínima y máxima a las que una capa será visible. Para establecer el renderizado dependiente de la escala, abra el diálogo *Propiedades* mediante doble clic en una capa en el panel Capas. En la pestaña *General*, haga clic en la casilla ☑ *Visibilidad dependiente de la escala* para activar la característica, luego establezca los valores mínimo y máximo de escala.

Puede determinar los valores de escala haciendo zum primero al nivel que quiera usar y anotanto el valor de escala en la barra de estado de QGIS.

8.3.2 Controlar el renderizado del mapa

El renderizado del mapa se puede controlar de varias formas, como se describe a continuación.

Suspender el renderizado

Para suspender el renderizado, haga clic en la casilla ☑ *Representar* en la esquina inferior derecha de la barra de estado. Cuando la casilla ☑ *Representar* no está marcada, QGIS no redibuja el lienzo en respuesta a cualquiera de los eventos descritos en la sección *Renderizado*. Ejemplos de cuándo puede querer suspender la representación incluyen:

- Añadir muchas capas y simbolizarlas antes de dibujar
- Añadir una o más capas grandes y establecer la dependencia de escala antes de dibujar
- Añadir una o más capas grandes y hacer zoom a una vista específica antes de dibujar
- Cualquier combinación de la anteriores

Marcar la casilla ☑ *Renderizar* habilita el renderizado y origina un refresco inmediato del lienzo del mapa.

Configurar la opción de añadir una capa

Puede establecer una opción para cargar siempre las nuevas capas sin dibujarlas. Esto significa que las capas se añadirán al mapa pero su casilla de visibilidad en el panel Capas no estará marcada de forma predeterminada. Para establecer esta opción, seleccione la opción de menú *Configuración* → *Opciones* y haga clic en la pestaña *Representación*. Desmarque la casilla ☑ *Por omisión, las nuevas capas añadidas al mapa se deben visualizar*. Cualquier capa añadida posteriormente al mapa estará desactivada (invisible) por omisión.

Detener el renderizado

Para detener el dibujado del mapa, presione la tecla `ESC`. Esto detendrá el refresco del lienzo del mapa y dejará el mapa parcialmente dibujado. Puede que tarde un poco desde que se presiona la tecla `ESC` hasta que se detenga el dibujado del mapa.

Nota: Actualmente no es posible detener la representación — esto se desactivó en el paso a Qt4 debido a problemas y cuelgues de la Interfaz de Usuario (IU).

Actualizar la visualización del mapa durante el renderizado

Se puede establecer una opción para actualizar la visualización del mapa a medida que se dibujan los objetos espaciales. Por omisión, QGIS no muestra ningún objeto espacial de una capa hasta que toda la capa ha sido representada. Para actualizar la pantalla a medida que se leen los objetos espaciales desde el almacén de datos, seleccione la opción de menú *Configuración* → *Opciones* y haga clic en la pestaña *Representación*. Establezca el número de objetos espaciales a un valor apropiado para actualizar la pantalla durante la representación. Al establecer un valor de 0 desactiva la actualización durante el dibujado (este es el valor predeterminado). Establecer un valor demasiado bajo dará como resultado un bajo rendimiento, ya que la vista del mapa se actualiza continuamente durante la lectura de los objetos espaciales. Un valor sugerido para empezar es 500.

Influir en la calidad del renderizado

Para influir en la calidad de la presentación del mapa, se tienen dos opciones. Elegir la opción de menú *Configuración* → *Opciones*, hacer clic en la pestaña *Representación* y seleccionar o deseleccionar las siguientes casillas de verificación:

- *Hacer que las líneas se muestren menos quebradas a expensas del rendimiento de la representación*
- *Solucionar problemas con polígonos rellenados incorrectamente*

Acelerar renderizado

Hay dos ajustes que le permiten mejorar la velocidad de presentación. Abrir el diálogo de las opciones de QGIS usando *Configuración*→ *Opciones*, ir a la pestaña guilabel:*Representación* y seleccionar o deseleccionar las siguientes casillas de verificación:

- *Activar buffer trasero*. Esto proporciona un mejor rendimiento gráficos a costa de perder la posibilidad de cancelar la representación y dibujar objetos espaciales incrementalmente. Si no esta marcada, se puede establecer el *Número de objetos espaciales a dibujar antes de actualizar la visualización*, de lo contrario esta opción está inactiva.
- *Usar cacheado de representación cuando sea posible para acelerar redibujados*

8.4 Mediciones

Las mediciones funcionan en sistemas de coordenadas proyectadas (por ejemplo, UTM) y en datos sin proyectar. Si el mapa cargado está definido con un sistema de coordenadas geográficas (latitud/longitud), los resultados de las mediciones de lineas o áreas serán incorrectos. Para solucionar esto, se debe establecer un sistema de coordenadas del mapa apropiado (ver sección :ref:'label_projections). Todos los módulos de medición también usan la configuración de autoensamblado del módulo de digitalización. Esto es útil si se quiere medir a lo largo de lineas o áreas en una capa vectorial.

Para seleccionar una herramienta de medición, pulsar y seleccione la herramienta que se quiera usar.

8.4.1 Medir longitud, áreas y ángulos

Medir línea: En QGIS es posible medir distancias reales entre puntos dados conforme a un elipsoide definido. Para configurar esto, seleccione la opción de menú *Configuración* → *Opciones*, haga clic en la pestaña *Herramientas del mapa* y seleccione el elipsoide apropiado. Ahí tambień puede definir un color de la banda de medida y las unidades de medida (metros o pies) y de ángulos preferidas (grados, radianes, grados centesimales). La herramienta entonces le permite hacer clic en puntos del mapa. La longitud de cada segmento, así como el total, aparecerán en la ventana de medición. Para detener la medición, pulsar el botón derecho del ratón.

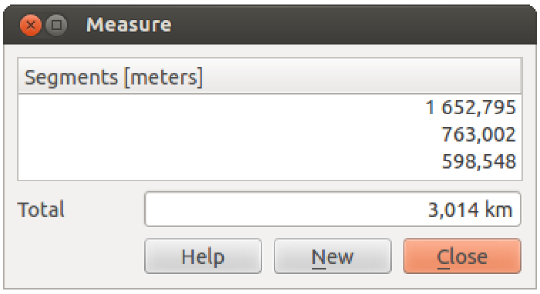

Figura 8.2: Medir distancia (Gnome)

Medir áreas: Las áreas también pueden ser medidas. En la ventana de medición, aparece el tamaño del área acumulada. Además, la herramienta de medición se autoensamblará a la capa actualmente seleccionada, siempre que la capa tenga establecida una tolerancia de autoensamblado (ver sección *Setting the Snapping Tolerance and Search Radius*). Por lo tanto, si se desea medir con exactitud a lo largo de un objeto espacial lineal, o alrededor de un objeto poligonal, primero establezca su tolerancia de autoensamblado, luego seleccione la capa. Ahora, al utilizar las herramientas de medición, cada clic del ratón (dentro de la tolerancia configurada) se ajustará a esa capa.

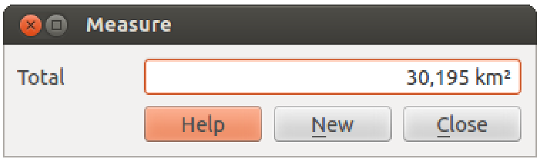

Figura 8.3: Medir área (Gnome)

Medir ángulo: Se pueden también medir ángulos. El cursor se convierte en forma de cruz. Se debe hacer clic para dibujar el primer segmento del ángulo que se desea medir y a continuación mover el cursor para dibujar el ángulo deseado. La medida se mostrará en el diálogo emergente.

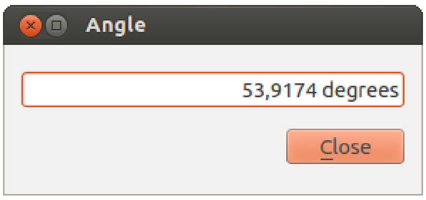

Figura 8.4: Medir ángulo (Gnome)

8.4.2 Seleccionar y deseleccionar objetos espaciales

La barra de herramientas de QGIS provee varias herramientas para seleccionar objetos espaciales en la vista del mapa. Para seleccionar una o varios objetos, basta con hacer clic en y seleccionar la herramienta:

- Seleccionar objetos espaciales individuales
- Seleccionar objetos espaciales por rectángulo
- Seleccionar objetos espaciales por polígono
- Seleccionar objetos espaciales a mano alzada
- Seleccionar objetos espaciales por radio

Para deseleccionar todos los objetos espaciales seleccionados, haga clic en Deseleccionar objetos espaciales de todas las capas.

Seleccionar un objeto espacial utilizando una expresión‘permite al usuario seleccionar objetos espaciales utilizando un dialogo de expresión. Ver capítulo :ref:‘vector_expressions para más ejemplos.

Los usuarios pueden guardar objetos espaciales seleccionados en una **Nueva capa vectorial en memoria** o una **Nueva capa vectorial** utilizando *Edición* → *Pegar objetos espaciales como ...* y elegir el modo que desea.

8.5 Identificar objetos espaciales

La herramienta de identificar le permite interactuar con la vista del mapa y obtener información de los objetos espaciales en una ventana emergente. Para identificar objetos espaciales, se usa *Ver* → *Identificar objetos espaciales* o presionar `Ctrl + Shift + I`, o hacer clic en el icono Identificar objetos espaciales en la barra de herramientas.

Si se hace clic en varios objetos, el diálogo *Resultados de la Identificación* mostrará una lista de todos los objetos seleccionados. El primer elemento es el numero de objetos en la lista de resultados, seguido por el nombre de la capa. Luego su primer hijo será el nombre de un campo con su valor. Finalmente, toda la información de los objetos que se están mostrando.

Esta ventana puede ser personalizada para mostrar campos personalizados, pero por omisión mostrará tres tipos de información:

- Acciones: se pueden agregar acciones a la ventana para identificar objetos espaciales. Al hacer clic en la etiqueta de la acción, ésta se llevará a cabo. Por omisión, sólo se añade una acción, para ver el formulario del objeto para edición.
- Derivado: esta información se calcula o es derivada de otra información. Se puede encontrar las coordenadas pulsadas, coordendas X y Y, área y perímetro en unidades del mapa para polígonos, longitud en unidades del mapa para lineas e ID de los objetos espaciales.
- Atributos de datos: Esta es la lista de campos de atributos de los datos.

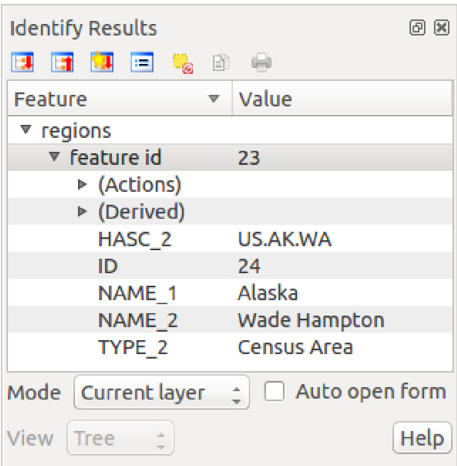

Figura 8.5: Diálogo de identificación de objetos espaciales (Gnome)

En la parte inferior de la ventana, tiene cinco iconos:

- Expandir árbol
- Comprimir árbol
- Comportamiento predeterminado
- Copiar atributos

- Imprimir respuesta del HTML seleccionado

Otras funciones se pueden encontrar en el menú contextual del elemento identificado. Por ejemplo, del menú contextual se puede:

- Ver el formulario del objeto espacial
- Zum a objeto espacial
- Copiar objeto espacial: Copiar toda la geometría y atributos del objeto espacial
- Selección de objetos espaciales: añadir objeto espacial identificado a selección.
- Copiar el valor del atributo: copiar solo el valor del atributo sobre el cual se hizo clic
- Copiar atributos del objeto espacial: Copiar solo atributos
- Limpiar resultados: quitar resultados de la ventana
- Limpiar resaltados: Deseleccionar los objetos espaciales en el mapa
- Resaltar todo
- Resaltar capa
- Activar capa: Elegir una capa para ser activada
- Propiedades de la capa: Abrir la ventana de propiedades de la capa.
- Expandir todo
- Colapsar todo

8.6 Elementos decorativos

Las Ilustraciones de QGIS incluyen la Cuadrícula, Etiqueta de Copyright, Flecha de Norte y Barra de Escala. Se usan para 'adornar' el mapa al agregar elementos cartográficos.

8.6.1 Cuadrícula

Cuadrícula permite agregar una rejilla de coordenadas y anotaciones a la vista del mapa.

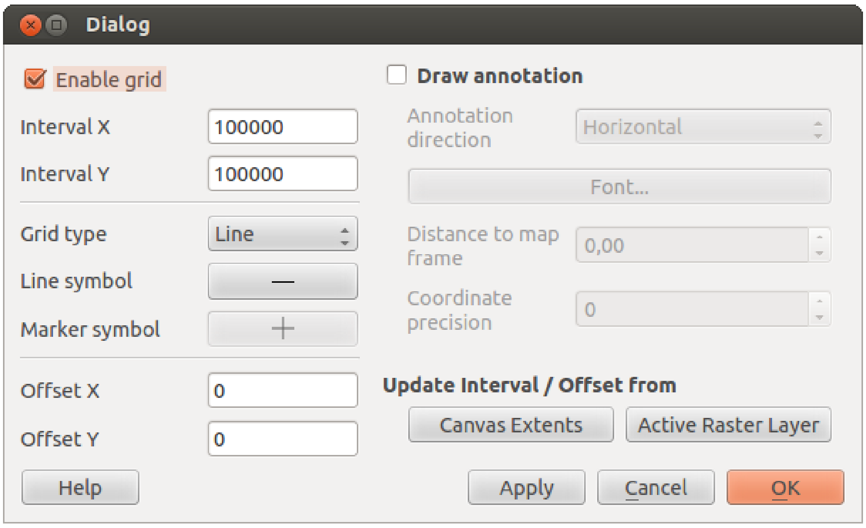

Figura 8.6: El diálogo de cuadrícula

1. Seleccione en el menú *Ver* → *Ilustraciones*→ *Cuadrícula*. Aparece el diálogo (ver figure_decorations_1).
2. Activar la casilla *Activar cuadrícula* y establecer la definición de la cuadrícula de acuerdo con las capas cargadas en la vista del mapa.
3. Activar la casilla *Dibujar anotaciones* y establecer la definición de las anotaciones de acuerdo con las capas cargadas en la vista del mapa.
4. Hacer clic en **[Aplicar]** para verificar que se vea como se esperaba.
5. Pulse **[Aceptar]** para cerrar el diálogo.

8.6.2 Etiqueta de derechos de autor

Etiqueta de copyright añade una etiqueta de copyright usando el texto que se prefiera al mapa.

Figura 8.7: Diálogo de copyright

1. Seleccione en el menú *Ver* → *Ilustraciones*→ *Etiqueta de Copyright*. Aparece el diálogo (ver figure_decorations_2).
2. Escribir el texto que se quiera colocar en el mapa. Se puede usar HTML como se muestra en el ejemplo.
3. Elegir la ubicación de la etiqueta en la lista desplegable *Ubicación*
4. Comprobar que la casilla de verificación *Activar etiqueta de copyright* este marcada.
5. Hacer clic en **[Aceptar]**

En el ejemplo anterior, que es el predeterminado, QGIS coloca un símbolo de los derechos de autor seguido de la fecha en la esquina inferior derecha de la vista del mapa.

8.6.3 Flecha del Norte

Flecha de Norte coloca una sencilla flecha de norte en la vista del mapa. En la actualidad sólo hay un estilo disponible. Se puede ajustar el ángulo de la flecha o dejar que QGIS establezca la dirección automáticamente. Si decide dejar que QGIS determine la dirección, hará su mejor conjetura en cuanto a cómo se debe orientar la flecha. Para la colocación de la flecha, se tienen cuatro opciones que corresponden a las cuatro esquinas de la vista del mapa.

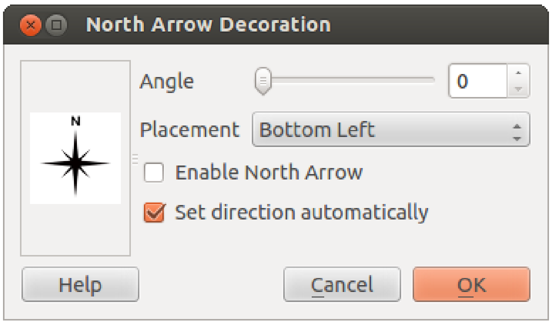

Figura 8.8: Diálogo de la flecha del Norte

8.6.4 Barra de escala

Barra de escala añade una barra de escala sencilla a la vista del mapa. Se puede controlar el estilo y la ubicación, así como el etiquetado de la barra.

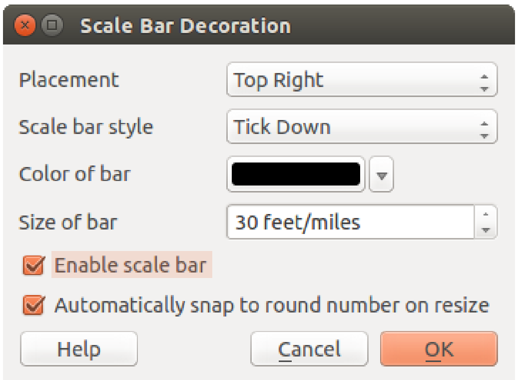

Figura 8.9: El diálogo de barra de escala

QGIS sólo es compatible con la visualización de la escala en las mismas unidades que el marco del mapa. Así que si las unidades de las capas están en metros, no se puede crear una barra de escala en pies. Del mismo modo, si está usando grados decimales, no se puede crear una barra de escala para mostrar la distancia en metros.

Para añadir una barra de escala:

1. Seleccionar del menú *Ver* → *Ilustraciones* → *Barra de escala*. Se iniciará el diálogo (ver figure_decorations_4).
2. Elegir la ubicación de la lista desplegable *Ubicación* .
3. Elegir el estilo de la caja desplegable *Estilo de la barra de escala*
4. Seleccionar el color de la barra *Color de la barra* Border o usar el color negro predeterminado.
5. Establecer el tamaño de la barra y su etiqueta *Tamaño de barra* 1,00.
6. Comprobar que la casilla de verificación *Habilitar barra de escala* esté marcada.
7. Opcionalmente, comprobar *Redondear números automáticamente al cambiar de tamaño*.
8. Hacer clic en **[Aceptar]**

Truco: Configuración de elementos decorativos

Al guardar un proyecto `.qgs`, cualquiera de los cambios que se hayan hecho a la cuadrícula, flecha de norte, barra de escala y copyright se guardarán en el proyecto y se restaurán la próxima vez que cargue el proyecto.

8.7 Herramientas de anotaciones

La herramienta Anotación de texto en la barra de herramientas de atributos provee la posibilidad de colocar texto con formato en un globo en la vista del mapa de QGIS. Usando la herramienta *Anotación de texto* haga clic en la vista del mapa.

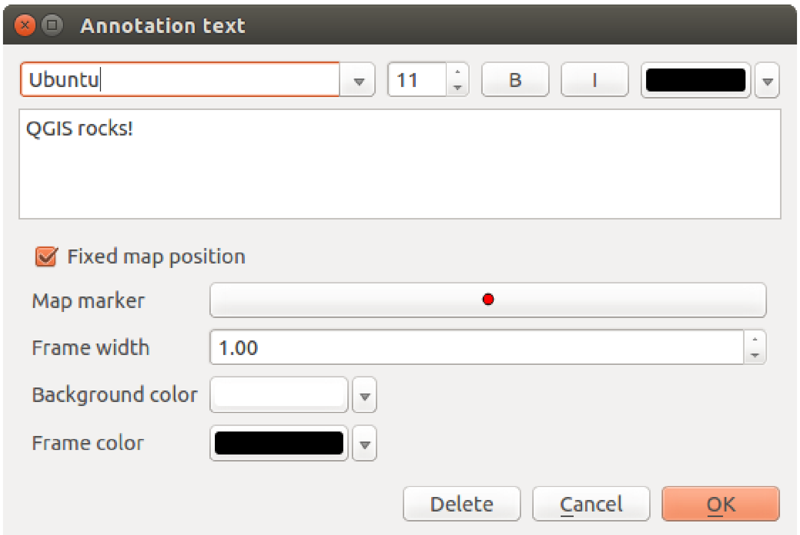

Figura 8.10: Diálogo de texto de anotación

Haciendo doble clic sobre el elemento se abre un cuadro de diálogo con varias opciones. Hay un editor de texto para escribir el texto con formato y otros ajustes de elementos. Por ejemplo, existe la opción de tener el elemento colocado en una posición del mapa (mostrado por el símbolo del marcador) o tener el elemento en una posición de la pantalla (no relacionado con el mapa). El elemento se puede mover por la posición del mapa (al arrastrar el marcador del mapa) o moviendo solo el globo. Los iconos son parte del tema de los SIG, y se utilizan de forma predeterminada en otros temas también.

La herramienta Mover anotación permite mover la anotación en la vista del mapa.

8.7.1 Anotaciones HTML

La herramienta Anotación HTML de la barra de herramientas de atributos provee la posibilidad de colocar el contenido de un archivo HTML en un globo en la vista del mapa de QGIS. Utilizando la herramienta *Anotación HTML*, haga clic en la vista del mapa y agregue la ruta de acceso al archivo HTML en el diálogo.

8.7.2 Anotaciones SVG

La herramienta Anotación SVG de la barra de herramientas de atributos provee la posibilidad para colocar un símbolo SVG en un globo en la vista del mapa de QGIS. Utilizando la herramienta *Anotación SVG*, haga clic en la vista del mapa y añada la ruta de acceso al archivo SVG en el diálogo.

8.7.3 Anotaciones de formulario

Además, puede crear sus propios formularios de anotaciones. La herramienta Formulario de anotaciones es util para mostrar los atributos de una capa vectorial en un formulario Qt Designer personalizado (ver figure_custom_annotation). Esto es similar al diseñador de formularios para la herramienta *Identificar objetos espaciales*, pero mostrado en un elemento de la anotación. Ver también el video https://www.youtube.com/watch?v=0pDBuSbQ02o de Tim Sutton para más información.

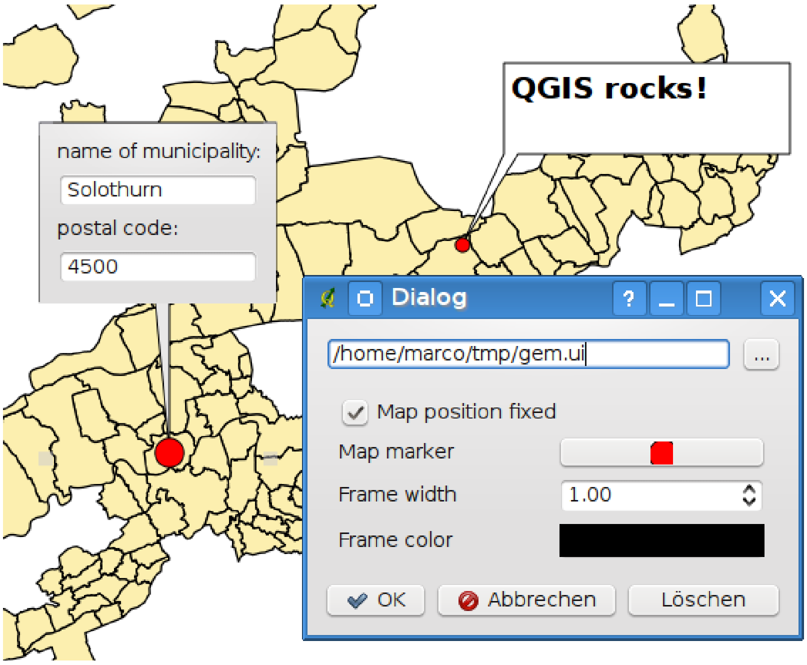

Figura 8.11: Formulario de anotación de diseñador qt personalizado

Nota: Si presiona `Ctrl+T` mientras está activa una herramienta *Anotación* (mover anotación, anotación de texto, anotación de formulario), se invierten los estados de visibilidad de los elementos.

8.8 Marcadores espaciales

Los marcadores espaciales le permiten "marcar" una localización geográfica y volver a ella más tarde.

8.8.1 Crear un marcador

Para crear un marcador:

1. Hacer zoom o desplazarse al área de interés.
2. Seleccione la opción de menú *Ver* → *Nuevo marcador* o presione `Ctrl-B`.
3. Introduzca un nombre descriptivo para el marcador (hasta 255 caracteres).
4. Presione `Añadir` para añadir el marcador o **[Borrar]** para eliminarlo.

Tenga en cuenta que puede tener múltiples marcadores con el mismo nombre.

8.8.2 Trabajar con marcadores

Para usar o administrar marcadores, seleccionar la opción de menú *Ver* → *Mostrar marcadores*. El cuadro de diálogo *Marcadores geoespaciales* permite hacer zum a un marcador o eliminarlo. No se pueden editar el nombre o las coordenadas del marcador.

8.8.3 Hacer zoom a un marcador

En el diálogo *Marcadores geoespaciales*, seleccione el marcador deseado haciendo clic en él y luego en **[Zum a]**. También puede hacer zum a un marcador haciendo doble clic en él.

8.8.4 Borrar un marcador

Para eliminar un marcador del cuadro de diálogo *Marcadores geospaciales*, hacer clic sobre él, después hacer clic en **[Eliminar]**. Confirmar la elección pulsando **[Si]**, o cancelar la eliminación pulsando **[No]**.

8.9 Anidar proyectos

Si se quiere incluir contenido de otros proyectos en un proyecto, se puede elegir *Capa* → *Empotrar capas y grupos*.

8.9.1 Empotrar capas

El siguiente cuadro de diálogo le permite incluir capas de otros proyectos. Aquí un pequeño ejemplo:

1. Presione ... para buscar otro proyecto del conjunto de datos de Alaska.
2. Seleccionar el archivo de proyecto `grassland`. Puede ver el contenido del proyecto (ver figure_embed_dialog).
3. Presionar `Ctrl` y hacer clic sobre las capas file:*grassland* y `regions`. Presionar **[OK]**. Ahora la capa seleccionada está incrustada en la leyenda del mapa y la vista del mapa.

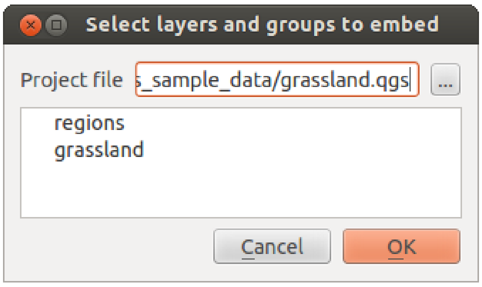

Figura 8.12: Seleccionar capas y grupos para empotrar

Si bien las capas incrustadas son editables, no se pueden cambiar sus propiedades como estilo y etiquetado.

8.9.2 Eliminar capas incrustadas

Clic derecho en la capa empotrada y elegir Eliminar.

.

Configuración QGIS

QGIS es altamente configurable a través del menú *Configuración*. Elegir entre Paneles, Barras de herramientas, Propiedades del proyecto, Opciones y Personalización.

Nota: QGIS sigue las directrices de escritorio para la ubicación de las opciones y elementos de las propiedades del proyecto. Por consecuencia relacionada con el sistema operativo que está utilizando, la ubicación de algunos de los elementos descritos anteriormente podrían estar situados en el menú :menuselection‘Ver‘ (Paneles y Barra de herramientas) o en *Proyecto* para Opciones.

9.1 Paneles y Barras de Herramientas

En el menú *Paneles*→, puede encender o apagar los widgets de QGIS. El menú *Barra de herramientas*→ proporciona la posibilidad para encender y apagar grupos de iconos en la barra de herramientas (ver figure_panels_toolbars).

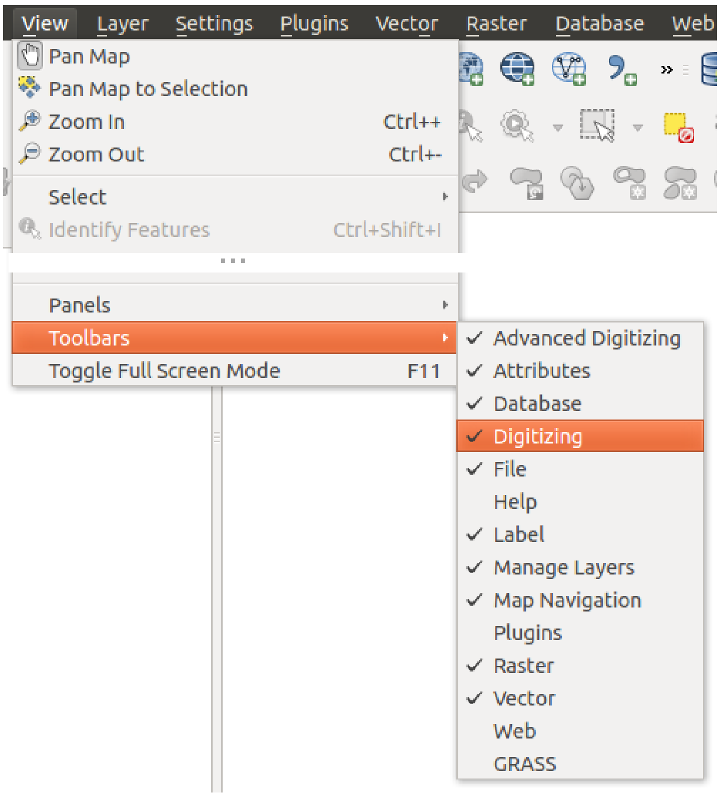

Figura 9.1: El menú de paneles y barras de herramientas

Truco: Activar la información general de QGIS

En QGIS, puede usar un panel de vista general que proporciona una vista completa de las capas añadidas. Se puede seleccionar en el menú *Configuración* → *Paneles* o *Ver* → *Paneles*. Dentro de la vista un rectangulo mostrará la vista del mapa actual. Esto le permite determinar rápidamente que área del mapa se ve actualmente. Tenga en cuenta que las etiquetas no son representadas en la vista general del mapa incluso si las capas en la vista general del mapa se ha establecido el etiquetado. Al hacer clic y arrastrar el rectángulo rojo en la vista general se muestra la extensión actual, la vista principal del mapa se actualizará en consecuencia.

Truco: Mostrar el registro de mensajes

Es posible seguir los mensajes de QGIS. Puede activar *Registro de mensajes* en el menú *Configuración*→ *Paneles* o *Ver* → *Paneles* y seguir los mensajes que aparecen en las diferentes pestañas durante la carga y funcionamiento.

9.2 Propiedades del proyecto

En la ventana de propiedades del proyecto bajo *Configuración* → *Propiedades del proyecto* (kde) o *Proyecto* → *Propiedades del proyecto* (Gnome), puede establecer opciones específicas del proyecto. Estos incluyen:

- En le menú *General*, el título del proyecto, color de selección y fondo, unidades de la capa, la precisión y la opción de guardar rutas relativas a las capas se pueden definir. Si la trasformación SRC esta activada, se puede elegir un elipsoide para cálculos de distancia. Se pueden definir las unidades del lienzo(sólo se utiliza cuando la transformación SRC está desactivada) y la precisión de decimales se utiliza. También puede definir una lista de la escala del proyecto, que anula las escalas predefinidas globales.
- El menú *SRC* habilitado para elegir el Sistema de Referencia de Coordenadas para este proyecto, y para habilitar la reproyección al vuelo de capas ráster y vector cuando se muestran capas de un diferente SRC.
- Con el tercer menú *Identificar capas*, se establece (o deshabilitar) las capas que responderán a la herramienta de identificar objetos espaciales (ver el párrafo de "Herramientas del mapa" de la sección *Opciones* para permitir la identificación de múltiples capas)
- El menú *Estilos predeterminados* le permite controlar cómo las nuevas capas se dibujaran cuando no tienen un estilo existente `.qml` definido. También puede establecer el nivel de trasparecía por defecto para nuevas capas y si los símbolos deben tener colores al azar para asignarlos. También hay una sección adicional donde puede definir colores específicos para el proyecto en ejecución. Puede encontrar los colores añadidos en el menú desplegable de la ventana de diálogo de color presente en cada representación.
- La pestaña de *Servidor OWS* le permite definir información acerca del QGIS servidor WMS y capacidades WFS, extensión y restricciones SRC.
- El menú *Macros* es utilizado para editar macros de Python para proyectos. Actualmente, solo tres macros están disponibles: `openProject()`, `saveProject()` and `closeProject()`.
- El menú *Relaciones* es utilizado para definir relaciones 1:n. Las relaciones están definidas en el diálogo de propiedades del proyecto. Una vez que existen las relaciones de una capa, un nuevo elemento de la interfaz de usuario en la vista del formulario (por ejemplo al identificar un elemento espacial y abrir el formulario) mostrará una lista de las entidades relacionadas. Este proporciona un poderosa forma para expresar, por ejemplo la inspección de la longitud de una tubería o el segmento de carretera. Se puede encontrar más información acerca de relaciones 1:n y soporte en la sección *Creating one to many relations*.

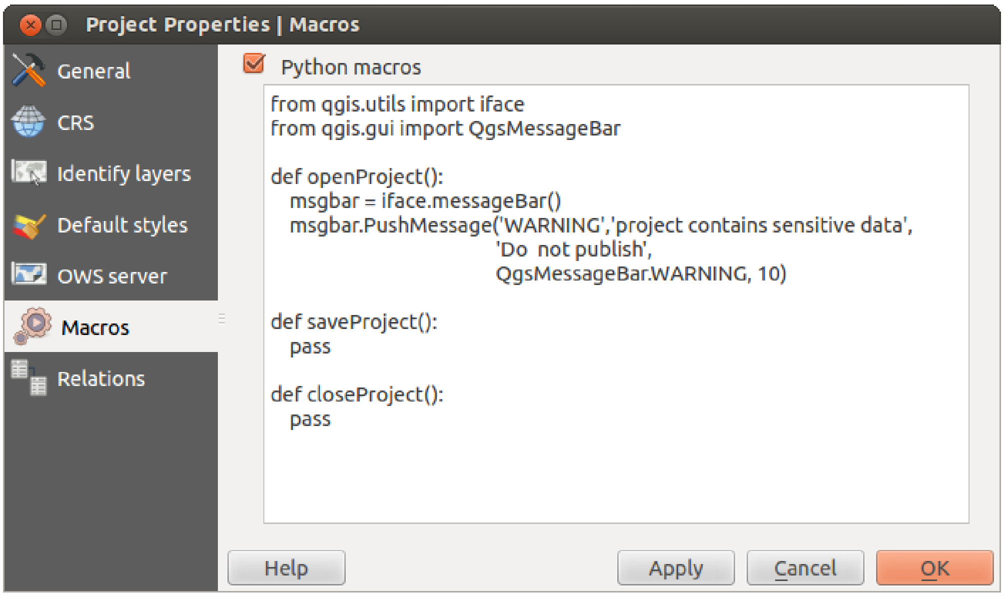

Figura 9.2: Ajustes de la Macro en QGIS

9.3 Opciones

Algunas opciones básicas de QGIS se pueden seleccionar utilizando el diálogo *Opciones*. Seleccione la opción del menú *Configuración* → *Opciones*. Las pestañas donde puede personalizar las opciones están descritas a continuación.

9.3.1 Menú General

Aplicación

- Seleccione el *Estilo (QGIS requiere reiniciar)* y elija entre 'Oxygen','Windows','Motif','CDE', 'Plastique' and 'Cleanlooks' ().
- Definir el *Tema de icono* . Actualmente solo 'predeterminado' es posible.
- Definir el *Tamaño del icono* .
- Definir la *Fuente*. Elegir entre *Qt default* y una fuente definida por el usuario.
- Cambiar el *Límite de tiempo para mensajes o diálogos con tiempo* .
- *Ocultar la pantalla de bienvenida al iniciar la aplicación*
- *Mostrar consejos al iniciar*
- *Títulos de cajas de grupos en negrita*
- *Cajas de grupo al estilo QGIS*
- *Usar diálogos de selección de color actualizados en vivo*

Los archivos de proyecto

- *Abrir proyecto on launch* (elegir entre 'Nuevo', Más reciente' y 'Específico'). Al elegir 'Específico' utilice el ... para definir un proyecto.

- *Crear nuevo proyecto desde el proyecto predeterminado*. Tiene la posibilidad de presionar *Establecer el actual proyecto como predeterminado* o sobre *Restablecer el predeterminado*. Puede navegar a través de sus archivos y definir un directorio donde se encuentra las plantillas definidas por el usuario. Esto se añadirá a *Proyecto → Nueva plantilla de formulario*. Si activa primero *Crear nuevo proyecto desde proyecto predeterminado* y entonces guarde un proyecto en l la carpeta de las plantillas de proyecto.
- *Solicitar guardar proyectos y fuentes de datos modificadas cuando sea necesario*
- *Avisar cuando se abra un proyecto guardado con una versión anterior de QGIS*
- *Habilitar macros* . Esta opción fue creada para manejar macros que estén escritos para llevar una acción en los eventos del proyecto. Puede elegir entre 'Nunca', 'Preguntar', 'Sólo para esta sesión' y 'Siempre (no recomendado)'.

9.3.2 Menú Sistema

Entorno

Variables de entorno del sistema ahora se puede ver, y muchos lo configuran en el grupo **Entorno** (ver figure_environment_variables). Esto es útil para las plataformas, como Mac, donde una aplicación GUI no heredan necesariamente entorno del casco del usuario. También es útil para configurar y visualizar las variables de entorno para los conjuntos de herramientas externas controladas por la caja de herramientas de procesamiento (por ejemplo, SAGA, GRASS), y para activar la salida de depuración para secciones específicas del código fuente.

- *Utilizar variables personalizadas (requiere reiniciar - incluir separadores)*. Puede **[Añadir]** y **[Borrar]** variables. Las variables de entorno ya definidas se muestran en *Variables de entorno actuales*, y es posible filtrarlos activando *Mostrar sólo variables de QGIS específicas*.

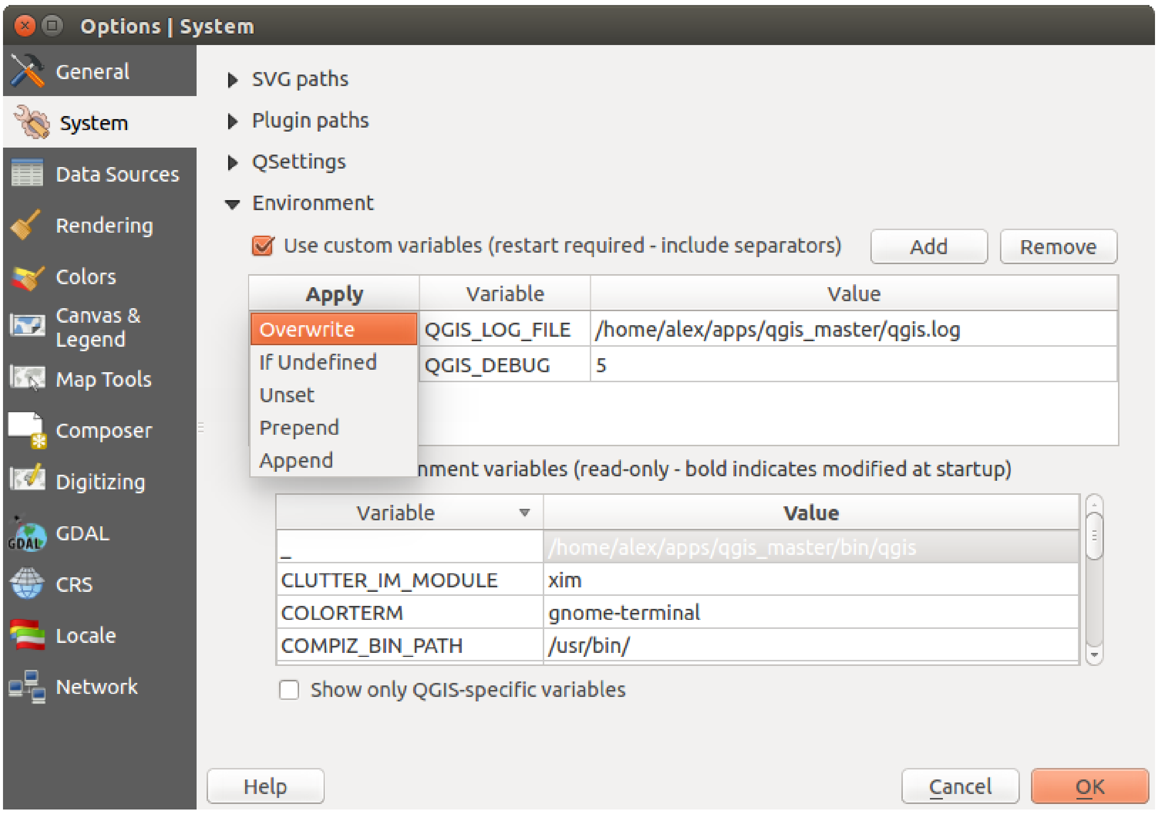

Figura 9.3: Variables de entorno del sistema en QGIS

Rutas de complemento

[Añadir] o **[Borrar]** *Ruta(s) para buscar librerías de componentes en C++ adicionales*

9.3.3 Menú Fuente de datos

Atributos de entidades espaciales y tabla

- *Abrir tabla de atributos en la ventana adosada (requiere reiniciar QGIS)*
- *Copiar geometría en WKT representación de la tabla de atributos*. Al utilizar :sup:‘ Copiar las filas seleccionadas al portapapeles‘ desde el diálogo *Tabla de atributos*, este tiene el resultado que las coordenadas de los puntos o vértices también se copian en el portapapeles.
- *Funcionamiento de la tabla de atributos* . Hay tres posibilidades: ‘Mostrar todos los objetos espaciales’, ‘Mostrar objetos seleccionados’ y ‘Mostrar objetos espaciales visibles en el mapa’.
- *Caché de registro de tabla de atributos* 1,00. Esta fila en caché hace posible guardar la última carga de N filas de atributos de modo que el trabajo con la tabla de atributos será más rápido. El caché se borrará cuando cierre la tabla de atributos.
- *Representación de valores NULOS*. Aquí, puede definir un valor para los datos de campos que tienen un valor NULO.

Manejo de fuente de datos

- *Buscar elementos válidos en el dock del explorador* . Puede elegir entre ‘Comprobar extensión’ y ‘Comprobar contenido de archivo’.
- *Analizar en busca de contenido de archivos comprimidos (zip) en navegador base* . ‘No’, ‘Exploración básica’ y ‘Exploración completa’ son posibles.
- *Solicitar subcapas raster al abrir*. Algunas subcapas raster soportadas — se les llama subdataset en GDAL. Un ejemplo son los archivos netCDF — si hay muchos variables netCDF, GDAL ve cada variable como un subconjunto de datos. La opción le permite controlar cómo lidiar con subcapas cuando se abre un archivo con subcapas. Dispone de las siguientes opciones:
  - ‘Siempre’: Siempre preguntar (Si hay subcapas existentes)
  - ‘Si es necesario’: Preguntar si la capa no tiene bandas, pero tiene subcapas
  - ‘Nunca’: Nunca preguntar, no se cargará nada
  - ‘Cargar todo’: Nunca preguntar, pero cargar todas las subcapas
- *Ignorar la declaración de codificación del archivo shape*. Si el archivo shape tiene información de codificación, Este será ignorado por QGIS.
- *Añadir capas PostGIS con doble clic y seleccionar en modo extendido*
- *Añadir capas de Oracle con doble clic y seleccionar en modo extendido*

9.3.4 Menú representación

Comportamiento de presentación

- *Por defecto las nuevas capas añadidas al mapa se deben mostrar*
- *Utilizar el cacheo de presentación en lo posible a la velocidad de regeneración*
- *Representación de capas en paralelo utilizando muchos núcleos CPU*
- *Máximo de núcleos a utilizar*
- *Intervalo de actualización del mapa (por defecto 250 ms)*

- *Habilitar simplificación de objetos espaciales por defecto a las nuevas capas añadidas*
- *Simplificación del umbral*
- *Simplifique el lado del proveedor si es posible*
- *Escala máxima a la que la capa se debe simplificar*

Calidad de representación

- *Hacer que las líneas se muestren menos quebradas a expensas del rendimiento de la representación*

Rásters

- Con *Selección de la banda RGB*, puede definir el numero para la banda Roja, Verde y Azul.

Mejora de contraste

- *Unibanda gris* . Una sola banda de gris puede tener 'Sin realce', 'Estirar a MinMax', 'Estirar y cortar a MinMax' y también 'Cortar a MinMax'.
- *Color de multibanda (byte/band)* . Las opciones son 'Sin realce', 'Estirar a MinMax', 'Estirar y cortar a MinMax' y 'Cortar a MinMax'.
- *Color de multibanda (>byte/band)* . Las opciones son 'No realce', 'Estirar a MinMax', 'Estirar y cortar a MinMax' y 'Cortar a MinMax'.
- *Límites (mínimo/máximo)* . Las opciones son 'Corte del conteo acumulativo', 'Min/Máx', 'Media +/- desviación estándar'.
- *Límite para corte del conteo acumulativo de píxeles*
- *Multiplicador de la desviación estándar*

Depuración

- *Refrescar lienzo de mapa*

9.3.5 Menú de Colores

Este menú permite añadir algunos colores personalizados que pueda encontrar en cada ventana de diálogo de color de la representación. Verá un conjunto de colores predefinidos en la pestaña: puede eliminar o editar todos ellos. Por otra parte puede añadir el color que desee y realizar alguna operación copiar y pegar. Finalmente puede exportar el color establecido como un archivo `gpl` o importarlos.

9.3.6 Menú Vista del mapa y leyenda

Apariencia del mapa predeterminado (anulado por las propiedades del proyecto)

- Definir un *Color de selección* y un *Color de fondo*.

Leyenda de capa

- *Acción doble clic en la leyenda* . Puede 'Abrir las propiedades de la capa' o 'Abrir la tabla de atributos' con el doble clic.
- Lo siguiente es posible *Estilos de elementos de la leyenda*:
  - *Comenzar el nombre de las capas con mayúsculas*
  - *Poner en negrita los nombres de la capa*
  - *Poner en negrita los nombres de grupo*

- ☑ *Mostrar nombres de atributos de clasificación*
- ☑ *Crear iconos de ráster (puede ser lento)*
- ☑ *Añadir nuevas capas al grupo seleccionado o al actual*

9.3.7 Menú Herramientas de mapa

Este menú ofrece algunas opciones con respecto al funcionamiento de la *Herramienta de Identificación*.

- *Radio de búsqueda para identificar y visualizar avisos en el mapa* es un factor de tolerancia expresada como un porcentaje del ancho de mapa. Esto significa que la herramienta de identificación representara los resultados siempre y cuando haga clic dentro de esta tolerancia.
- *Color de realce* le permite elegir con que color deben ser identificados los objetos espaciales que están resaltados.
- *Buffer* expresado como un porcentaje de el ancho del mapa, determina una distancia de separación que se representa a partir del contorno de lo mas destacado a identificar.
- *El ancho mínimo* expresado como un porcentaje de la anchura del mapa, determina el grosor del contorno de cómo debe ser un objeto resaltado.

Herramienta de medición

- Definir *Color de la banda de medida* para herramienta de medida
- Definir *Lugares decimales*
- *Mantener unidad base*
- *Unidades de medida preferidas* (‘Metros’, ‘Pies’, ‘Millas náuticas’ o ‘Grados’)‘
- *Unidades de ángulos preferidas* (‘Grados’, ‘Radianes’ o ‘Grados centecimales’)

Mover y zum

- Definir *Acción de la rueda del ratón* (‘Zum’, ‘Zum y centrar’, ‘Zoom al cursor del ratón’, ‘Nada’)
- Definir *Factor de zum* para la rueda del ratón

Escalas predefinidas

Aquí, encontrará una liste de escalas predefinidas. Con los botones **[+]** y **[-]** puede añadir o eliminar las escalas individuales.

9.3.8 Menú Diseñador

Predeterminados de la composición

Puede definir la fuente *Predeterminado* aquí.

Apariencia de la cuadrícula

- Definir el *Estilo de cuadrícula* (‘Sólido, ‘Puntos’, ‘Cruces’)
- Definir el *Color...*

Cuadrícula predeterminada

- Definir la *Separación* 1,00
- Definir el *Desplazamiento de cuadrícula* 1,00 para x y y
- Definir la *Tolerancia de Ajuste* 1,00

Guía predeterminada

- Definir la *Tolerancia de Ajuste* 1,00

9.3.9 Menú Digitalización

Creación de entidades espaciales

- *Suprimir formulario emergente de atributos después de crear objetos espaciales*
- *Reutilizar últimos valores de atributos introducidos*
- *Validar geometrías*. Editar lineas y polígonos complejos con muchos nodos puede resultar a una representación muy lenta. Esto se debe a los procesos de validación por defecto en QGIS puede tomar mucho tiempo. Para acelerar la representación, es posible seleccionar la validación de geometría GEOS (a partir de GEOS 3.3) o a pagarlo. La validación de geometría GEOS es mucho más rápido, pero la desventaja es que sólo el primer problema de geometría será reportado.

Banda de medición

- Definir banda elástica *Ancho de línea* y *Color de línea*

Autoensamblado

- *Abrir opciones de autoensamblado en una ventana adosada(requiere reiniciar QGIS)*
- Definir *Modo de autoensamblado por omisión* (‘A vértice’, ‘A segmento’, ‘A vértice y segmento’, ‘Desconectado’)
- Definir *Tolerancia de autoensamblado predeterminado* en unidades de mapa o píxeles
- Definir el *Radio de búsqueda para edición de vértices* en unidades de mapa o píxeles

Marcar vértices

- *Mostrar marcadores sólo para los objetos espaciales seleccionados*
- Definir vértice *Estilo de marcador* (‘Cruz’ (predeterminado), ‘Círculo semitransparente’ o ‘Nada’)
- Definir vértice *Tamaño de marcador*

Herramienta de desplazamiento de curva

Las siguientes 3 opciones se refieren a la herramienta Desplazar curva en *Advanced digitizing*. A través de las diversas configuraciones, es posible influir en la forma del desplazamiento de la línea. Estas opciones son posibles a partir de GEOS 3.3.

- *Estilo de la unión*
- *Segmentos del cuadrante*
- *Límite Miter*

9.3.10 Menú GDAL

GDAL es una biblioteca de intercambio de datos para archivos ráster. Es esta pestaña, puede *Editar opciones de creación* y *Editar opciones de pirámides* de los formatos ráster. Definir que controlador GDAL se va a utilizar para un formato ráster, como en algunos casos más de un controlador está disponible.

9.3.11 Menú SRC

SRC predeterminado para nuevos proyectos

- *No habilitar la reproyección ‘al vuelo’*
- *Habilitar automáticamente la reproyección al vuelo si las capas tienen un SRC diferente*

- *Activar reproyección al vuelo por defecto*
- Seleccionar un SRC y *Empezar siempre nuevos proyectos con este SRC*

SRC para nuevas capas

Esta área permite definir la acción a realizar cuando una nueva capa es creada, o cuando una capa sin SRC es cargada.

- *Solicitar SRC*
- *Usar SRC del proyecto*
- *Usar SRC por omisión mostrado abajo*

Por defecto transformación de datum

- *Preguntar por la trasformación del datum cuando el predeterminado no este definido*
- Si ha trabajado con la trasformación de SRC 'al vuelo' puede ver el resultado de la transformación en la ventana de abajo. Puede encontrar información acerca de 'Origen SRC' y 'Destino SRC' así como también 'Transformación de datum de origen' y 'Trasformación de datum destino'.

9.3.12 Menú Idioma

- *Ignorar el idioma del sistema* y *Idioma a usar en su lugar*
- Información acerca del idioma del sistema

9.3.13 Menú Red

General

- Definir *Dirección de búsqueda de WMS*, por omisión es `http://geopole.org/wms/search?search=\%1\&type=`
- Definir *Expiró el tiempo para solicitudes de red* - por omisión 60000
- Definir *Periodo de expiración predeterminada para teselas WMS-C/WMTS (en horas)* - por omisión 24
- Definir *Reintentar al máximo en caso de errores en la solicitud de tile*
- Definir *Agente- Usuario*

Configuración de caché

Definir la configuración del caché *Directorio* y un *Tamaño*.

- *Usar proxy para acceso web* y definir 'Servidor', 'Puerto', 'Usuario', y 'Contraseña'.
- Establecer el *Tipo de proxy* de acuerdo a sus necesidades.
  - *Default Proxy*: Proxy se determina con base en el proxy de aplicación que establece el uso
  - *Socks5Proxy*: Proxy genérico para cualquier tipo de conexión. Soporta TCP, UDP, unión a un puerto (conexiones entrantes) y autenticación.
  - *HttpProxy*: Implementado con el comando "CONNECT", sólo admite conexiones TCP salientes; admite la autenticación.
  - *HttpCachingProxy*: Implementando el uso de comandos HTTP normales, es útil sólo en el contexto de peticiones HTTP.
  - *FtpCachingProxy*: Implementar el uso de un proxy FTP, es útil sólo en el contexto de las peticiones FTP.

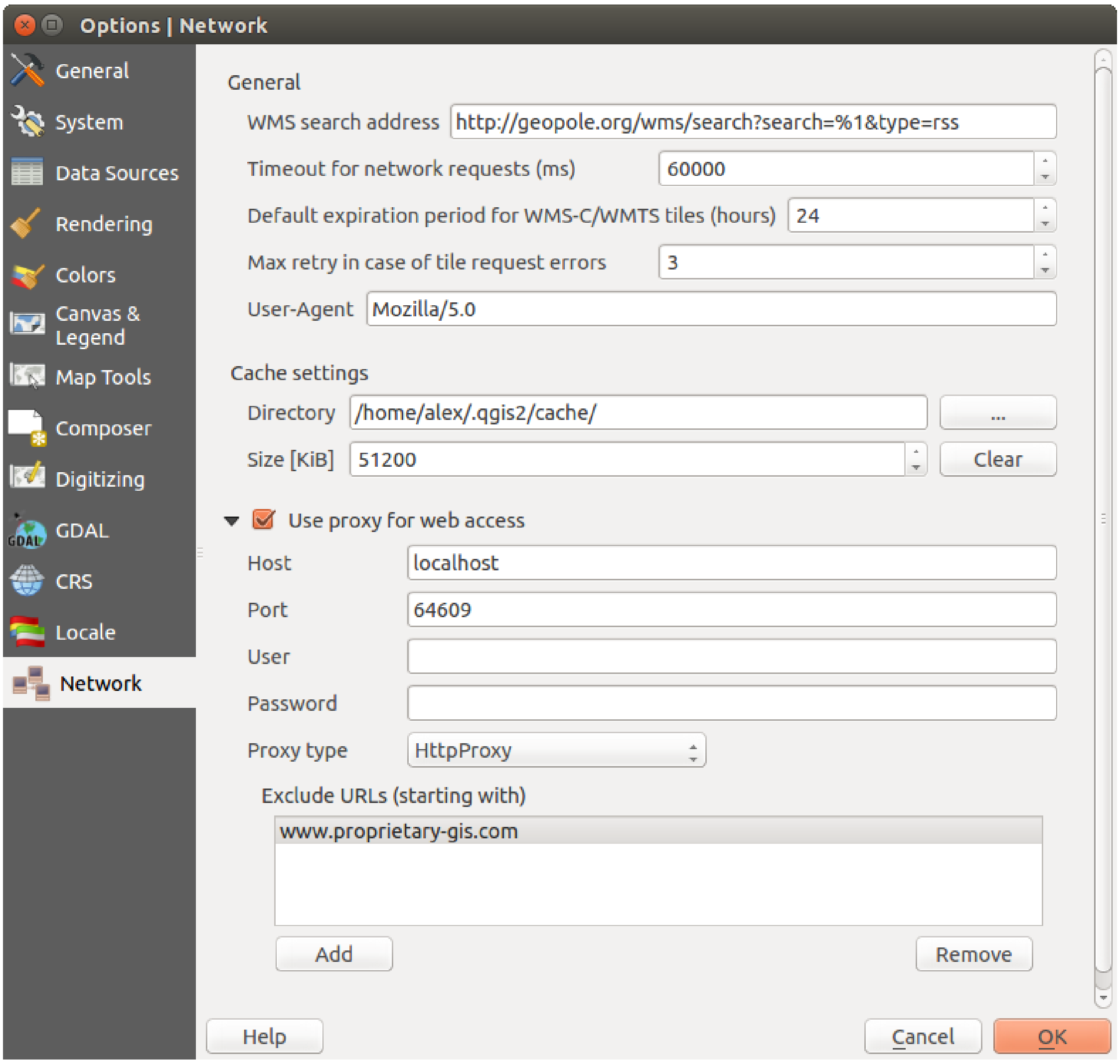

Figura 9.4: Configurar proxy en QGIS

Excluir algunas URLs se puede agregar a la caja de texto debajo los valores del proxy (ver Figure_Network_Tab).

Si necesita más información detallada acerca de las diferentes configuraciones de proxy, consulte el manual de documentación de la biblioteca QT en http://doc.trolltech.com/4.5/qnetworkproxy.html#ProxyType-enum.

Truco: Utilizar proxies

El uso de proxies a veces puede ser complicado. Es útil para proceder por 'prueba y error' con los tipos de proxies anteriores, comprobar para ver si en su caso tiene éxito.

Puede modificar las opciones de acuerdo a sus necesidades. Alguno de los cambios puede requerir un reinicio de QGIS antes de hacerse efectivos.

- La configuración se guarda en un archivo de texto: `$HOME/.config/QGIS/QGIS2.conf`
- Puede encontrar sus ajustes en: `$HOME/Library/Preferences/org.qgis.qgis.plist`
- Los ajustes se almacenan bajo el registro: `HKEY\CURRENT_USER\Software\QGIS\qgis`

9.4 Personalización

Las herramientas personalizadas permite que (des)active casi todos los elementos en la interfaz de usuario de QGIS. Esto puede ser muy útil si se tienen muchos complementos instalados que nunca se utilizan y que esta llenando su pantalla.

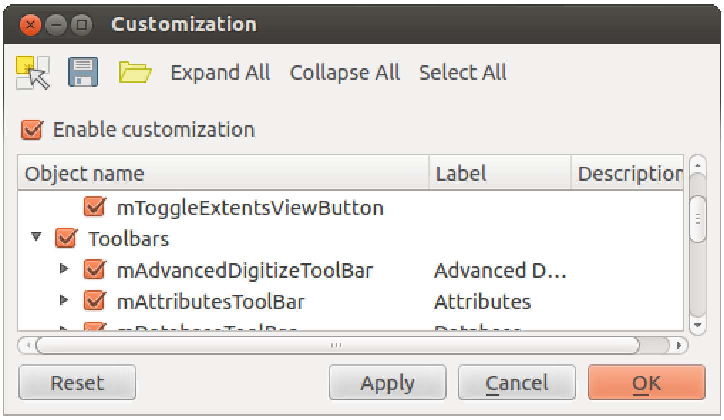

Figura 9.5: El diálogo de Personalización

La personalización de QGIS se divide en cinco grupos. En los *Menús*, puede ocultar las entradas en la barra de menú. En *Panel*, encontrar el panel de ventanas. Ventanas del panel son aplicaciones que se pueden iniciar y usar como una ventana flotante, de nivel superior o incrustados a la ventana principal de QGIS como se acopló el widget (ver también *Paneles y Barras de Herramientas*). En el *Barra de Estado*, las funciones como la información de coordenadas se puede desactivar. En *Barra de Herramientas*, puede (des)activar los iconos de la barra de QGIS, y en *Widgets*, puede (des)activar diálogos, así como sus botones.

Con Cambiar a la captura de widgets en la aplicación principal, puede hacer clic en los elementos en QGIS que desee que se oculte y busque las entradas correspondientes en la personalización (ver figure_customization). También puede guardar sus diferentes configuraciones para diferentes casos de uso. Antes de aplicar los cambios es necesario reiniciar QGIS.

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Working with Projections

QGIS allows users to define a global and project-wide CRS (coordinate reference system) for layers without a pre-defined CRS. It also allows the user to define custom coordinate reference systems and supports on-the-fly (OTF) projection of vector and raster layers. All of these features allow the user to display layers with different CRSs and have them overlay properly.

10.1 Overview of Projection Support

QGIS has support for approximately 2,700 known CRSs. Definitions for each CRS are stored in a SQLite database that is installed with QGIS. Normally, you do not need to manipulate the database directly. In fact, doing so may cause projection support to fail. Custom CRSs are stored in a user database. See section *Custom Coordinate Reference System* for information on managing your custom coordinate reference systems.

The CRSs available in QGIS are based on those defined by the European Petroleum Search Group (EPSG) and the Institut Geographique National de France (IGNF) and are largely abstracted from the spatial reference tables used in GDAL. EPSG identifiers are present in the database and can be used to specify a CRS in QGIS.

In order to use OTF projection, either your data must contain information about its coordinate reference system or you will need to define a global, layer or project-wide CRS. For PostGIS layers, QGIS uses the spatial reference identifier that was specified when the layer was created. For data supported by OGR, QGIS relies on the presence of a recognized means of specifying the CRS. In the case of shapefiles, this means a file containing the well-known text (WKT) specification of the CRS. This projection file has the same base name as the shapefile and a `.prj` extension. For example, a shapefile named `alaska.shp` would have a corresponding projection file named `alaska.prj`.

Whenever you select a new CRS, the layer units will automatically be changed in the *General* tab of the *Project Properties* dialog under the *Project* (Gnome, OS X) or *Settings* (KDE, Windows) menu.

10.2 Global Projection Specification

QGIS starts each new project using the global default projection. The global default CRS is EPSG:4326 - WGS 84 (`proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs`), and it comes predefined in QGIS. This default can be changed via the **[Select...]** button in the first section, which is used to define the default coordinate reference system for new projects, as shown in figure_projection_1. This choice will be saved for use in subsequent QGIS sessions.

When you use layers that do not have a CRS, you need to define how QGIS responds to these layers. This can be done globally or project-wide in the *CRS* tab under *Settings* → *Options*.

The options shown in figure_projection_1 are:

- *Prompt for CRS*
- *Use project CRS*

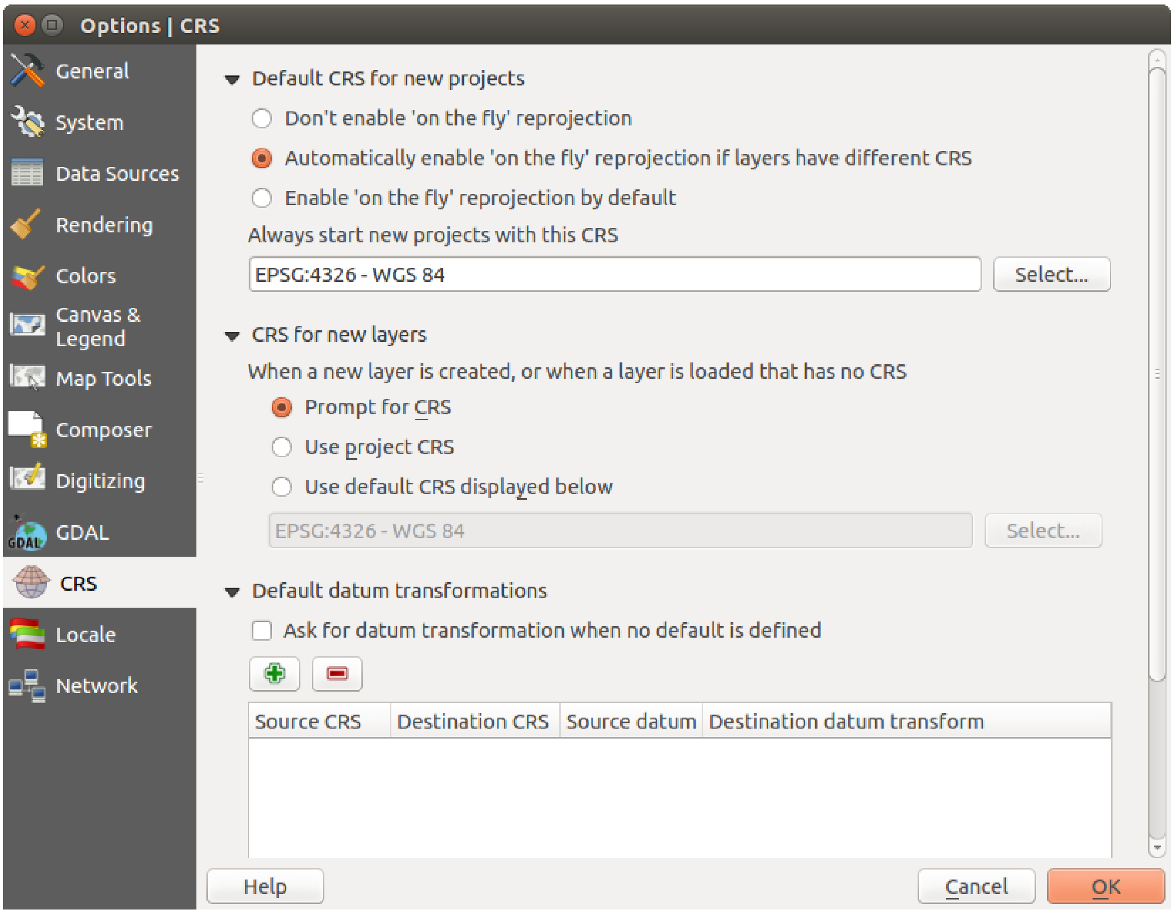

Figura 10.1: CRS tab in the QGIS Options Dialog

- *Use default CRS displayed below*

If you want to define the coordinate reference system for a certain layer without CRS information, you can also do that in the *General* tab of the raster and vector properties dialog (see *General Menu* for rasters and *General Menu* for vectors). If your layer already has a CRS defined, it will be displayed as shown in *Vector Layer Properties Dialog* .

Truco: CRS in the Map Legend

Right-clicking on a layer in the Map Legend (section *Leyenda del mapa*) provides two CRS shortcuts. *Set layer CRS* takes you directly to the Coordinate Reference System Selector dialog (see figure_projection_2). *Set project CRS from Layer* redefines the project CRS using the layer's CRS.

10.3 Define On The Fly (OTF) Reprojection

QGIS supports OTF reprojection for both raster and vector data. However, OTF is not activated by default. To use OTF projection, you must activate the *Enable on the fly CRS transformation* checkbox in the *CRS* tab of the *Project Properties* dialog.

There are three ways to do this:

1. Select *Project Properties* from the *Project* (Gnome, OSX) or *Settings* (KDE, Windows) menu.
2. Click on the CRS status icon in the lower right-hand corner of the status bar.
3. Turn OTF on by default in the *CRS* tab of the *Options* dialog by selecting *Enable 'on the fly' reprojection by default* or *Automatically enable 'on the fly' reprojection if layers have different CRS*.

If you have already loaded a layer and you want to enable OTF projection, the best practice is to open the *CRS* tab of the *Project Properties* dialog, select a CRS, and activate the *Enable 'on the fly' CRS transformation* checkbox. The CRS status icon will no longer be greyed out, and all layers will be OTF projected to the CRS shown next to the icon.

The *CRS* tab of the *Project Properties* dialog contains five important components, as shown in Figure_projection_2 and described below:

1. **Enable 'on the fly' CRS transformation** — This checkbox is used to enable or disable OTF projection. When off, each layer is drawn using the coordinates as read from the data source, and the components described below are inactive. When on, the coordinates in each layer are projected to the coordinate reference system defined for the map canvas.
2. **Filter** — If you know the EPSG code, the identifier, or the name for a coordinate reference system, you can use the search feature to find it. Enter the EPSG code, the identifier or the name.
3. **Recently used coordinate reference systems** — If you have certain CRSs that you frequently use in your everyday GIS work, these will be displayed in this list. Click on one of these items to select the associated CRS.
4. **Coordinate reference systems of the world** — This is a list of all CRSs supported by QGIS, including Geographic, Projected and Custom coordinate reference systems. To define a CRS, select it from the list by expanding the appropriate node and selecting the CRS. The active CRS is preselected.
5. **PROJ.4 text** — This is the CRS string used by the PROJ.4 projection engine. This text is read-only and provided for informational purposes.

Truco: Project Properties Dialog

If you open the *Project Properties* dialog from the *Project* menu, you must click on the *CRS* tab to view the CRS settings.

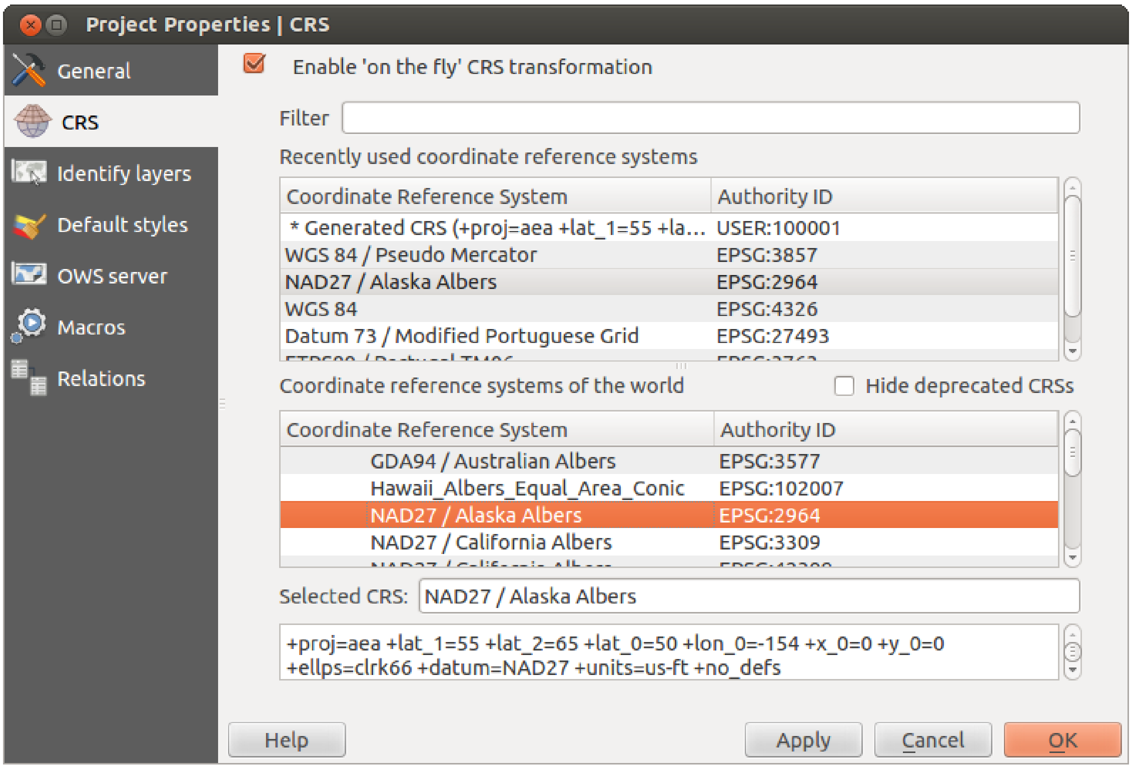

Figura 10.2: Project Properties Dialog

Opening the dialog from the CRS status icon will automatically bring the *CRS* tab to the front.

10.4 Custom Coordinate Reference System

If QGIS does not provide the coordinate reference system you need, you can define a custom CRS. To define a CRS, select *Custom CRS...* from the *Settings* menu. Custom CRSs are stored in your QGIS user database. In addition to your custom CRSs, this database also contains your spatial bookmarks and other custom data.

Defining a custom CRS in QGIS requires a good understanding of the PROJ.4 projection library. To begin, refer to “Cartographic Projection Procedures for the UNIX Environment - A User’s Manual” by Gerald I. Evenden, U.S. Geological Survey Open-File Report 90-284, 1990 (available at ftp://ftp.remotesensing.org/proj/OF90-284.pdf).

This manual describes the use of the `proj.4` and related command line utilities. The cartographic parameters used with `proj.4` are described in the user manual and are the same as those used by QGIS.

The *Custom Coordinate Reference System Definition* dialog requires only two parameters to define a user CRS:

1. A descriptive name
2. The cartographic parameters in PROJ.4 format

To create a new CRS, click the Add new CRS button and enter a descriptive name and the CRS parameters.

Note that the *Parameters* must begin with a `+proj=` block, to represent the new coordinate reference system.

You can test your CRS parameters to see if they give sane results. To do this, enter known WGS 84 latitude and longitude values in *North* and *East* fields, respectively. Click on **[Calculate]**, and compare the results with the known values in your coordinate reference system.

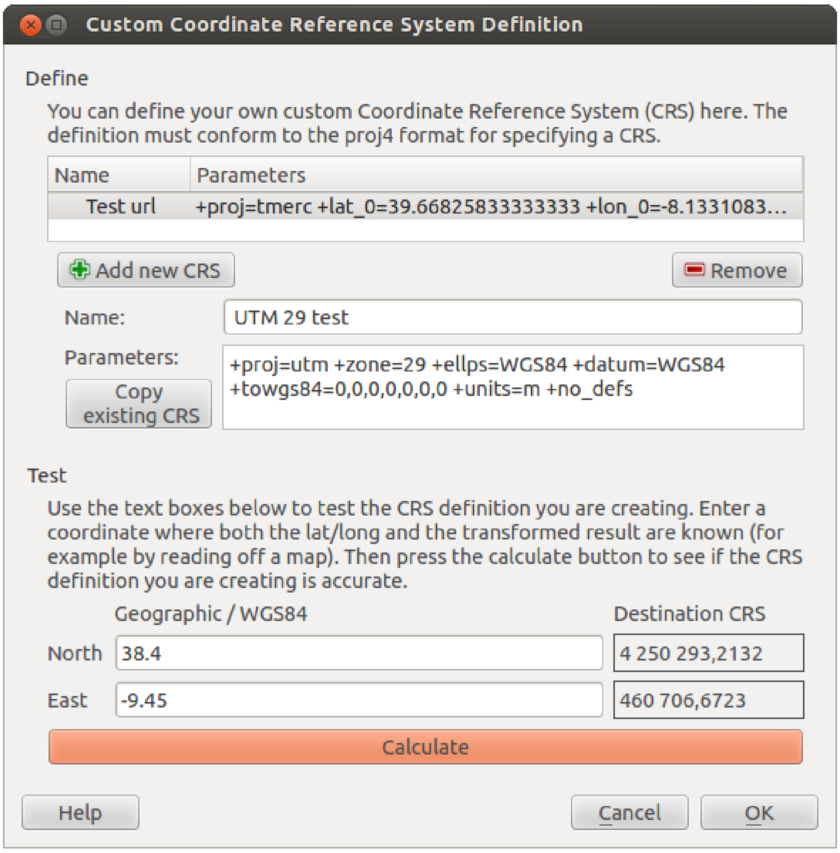

Figura 10.3: Custom CRS Dialog

10.5 Default datum transformations

OTF depends on being able to transform data into a 'default CRS', and QGIS uses WGS84. For some CRS there are a number of transforms available. QGIS allows you to define the transformation used otherwise QGIS uses a default transformation.

In the *CRS* tab under *Settings* → *Options* you can:

- set QGIS to ask you when it needs define a transformation using *Ask for datum transformation when no default is defined*
- edit a list of user defaults for transformations.

QGIS asks which transformation to use by opening a dialogue box displaying PROJ.4 text describing the source and destination transforms. Further information may be found by hovering over a transform. User defaults can be saved by selecting *Remember selection*.

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QGIS Browser

The QGIS Browser is a panel in QGIS that lets you easily navigate in your filesystem and manage geodata. You can have access to common vector files (e.g., ESRI shapefiles or MapInfo files), databases (e.g., PostGIS, Oracle, SpatiaLite or MS SQL Spatial) and WMS/WFS connections. You can also view your GRASS data (to get the data into QGIS, see *GRASS GIS Integration*).

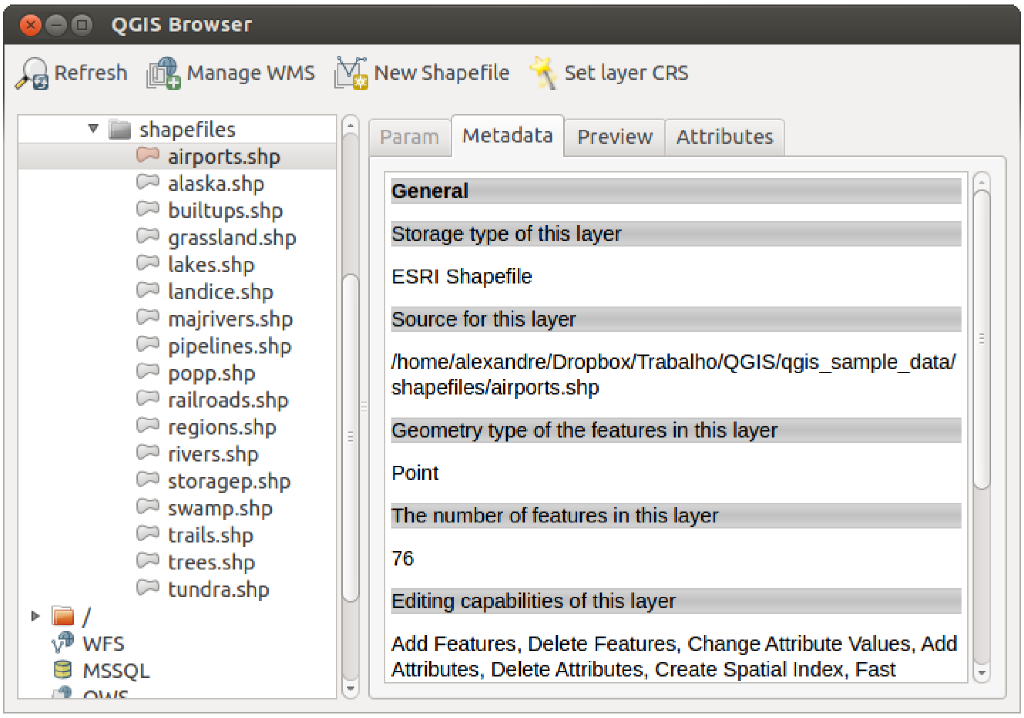

Figura 11.1: QGIS browser as a stand alone application

Use the QGIS Browser to preview your data. The drag-and-drop function makes it easy to get your data into the map view and the map legend.

1. Activate the QGIS Browser: Right-click on the toolbar and check *Browser* or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window and release it.
3. Click on the *Browser* tab.
4. Browse in your filesystem and choose the `shapefile` folder from `qgis_sample_data` directory.
5. Press the `Shift` key and select the `airports.shp` and `alaska.shp` files.
6. Press the left mouse button, then drag and drop the files into the map canvas.

7. Right-click on a layer and choose *Set project CRS from layer*. For more information see *Working with Projections*.
8. Click on Zoom Full to make the layers visible.

There is a second browser available under *Settings* → *Panels*. This is handy when you need to move files or layers between locations.

1. Activate a second QGIS Browser: Right-click on the toolbar and check *Browser (2)*, or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window.
3. Navigate to the *Browser (2)* tab and browse for a shapefile in your file system.
4. Select a file with the left mouse button. Now you can use the Add Selected Layers icon to add it into the current project.

QGIS automatically looks for the coordinate reference system (CRS) and zooms to the layer extent if you work in a blank QGIS project. If there are already files in your project, the file will just be added, and in the case that it has the same extent and CRS, it will be visualized. If the file has another CRS and layer extent, you must first right-click on the layer and choose *Set Project CRS from Layer*. Then choose *Zoom to Layer Extent*.

The Filter files function works on a directory level. Browse to the folder where you want to filter files and enter a search word or wildcard. The Browser will show only matching filenames – other data won't be displayed.

It's also possible to run the QGIS Browser as a stand-alone application.

Start the QGIS browser

- Type in "qbrowser" at a command prompt.
- Start the QGIS Browser using the Start menu or desktop shortcut.
- The QGIS Browser is available from your Applications folder.

In figure_browser_standalone_metadata, you can see the enhanced functionality of the stand-alone QGIS Browser. The *Param* tab provides the details of your connection-based datasets, like PostGIS or MSSQL Spatial. The *Metadata* tab contains general information about the file (see *Metadata Menu*). With the *Preview* tab, you can have a look at your files without importing them into your QGIS project. It's also possible to preview the attributes of your files in the *Attributes* tab.

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CAPÍTULO 12

Trabajar con catos vectoriales

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12.1 Supported Data Formats

QGIS uses the OGR library to read and write vector data formats, including ESRI shapefiles, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, SpatiaLite, Oracle Spatial and MSSQL Spatial databases, and many more. GRASS vector and PostgreSQL support is supplied by native QGIS data provider plugins. Vector data can also be loaded in read mode from zip and gzip archives into QGIS. As of the date of this document, 69 vector formats are supported by the OGR library (see OGR-SOFTWARE-SUITE in *Referencias bibliográficas y web*). The complete list is available at http://www.gdal.org/ogr/ogr_formats.html.

Nota: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL/OGR installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a vector into QGIS. Other untested formats can be loaded by selecting `*.*`.

Working with GRASS vector data is described in Section *GRASS GIS Integration*.

This section describes how to work with several common formats: ESRI shapefiles, PostGIS layers, SpatiaLite layers, OpenStreetMap vectors, and Comma Separated data (CSV). Many of the features available in QGIS work the same, regardless of the vector data source. This is by design, and it includes the identify, select, labeling and attributes functions.

12.1.1 ESRI Shapefiles

The standard vector file format used in QGIS is the ESRI shapefile. Support is provided by the OGR Simple Feature Library (http://www.gdal.org/ogr/).

A shapefile actually consists of several files. The following three are required:

1. `.shp` file containing the feature geometries
2. `.dbf` file containing the attributes in dBase format
3. `.shx` index file

Shapefiles also can include a file with a `.prj` suffix, which contains the projection information. While it is very useful to have a projection file, it is not mandatory. A shapefile dataset can contain additional files. For further details, see the ESRI technical specification at http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf.

Loading a Shapefile

To load a shapefile, start QGIS and click on the Add Vector Layer toolbar button, or simply press `Ctrl+Shift+V`. This will bring up a new window (see figure_vector_1).

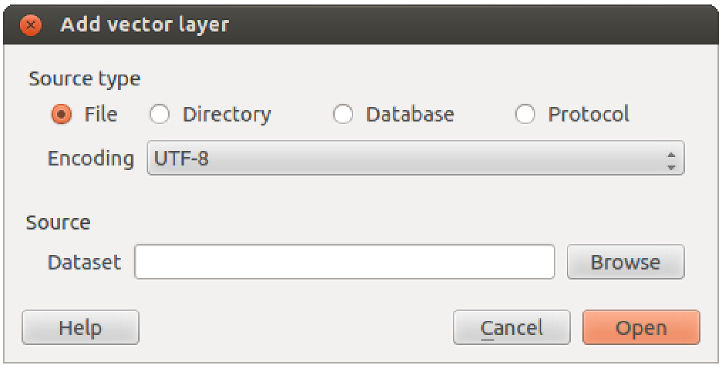

Figura 12.1: Add Vector Layer Dialog

From the available options check *File*. Click on **[Browse]**. That will bring up a standard open file dialog (see figure_vector_2), which allows you to navigate the file system and load a shapefile or other supported data source. The selection box *Filter* allows you to preselect some OGR-supported file formats.

You can also select the encoding for the shapefile if desired.

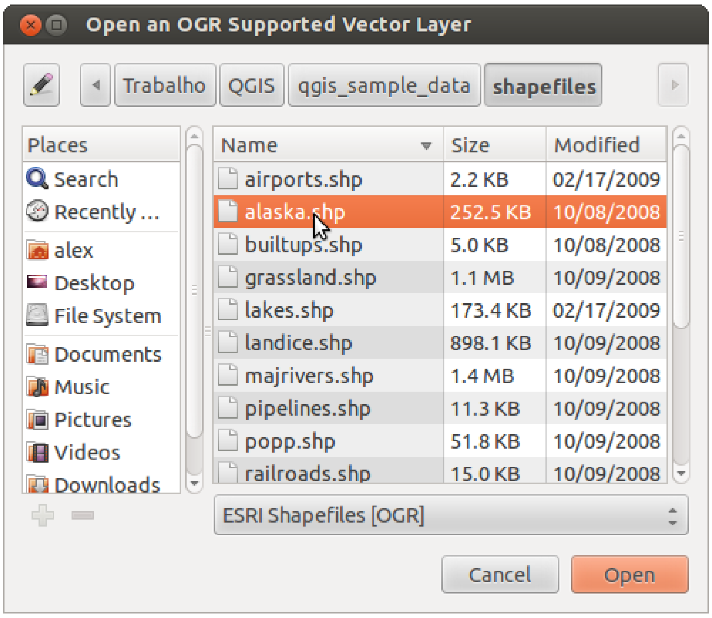

Figura 12.2: Open an OGR Supported Vector Layer Dialog

Selecting a shapefile from the list and clicking **[Open]** loads it into QGIS. Figure_vector_3 shows QGIS after loading the `alaska.shp` file.

Truco: Layer Colors

When you add a layer to the map, it is assigned a random color. When adding more than one layer at a time, different colors are assigned to each layer.

Once a shapefile is loaded, you can zoom around it using the map navigation tools. To change the style of a layer, open the *Layer Properties* dialog by double clicking on the layer name or by right-clicking on the name in the

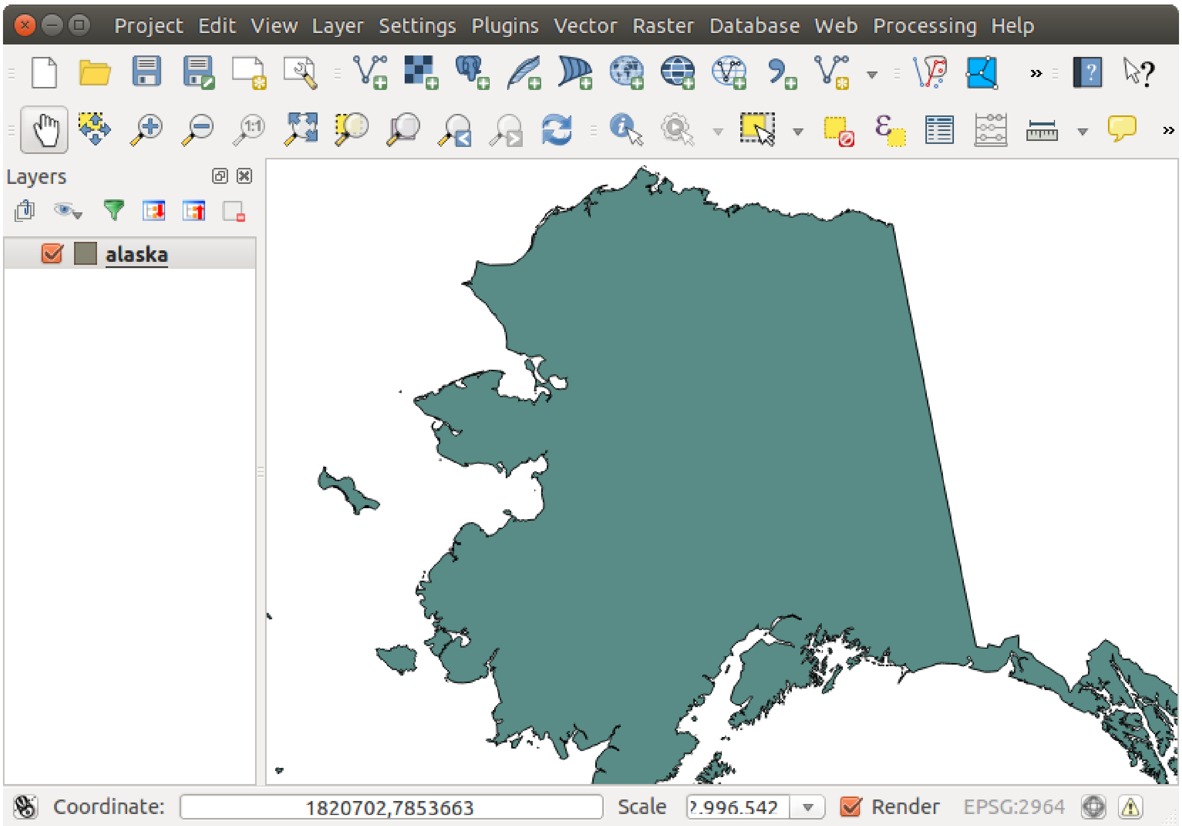

Figura 12.3: QGIS with Shapefile of Alaska loaded

legend and choosing *Properties* from the context menu. See section *Style Menu* for more information on setting symbology of vector layers.

Truco: Load layer and project from mounted external drives on OS X

On OS X, portable drives that are mounted beside the primary hard drive do not show up as expected under *File* → *Open Project*. We are working on a more OSX-native open/save dialog to fix this. As a workaround, you can type `/Volumes` in the *File name* box and press `Enter`. Then you can navigate to external drives and network mounts.

Improving Performance for Shapefiles

To improve the performance of drawing a shapefile, you can create a spatial index. A spatial index will improve the speed of both zooming and panning. Spatial indexes used by QGIS have a `.qix` extension.

Use these steps to create the index:

- Load a shapefile by clicking on the Add Vector Layer toolbar button or pressing `Ctrl+Shift+V`.
- Open the *Layer Properties* dialog by double-clicking on the shapefile name in the legend or by right-clicking and choosing *Properties* from the context menu.
- In the *General* tab, click the **[Create Spatial Index]** button.

Problem loading a shape .prj file

If you load a shapefile with a `.prj` file and QGIS is not able to read the coordinate reference system from that file, you will need to define the proper projection manually within the *General* tab of the *Layer Properties* dialog of the layer by clicking the **[Specify...]** button. This is due to the fact that `.prj` files often do not provide the complete projection parameters as used in QGIS and listed in the *CRS* dialog.

For the same reason, if you create a new shapefile with QGIS, two different projection files are created: a `.prj` file with limited projection parameters, compatible with ESRI software, and a `.qpj` file, providing the complete parameters of the used CRS. Whenever QGIS finds a `.qpj` file, it will be used instead of the `.prj`.

12.1.2 Loading a MapInfo Layer

To load a MapInfo layer, click on the Add Vector Layer toolbar button; or type `Ctrl+Shift+V`, change the file type filter *Files of type* : to 'Mapinfo File [OGR] (*.mif *.tab *.MIF *.TAB)' and select the MapInfo layer you want to load.

12.1.3 Loading an ArcInfo Binary Coverage

To load an ArcInfo Binary Coverage, click on the Add Vector Layer toolbar button or press `Ctrl+Shift+V` to open the *Add Vector Layer* dialog. Select *Directory* as *Source type*. Change the file type filter *Files of type* to 'Arc/Info Binary Coverage'. Navigate to the directory that contains the coverage file, and select it.

Similarly, you can load directory-based vector files in the UK National Transfer Format, as well as the raw TIGER Format of the US Census Bureau.

12.1.4 Delimited Text Files

Tabular data is a very common and widely used format because of its simplicity and readability – data can be viewed and edited even in a plain text editor. A delimited text file is an attribute table with each column separated by a defined character and each row separated by a line break. The first row usually contains the column names. A common type of delimited text file is a CSV (Comma Separated Values), with each column separated by a comma.

Such data files can also contain positional information in two main forms:

- As point coordinates in separate columns
- As well-known text (WKT) representation of geometry

QGIS allows you to load a delimited text file as a layer or ordinal table. But first check that the file meets the following requirements:

1. The file must have a delimited header row of field names. This must be the first line in the text file.
2. The header row must contain field(s) with geometry definition. These field(s) can have any name.
3. The X and Y coordinates (if geometry is defined by coordinates) must be specified as numbers. The coordinate system is not important.

As an example of a valid text file, we import the elevation point data file `elevp.csv` that comes with the QGIS sample dataset (see section *Datos de ejemplo*):

```
X;Y;ELEV
-300120;7689960;13
-654360;7562040;52
1640;7512840;3
[...]
```

Some items to note about the text file:

1. The example text file uses `;` (semicolon) as delimiter. Any character can be used to delimit the fields.
2. The first row is the header row. It contains the fields `X`, `Y` and `ELEV`.
3. No quotes (`"`) are used to delimit text fields.

4. The X coordinates are contained in the X field.
5. The Y coordinates are contained in the Y field.

Loading a delimited text file

Click the toolbar icon Add Delimited Text Layer in the *Manage layers* toolbar to open the *Create a Layer from a Delimited Text File* dialog, as shown in figure_delimited_text_1.

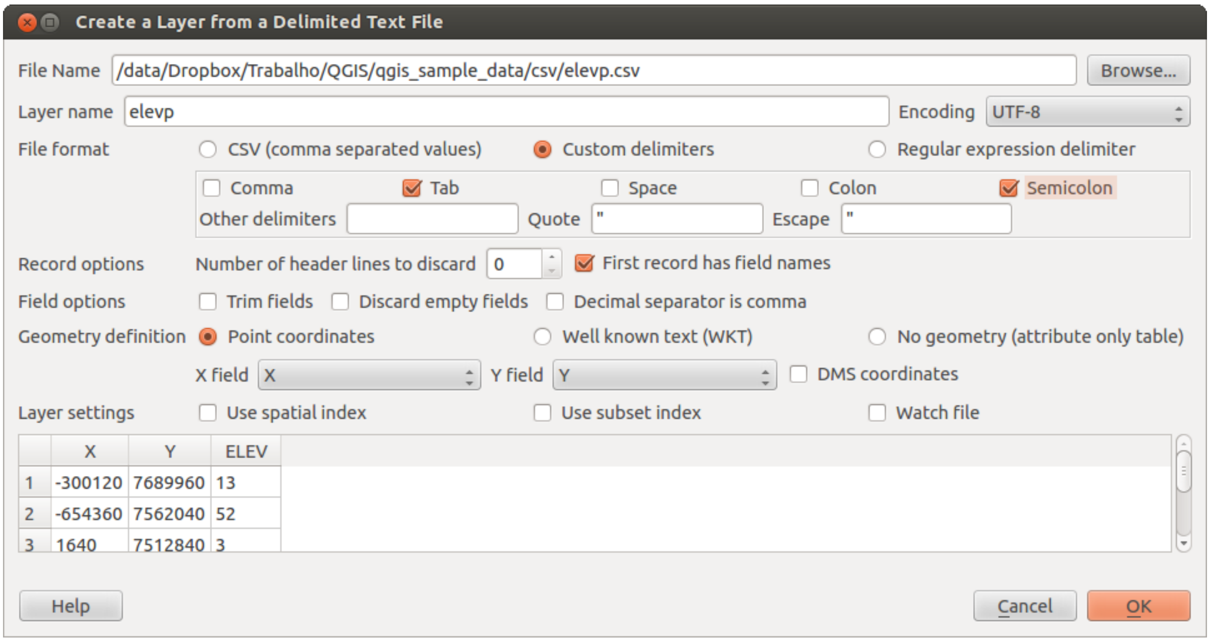

Figura 12.4: Delimited Text Dialog

First, select the file to import (e.g., `qgis_sample_data/csv/elevp.csv`) by clicking on the **[Browse]** button. Once the file is selected, QGIS attempts to parse the file with the most recently used delimiter. To enable QGIS to properly parse the file, it is important to select the correct delimiter. You can specify a delimiter by activating *Custom delimiters*, or by activating *Regular expression delimiter* and entering text into the *Expression* field. For example, to change the delimiter to tab, use `\t` (this is a regular expression for the tab character).

Once the file is parsed, set *Geometry definition* to *Point coordinates* and choose the X and Y fields from the drop-down lists. If the coordinates are defined as degrees/minutes/seconds, activate the *DMS coordinates* checkbox.

Finally, enter a layer name (e.g., `elevp`), as shown in figure_delimited_text_1. To add the layer to the map, click **[OK]**. The delimited text file now behaves as any other map layer in QGIS.

There is also a helper option that allows you to trim leading and trailing spaces from fields — *Trim fields*. Also, it is possible to *Discard empty fields*. If necessary, you can force a comma to be the decimal separator by activating *Decimal separator is comma*.

If spatial information is represented by WKT, activate the *Well Known Text* option and select the field with the WKT definition for point, line or polygon objects. If the file contains non-spatial data, activate *No geometry (attribute only table)* and it will be loaded as an ordinal table.

Additionaly, you can enable:

- *Use spatial index* to improve the performance of displaying and spatially selecting features.
- *Use subset index*.

- *Watch file* to watch for changes to the file by other applications while QGIS is running.

12.1.5 OpenStreetMap data

In recent years, the OpenStreetMap project has gained popularity because in many countries no free geodata such as digital road maps are available. The objective of the OSM project is to create a free editable map of the world from GPS data, aerial photography or local knowledge. To support this objective, QGIS provides suppport for OSM data.

Loading OpenStreetMap Vectors

QGIS integrates OpenStreetMap import as a core functionality.

- To connect to the OSM server and download data, open the menu *Vector* → *Openstreetmap* → *Load data*. You can skip this step if you already obtained an `.osm` XML file using JOSM, Overpass API or any other source.
- The menu *Vector* → *Openstreetmap* → *Import topology from an XML file* will convert your `.osm` file into a SpatiaLite database and create a corresponding database connection.
- The menu *Vector* → *Openstreetmap* → *Export topology to SpatiaLite* then allows you to open the database connection, select the type of data you want (points, lines, or polygons) and choose tags to import. This creates a SpatiaLite geometry layer that you can add to your project by clicking on the Add SpatiaLite Layer toolbar button or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu (see section *SpatiaLite Layers*).

12.1.6 PostGIS Layers

PostGIS layers are stored in a PostgreSQL database. The advantages of PostGIS are the spatial indexing, filtering and query capabilities it provides. Using PostGIS, vector functions such as select and identify work more accurately than they do with OGR layers in QGIS.

Creating a stored Connection

The first time you use a PostGIS data source, you must create a connection to the PostgreSQL database that contains the data. Begin by clicking on the Add PostGIS Layer toolbar button, selecting the *Add PostGIS Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+D`. You can also open the *Add Vector Layer* dialog and select *Database*. The *Add PostGIS Table(s)* dialog will be displayed. To access the connection manager, click on the **[New]** button to display the *Create a New PostGIS Connection* dialog. The parameters required for a connection are:

- **Name**: A name for this connection. It can be the same as *Database*.
- **Service**: Service parameter to be used alternatively to hostname/port (and potentially database). This can be defined in `pg_service.conf`.
- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: Port number the PostgreSQL database server listens on. The default port is 5432.
- **Database**: Name of the database.
- **SSL mode**: How the SSL connection will be negotiated with the server. Note that massive speedups in PostGIS layer rendering can be achieved by disabling SSL in the connection editor. The following options are available:

- Disable: Only try an unencrypted SSL connection.
- Allow: Try a non-SSL connection. If that fails, try an SSL connection.
- Prefer (the default): Try an SSL connection. If that fails, try a non-SSL connection.
- Require: Only try an SSL connection.

- **Username**: User name used to log in to the database.
- **Password**: Password used with *Username* to connect to the database.

Optionally, you can activate the following checkboxes:

- *Save Username*
- *Save Password*
- *Only look in the geometry_columns table*
- *Don't resolve type of unrestricted columns (GEOMETRY)*
- *Only look in the 'public' schema*
- *Also list tables with no geometry*
- *Use estimated table metadata*

Once all parameters and options are set, you can test the connection by clicking on the **[Test Connect]** button.

Loading a PostGIS Layer

Once you have one or more connections defined, you can load layers from the PostgreSQL database. Of course, this requires having data in PostgreSQL. See section *Importing Data into PostgreSQL* for a discussion on importing data into the database.

To load a layer from PostGIS, perform the following steps:

- If the *Add PostGIS layers* dialog is not already open, selecting the *Add PostGIS Layer...* option from the *Layer* menu or typing `Ctrl+Shift+D` opens the dialog.
- Choose the connection from the drop-down list and click **[Connect]**.
- Select or unselect *Also list tables with no geometry*.
- Optionally, use some *Search Options* to define which features to load from the layer, or use the **[Build query]** button to start the *Query builder* dialog.
- Find the layer(s) you wish to add in the list of available layers.
- Select it by clicking on it. You can select multiple layers by holding down the `Shift` key while clicking. See section *Constructor de consultas* for information on using the PostgreSQL Query Builder to further define the layer.
- Click on the **[Add]** button to add the layer to the map.

Truco: PostGIS Layers

Normally, a PostGIS layer is defined by an entry in the geometry_columns table. From version 0.9.0 on, QGIS can load layers that do not have an entry in the geometry_columns table. This includes both tables and views. Defining a spatial view provides a powerful means to visualize your data. Refer to your PostgreSQL manual for information on creating views.

Some details about PostgreSQL layers

This section contains some details on how QGIS accesses PostgreSQL layers. Most of the time, QGIS should simply provide you with a list of database tables that can be loaded, and it will load them on request. However, if you have trouble loading a PostgreSQL table into QGIS, the information below may help you understand any QGIS messages and give you direction on changing the PostgreSQL table or view definition to allow QGIS to load it.

QGIS requires that PostgreSQL layers contain a column that can be used as a unique key for the layer. For tables, this usually means that the table needs a primary key, or a column with a unique constraint on it. In QGIS, this column needs to be of type int4 (an integer of size 4 bytes). Alternatively, the ctid column can be used as primary key. If a table lacks these items, the oid column will be used instead. Performance will be improved if the column is indexed (note that primary keys are automatically indexed in PostgreSQL).

If the PostgreSQL layer is a view, the same requirement exists, but views do not have primary keys or columns with unique constraints on them. You have to define a primary key field (has to be integer) in the QGIS dialog before you can load the view. If a suitable column does not exist in the view, QGIS will not load the layer. If this occurs, the solution is to alter the view so that it does include a suitable column (a type of integer and either a primary key or with a unique constraint, preferably indexed).

QGIS offers a checkbox **Select at id** that is activated by default. This option gets the ids without the attributes which is faster in most cases. It can make sense to disable this option when you use expensive views.

12.1.7 Importing Data into PostgreSQL

Data can be imported into PostgreSQL/PostGIS using several tools, including the SPIT plugin and the command line tools shp2pgsql and ogr2ogr.

DB Manager

QGIS comes with a core plugin named DB Manager. It can be used to load shapefiles and other data formats, and it includes support for schemas. See section *Complemento administrador de BBDD* for more information.

shp2pgsql

PostGIS includes an utility called **shp2pgsql** that can be used to import shapefiles into a PostGIS-enabled database. For example, to import a shapefile named `lakes.shp` into a PostgreSQL database named `gis_data`, use the following command:

```
shp2pgsql -s 2964 lakes.shp lakes_new | psql gis_data
```

This creates a new layer named `lakes_new` in the `gis_data` database. The new layer will have a spatial reference identifier (SRID) of 2964. See section *Working with Projections* for more information on spatial reference systems and projections.

Truco: Exporting datasets from PostGIS

Like the import tool **shp2pgsql**, there is also a tool to export PostGIS datasets as shapefiles: **pgsql2shp**. This is shipped within your PostGIS distribution.

ogr2ogr

Besides **shp2pgsql** and **DB Manager**, there is another tool for feeding geodata in PostGIS: **ogr2ogr**. This is part of your GDAL installation.

To import a shapefile into PostGIS, do the following:

```
ogr2ogr -f "PostgreSQL" PG:"dbname=postgis host=myhost.de user=postgres
password=topsecret" alaska.shp
```

This will import the shapefile `alaska.shp` into the PostGIS database *postgis* using the user *postgres* with the password *topsecret* on host server *myhost.de*.

Note that OGR must be built with PostgreSQL to support PostGIS. You can verify this by typing (in)

```
ogrinfo --formats | grep -i post
```

If you prefer to use PostgreSQL's **COPY** command instead of the default **INSERT INTO** method, you can export the following environment variable (at least available on and):

```
export PG_USE_COPY=YES
```

ogr2ogr does not create spatial indexes like **shp2pgsl** does. You need to create them manually, using the normal SQL command **CREATE INDEX** afterwards as an extra step (as described in the next section *Improving Performance*).

Improving Performance

Retrieving features from a PostgreSQL database can be time-consuming, especially over a network. You can improve the drawing performance of PostgreSQL layers by ensuring that a PostGIS spatial index exists on each layer in the database. PostGIS supports creation of a GiST (Generalized Search Tree) index to speed up spatial searches of the data (GiST index information is taken from the PostGIS documentation available at http://postgis.refractions.net).

The syntax for creating a GiST index is:

```
CREATE INDEX [indexname] ON [tablename]
  USING GIST ( [geometryfield] GIST_GEOMETRY_OPS );
```

Note that for large tables, creating the index can take a long time. Once the index is created, you should perform a `VACUUM ANALYZE`. See the PostGIS documentation (POSTGIS-PROJECT *Referencias bibliográficas y web*) for more information.

The following is an example of creating a GiST index:

```
gsherman@madison:~/current$ psql gis_data
Welcome to psql 8.3.0, the PostgreSQL interactive terminal.

Type:  \copyright for distribution terms
       \h for help with SQL commands
       \? for help with psql commands
       \g or terminate with semicolon to execute query
       \q to quit

gis_data=# CREATE INDEX sidx_alaska_lakes ON alaska_lakes
gis_data-# USING GIST (the_geom GIST_GEOMETRY_OPS);
CREATE INDEX
gis_data=# VACUUM ANALYZE alaska_lakes;
VACUUM
gis_data=# \q
gsherman@madison:~/current$
```

12.1.8 Vector layers crossing 180° longitude

Many GIS packages don't wrap vector maps with a geographic reference system (lat/lon) crossing the 180 degrees longitude line (http://postgis.refractions.net/documentation/manual-2.0/ST_Shift_Longitude.html). As result, if we open such a map in QGIS, we will see two far, distinct locations, that should appear near each other. In

Figure_vector_4, the tiny point on the far left of the map canvas (Chatham Islands) should be within the grid, to the right of the New Zealand main islands.

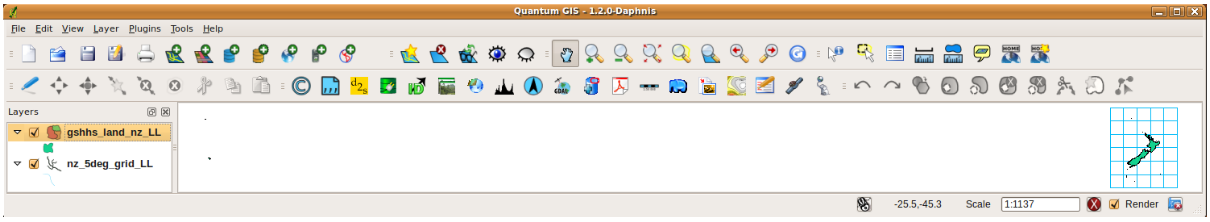

Figura 12.5: Map in lat/lon crossing the 180° longitude line

A work-around is to transform the longitude values using PostGIS and the **ST_Shift_Longitude** function. This function reads every point/vertex in every component of every feature in a geometry, and if the longitude coordinate is < 0°, it adds 360° to it. The result is a 0° - 360° version of the data to be plotted in a 180°-centric map.

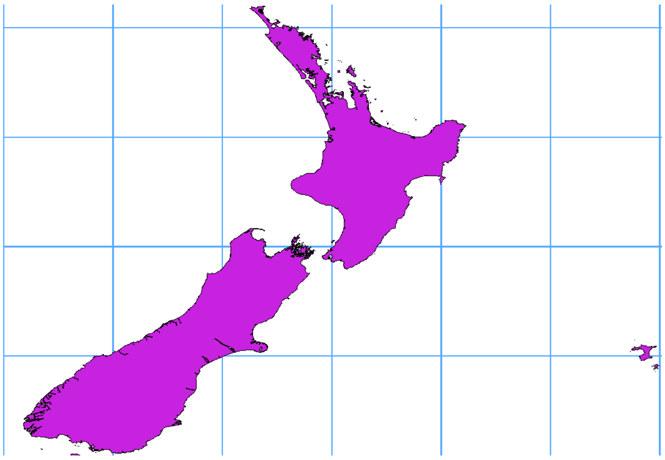

Figura 12.6: Crossing 180° longitude applying the **ST_Shift_Longitude** function

Usage

- Import data into PostGIS (*Importing Data into PostgreSQL*) using, for example, the DB Manager plugin.
- Use the PostGIS command line interface to issue the following command (in this example, "TABLE" is the actual name of your PostGIS table): `gis_data=# update TABLE set the_geom=ST_Shift_Longitude(the_geom);`
- If everything went well, you should receive a confirmation about the number of features that were updated. Then you'll be able to load the map and see the difference (Figure_vector_5).

12.1.9 SpatiaLite Layers

The first time you load data from a SpatiaLite database, begin by clicking on the Add SpatiaLite Layer toolbar button, or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+L`. This will bring up a window that will allow you either to connect to a SpatiaLite database already known to QGIS, which you can choose from the drop-down menu, or to define a new connection to a new database. To define a new connection, click on **[New]** and use the file browser to point to your SpatiaLite database, which is a file with a `.sqlite` extension.

If you want to save a vector layer to SpatiaLite format, you can do this by right clicking the layer in the legend. Then, click on *Save as..*, define the name of the output file, and select 'SpatiaLite' as format and the CRS. Also, you can select 'SQLite' as format and then add `SPATIALITE=YES` in the OGR data source creation option field. This tells OGR to create a SpatiaLite database. See also http://www.gdal.org/ogr/drv_sqlite.html.

QGIS also supports editable views in SpatiaLite.

Creating a new SpatiaLite layer

If you want to create a new SpatiaLite layer, please refer to section *Creating a new SpatiaLite layer*.

Truco: SpatiaLite data management Plugins

For SpatiaLite data management, you can also use several Python plugins: QSpatiaLite, SpatiaLite Manager or DB Manager (core plugin, recommended). If necessary, they can be downloaded and installed with the Plugin Installer.

12.1.10 MSSQL Spatial Layers

QGIS also provides native MS SQL 2008 support. The first time you load MSSQL Spatial data, begin by clicking on the Add MSSQL Spatial Layer toolbar button or by selecting the *Add MSSQL Spatial Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+M`.

12.1.11 Oracle Spatial Layers

The spatial features in Oracle Spatial aid users in managing geographic and location data in a native type within an Oracle database. QGIS now has support for such layers.

Creating a stored Connection

The first time you use an Oracle Spatial data source, you must create a connection to the database that contains the data. Begin by clicking on the Add Orcale Spatial Layer toolbar button, selecting the *Add Orcale Spatial Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+O`. To access the connection manager, click on the **[New]** button to display the *Create a New Oracle Spatial Connection* dialog. The parameters required for a connection are:

- **Name**: A name for this connection. It can be the same as *Database*
- **Database**: SID or SERVICE_NAME of the Oracle instance.
- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: Port number the PostgreSQL database server listens on. The default port is 1521.
- **Username**: Username used to login to the database.
- **Password**: Password used with *Username* to connect to the database.

Optionally, you can activate following checkboxes:

- *Save Username* Indicates whether to save the database username in the connection configuration.
- *Save Password* Indicates whether to save the database password in the connection settings.
- *Only look in meta data table* Restricts the displayed tables to those that are in the all_sdo_geom_metadata view. This can speed up the initial display of spatial tables.

- *Only look for user's tables* When searching for spatial tables, restrict the search to tables that are owned by the user.
- *Also list tables with no geometry* Indicates that tables without geometry should also be listed by default.
- *Use estimated table statistics for the layer metadata* When the layer is set up, various metadata are required for the Oracle table. This includes information such as the table row count, geometry type and spatial extents of the data in the geometry column. If the table contains a large number of rows, determining this metadata can be time-consuming. By activating this option, the following fast table metadata operations are done: Row count is determined from `all_tables.num_rows`. Table extents are always determined with the SDO_TUNE.EXTENTS_OF function, even if a layer filter is applied. Table geometry is determined from the first 100 non-null geometry rows in the table.
- *Only existing geometry types* Only list the existing geometry types and don't offer to add others.

Once all parameters and options are set, you can test the connection by clicking on the **[Test Connect]** button.

Truco: QGIS User Settings and Security

Depending on your computing environment, storing passwords in your QGIS settings may be a security risk. Passwords are saved in clear text in the system configuration and in the project files! Your customized settings for QGIS are stored based on the operating system:

- The settings are stored in your home directory in `~/.qgis2`.
- The settings are stored in the registry.

Loading an Oracle Spatial Layer

Once you have one or more connections defined, you can load layers from the Oracle database. Of course, this requires having data in Oracle.

To load a layer from Oracle Spatial, perform the following steps:

- If the *Add Oracle Spatial layers* dialog is not already open, click on the Add Oracle Spatial Layer toolbar button.
- Choose the connection from the drop-down list and click **[Connect]**.
- Select or unselect *Also list tables with no geometry*.
- Optionally, use some *Search Options* to define which features to load from the layer or use the **[Build query]** button to start the *Query builder* dialog.
- Find the layer(s) you wish to add in the list of available layers.
- Select it by clicking on it. You can select multiple layers by holding down the `Shift` key while clicking. See section *Constructor de consultas* for information on using the Oracle Query Builder to further define the layer.
- Click on the **[Add]** button to add the layer to the map.

Truco: Oracle Spatial Layers

Normally, an Oracle Spatial layer is defined by an entry in the **USER_SDO_METADATA** table.

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12.2 The Symbol Library

12.2.1 Presentation

The Symbol Library is the place where users can create generic symbols to be used in several QGIS projects. It allows users to export and import symbols, groups symbols and add, edit and remove symbols. You can open it with the *Settings* → *Style Library* or from the **Style** tab in the vector layer's *Properties*.

Share and import symbols

Users can export and import symbols in two main formats: qml (QGIS format) and SLD (OGC standard). Note that SLD format is not fully supported by QGIS.

share item displays a drop down list to let the user import or export symbols.

Groups and smart groups

Groups are categories of Symbols and smart groups are dynamic groups.

To create a group, right-click on an existing group or on the main **Groups** directory in the left of the library. You can also select a group and click on the add item button.

To add a symbol into a group, you can either right click on a symbol then choose *Apply group* and then the group name added before. There is a second way to add several symbols into group: just select a group and click and choose **Group Symbols**. All symbols display a checkbox that allow you to add the symbol into the selected groups. When finished, you can click on the same button, and choose **Finish Grouping**.

Create **Smart Symbols** is similar to creating group, but instead select **Smart Groups**. The dialog box allow user to choose the expression to select symbols in order to appear in the smart group (contains some tags, member of a group, have a string in its name, etc.)

Add, edit, remove symbol

With the *Style manager* from the **[Symbol]** menu you can manage your symbols. You can add item, edit item, remove item and share item. 'Marker' symbols, 'Line' symbols, 'Fill' patterns and 'colour ramps' can be used to create the symbols. The symbols are then assigned to 'All Symbols', 'Groups' or 'Smart groups'.

For each kind of symbols, you will find always the same dialog structure:

- at the top left side a symbol representation
- under the symbol representation the symbol tree show the symbol layers
- at the right you can setup some parameter (unit,transparency, color, size and rotation)
- under these parameteres you find some symbol from the symbol library

The symbol tree allow adding, removing or protect new simple symbol. You can move up or down the symbol layer.

More detailed settings can be made when clicking on the second level in the *Symbol layers* dialog. You can define *Symbol layers* that are combined afterwards. A symbol can consist of several *Symbol layers*. Settings will be shown later in this chapter.

Truco: Note that once you have set the size in the lower levels of the *Symbol layers* dialog, the size of the whole symbol can be changed with the *Size* menu in the first level again. The size of the lower levels changes accordingly, while the size ratio is maintained.

12.2.2 Marker Symbols

Marker symbols have several symbol layer types:

- Ellipse marker
- Font marker
- Simple marker (default)
- SVG marker
- Vector Field marker

The following settings are possible:

- *Symbol layer type*: You have the option to use Ellipse markers, Font markers, Simple markers, SVG markers and Vector Field markers.
- *colors*
- *Size*
- *Outline style*
- *Outline width*
- *Angle*
- *Offset X,Y*: You can shift the symbol in the x- or y-direction.
- *Anchor point*
- *Data defined properties ...*

12.2.3 Line Symbols

Line marker symbols have only two symbol layer types:

- Marker line
- Simple line (default)

The default symbol layer type draws a simple line whereas the other display a marker point regularly on the line. You can choose different location vertex, interval or central point. Marker line can have offset along the line or offset line. Finally, *rotation* allows you to change the orientation of the symbol.

The following settings are possible:

- *colour*
- *Pen width*
- *Offset*
- *Pen style*
- *Join style*
- *Cap style*
- *Use custom dash pattern*
- *Dash pattern unit*
- *Data defined properties ...*

12.2.4 Polygon Symbols

Polygon marker symbols have also several symbol layer types:

- Centroid fill
- Gradient fill
- Line pattern fill
- Point pattern fill
- SVG fill
- Shapeburst fille
- Simple fill (default)
- Outline: Marker line (same as line marker)
- Outline: simple line (same as line marker)

The following settings are possible:

- *Colors* for the border and the fill.
- *Fill style*
- *Border style*
- *Border width*
- *Offset X,Y*
- *Data defined properties ...*

Using the color combo box, you can drag and drop color for one color button to another button, copy-paste color, pick color from somewhere, choose a color from the palette or from recent or standard color. The combo box allow you to fill in the feature with transparency. You can also just clic on the button to open the palettte dialog. Note that you can import color from some external software like GIMP.

'Gradient Fill' *Symbol layer type* allows you to select between a *Two color* and *Color ramp* setting. You can use the *Feature centroid* as *Referencepoint*. All fills 'Gradient Fill' *Symbol layer type* is also available through the *Symbol* menu of the Categorized and Graduated Renderer and through the *Rule properties* menu of the Rule-based renderer. Other possibility is to choose a 'shapeburst fill' which is a buffered gradient fill, where a gradient is drawn from the boundary of a polygon towards the polygon's centre. Configurable parameters include distance from the boundary to shade, use of color ramps or simple two color gradients, optional blurring of the fill and offsets.

It is possible to only draw polygon borders inside the polygon. Using 'Outline: Simple line' select *Draw line only inside polygon*.

12.2.5 Color ramp

You can create a custom color ramp choosing *New color ramp...* from the *color ramp* drop-down menu. A dialog will prompt for the ramp type: Gradient, Random, colorBrewer, or cpt-city. The first three have options for number of steps and/or multiple stops in the color ramp. You can use the *Invert* option while classifying the data with a color ramp. See figure_symbology_3 for an example of custom color ramp and figure_symbology_3a for the cpt-city dialog.

The cpt-city option opens a new dialog with hundreds of themes included 'out of the box'.

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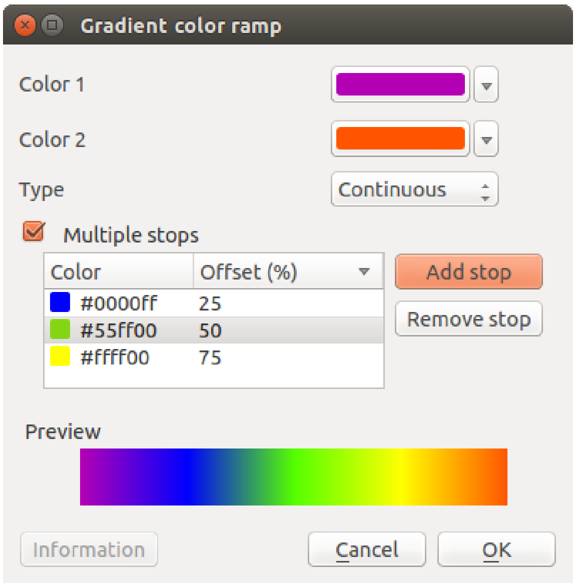

Figura 12.7: Example of custom gradient color ramp with multiple stops

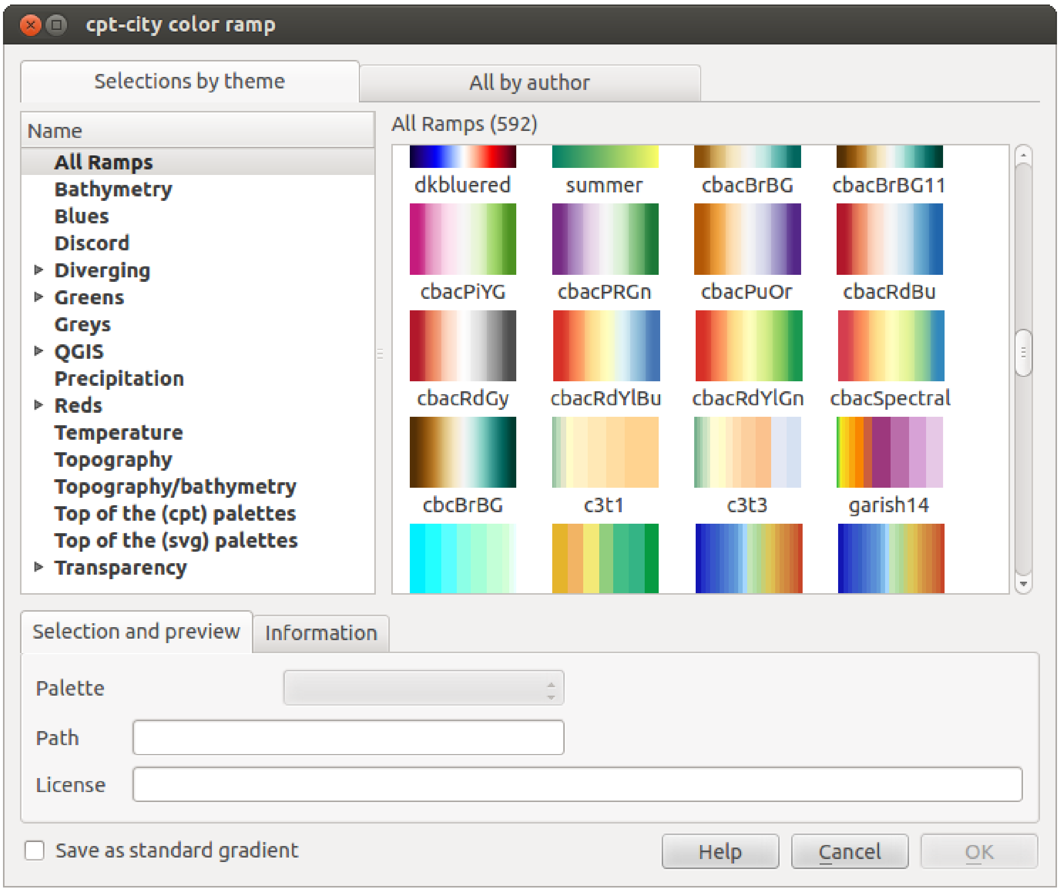

Figura 12.8: cpt-city dialog with hundreds of color ramps

12.3 The Vector Properties Dialog

The *Layer Properties* dialog for a vector layer provides information about the layer, symbology settings and labeling options. If your vector layer has been loaded from a PostgreSQL/PostGIS datastore, you can also alter the underlying SQL for the layer by invoking the *Query Builder* dialog on the *General* tab. To access the *Layer Properties* dialog, double-click on a layer in the legend or right-click on the layer and select *Properties* from the pop-up menu.

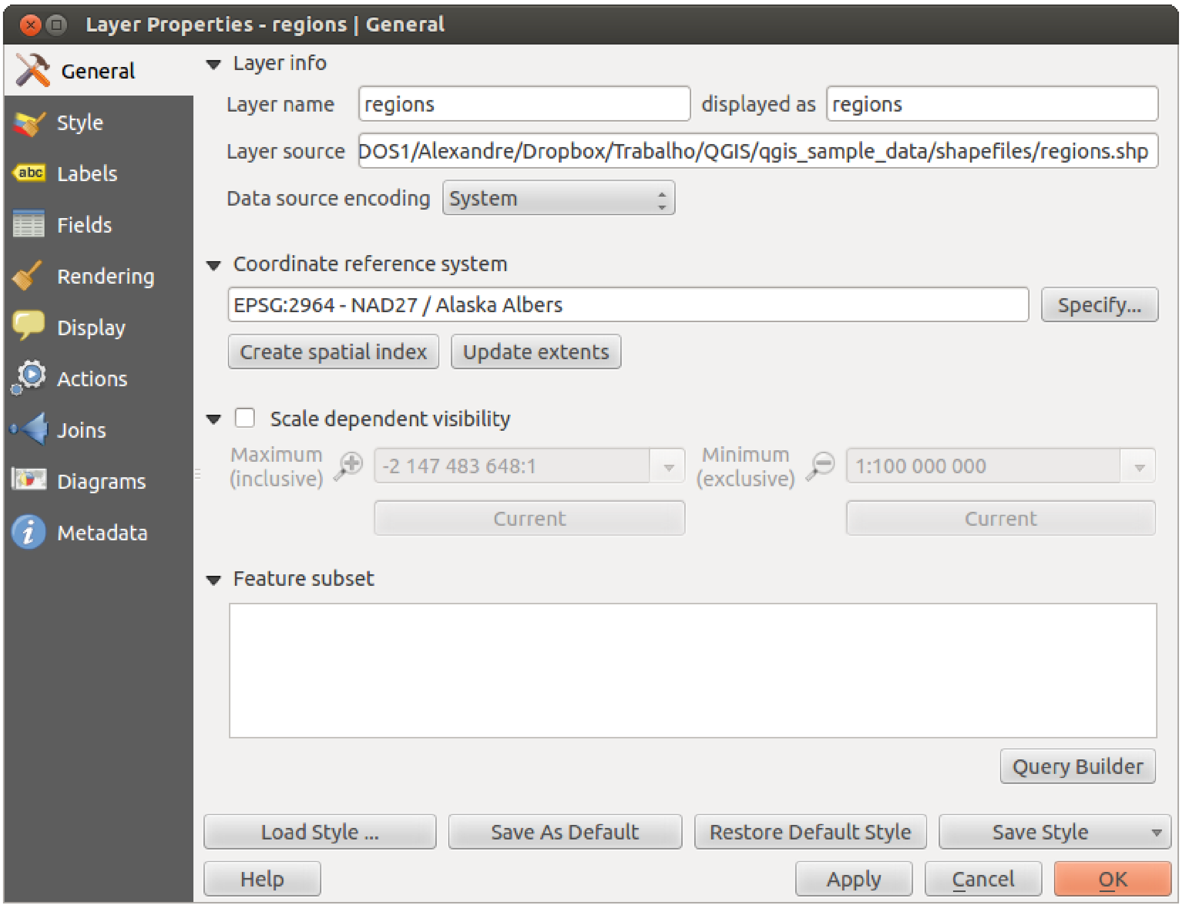

Figura 12.9: Vector Layer Properties Dialog

12.3.1 Style Menu

The Style menu provides you with a comprehensive tool for rendering and symbolizing your vector data. You can use *Layer rendering* → tools that are common to all vector data, as well as special symbolizing tools that were designed for the different kinds of vector data.

Renderers

The renderer is responsible for drawing a feature together with the correct symbol. There are four types of renderers: single symbol, categorized, graduated and rule-based. There is no continuous color renderer, because it is in fact only a special case of the graduated renderer. The categorized and graduated renderers can be created by specifying a symbol and a color ramp - they will set the colors for symbols appropriately. For point layers, there is a point displacement renderer available. For each data type (points, lines and polygons), vector symbol layer types are available. Depending on the chosen renderer, the *Style* menu provides different additional sections. On the bottom right of the symbology dialog, there is a **[Symbol]** button, which gives access to the Style Manager (see *Presentation*). The Style Manager allows you to edit and remove existing symbols and add new ones.

After having made any needed changes, the symbol can be added to the list of current style symbols (using **[Symbol]** *Save in symbol library*), and then it can easily be used in the future. Furthermore, you can use the **[Save Style]** button to save the symbol as a QGIS layer style file (.qml) or SLD file (.sld). SLDs can be exported from any type of renderer – single symbol, categorized, graduated or rule-based – but when importing an SLD, either a single symbol or rule-based renderer is created. That means that categorized or graduated styles are converted to rule-based. If you want to preserve those renderers, you have to stick to the QML format. On the other hand, it can be very handy sometimes to have this easy way of converting styles to rule-based.

If you change the renderer type when setting the style of a vector layer the settings you made for the symbol will be maintained. Be aware that this procedure only works for one change. If you repeat changing the renderer type the settings for the symbol will get lost.

If the datasource of the layer is a database (PostGIS or Spatialite for example), you can save your layer style inside a table of the database. Just clic on :guilabel:‘ Save Style‘ comboxbox and choose **Save in database** item then fill in the dialog to define a style name, add a description, an ui file and if the style is a default style. When loading a layer from the database, if a style already exists for this layer, QGIS will load the layer and its style. You can add several style in the database. Only one will be the default style anyway.

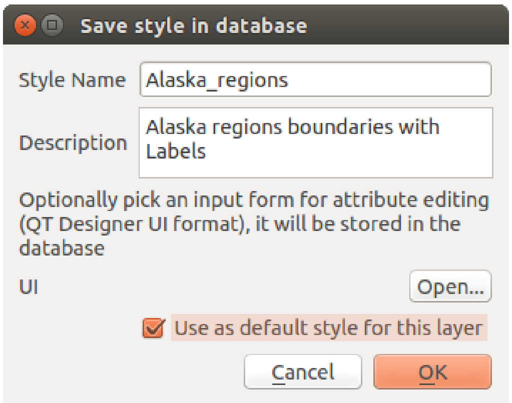

Figura 12.10: Save Style in database Dialog

Truco: Select and change multiple symbols

The Symbology allows you to select multiple symbols and right click to change color, transparency, size, or width of selected entries.

Single Symbol Renderer

The Single Symbol Renderer is used to render all features of the layer using a single user-defined symbol. The properties, which can be adjusted in the *Style* menu, depend partially on the type of layer, but all types share the following dialog structure. In the top-left part of the menu, there is a preview of the current symbol to be rendered. On the right part of the menu, there is a list of symbols already defined for the current style, prepared to be used by selecting them from the list. The current symbol can be modified using the menu on the right side. If you click on the first level in the *Symbol layers* dialog on the left side, it’s possible to define basic parameters like *Size*, *Transparency*, *color* and *Rotation*. Here, the layers are joined together.

Categorized Renderer

The Categorized Renderer is used to render all features from a layer, using a single user-defined symbol whose color reflects the value of a selected feature’s attribute. The *Style* menu allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expressions*)
- The symbol (using the Symbol dialog)
- The colors (using the color Ramp listbox)

Then click on **Classify** button to create classes from the distinct value of the attribute column. Each classes can be disabled unchecking the checkbox at the left of the class name.

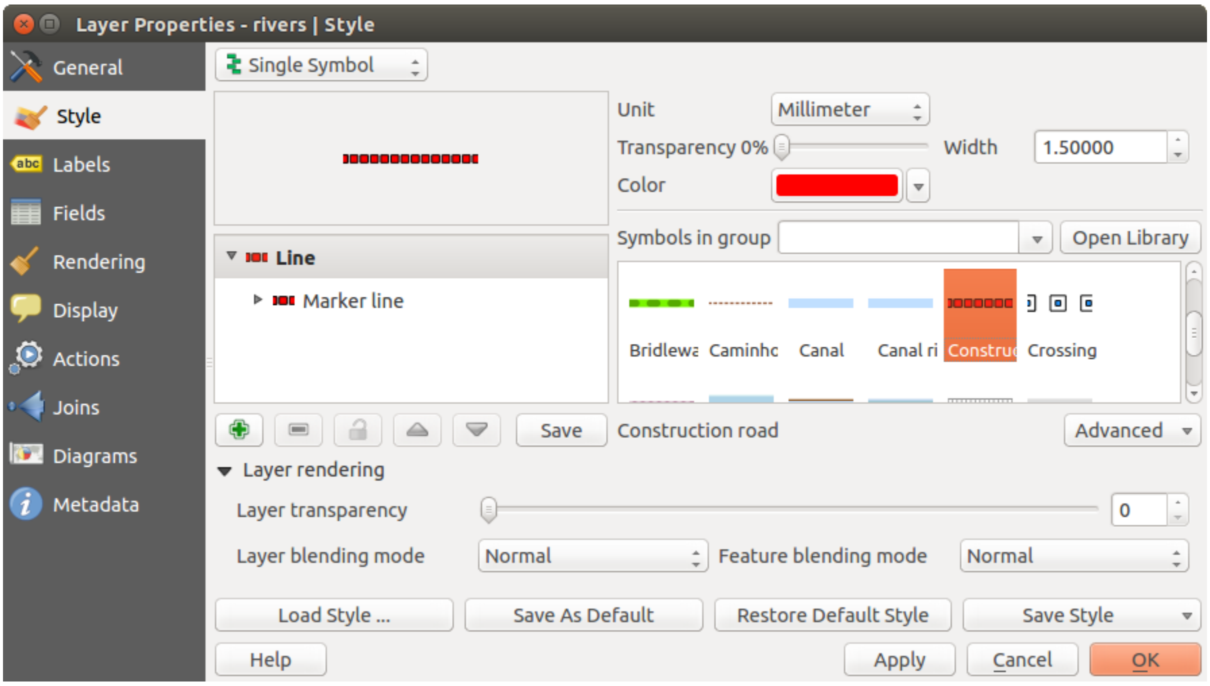

Figura 12.11: Single symbol line properties

You can change symbol, value and/or label of the clic, just double clicking on the item you want to change.

Right-clic shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The **[Advanced]** button in the lower-right corner of the dialog allows you to set the fields containing rotation and size scale information. For convenience, the center of the menu lists the values of all currently selected attributes together, including the symbols that will be rendered.

The example in figure_symbology_2 shows the category rendering dialog used for the rivers layer of the QGIS sample dataset.

Graduated Renderer

The Graduated Renderer is used to render all the features from a layer, using a single user-defined symbol whose color reflects the assignment of a selected feature's attribute to a class.

Like the Categorized Renderer, the Graduated Renderer allows you to define rotation and size scale from specified columns.

Also, analogous to the Categorized Renderer, the *Style* tab allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expressions* chapter)
- The symbol (using the Symbol Properties button)
- The colors (using the color Ramp list)

Additionally, you can specify the number of classes and also the mode for classifying features within the classes (using the Mode list). The available modes are:

- Equal Interval: each class has the same size (e.g. values from 0 to 16 and 4 classes, each class has a size of 4);
- Quantile: each class will have the same number of element inside (the idea of a boxplot);
- Natural Breaks (Jenks): the variance within each class is minimal while the variance between classes is maximal;
- Standard Deviation: classes are built depending on the standard deviation of the values;

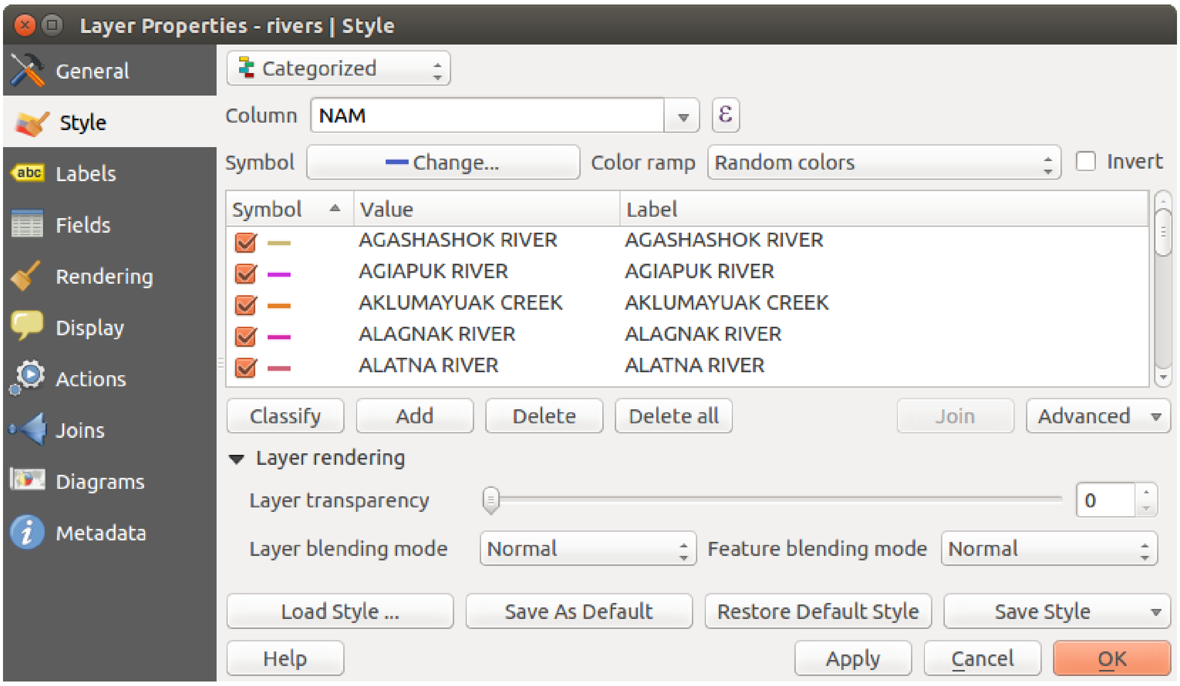

Figura 12.12: Categorized Symbolizing options

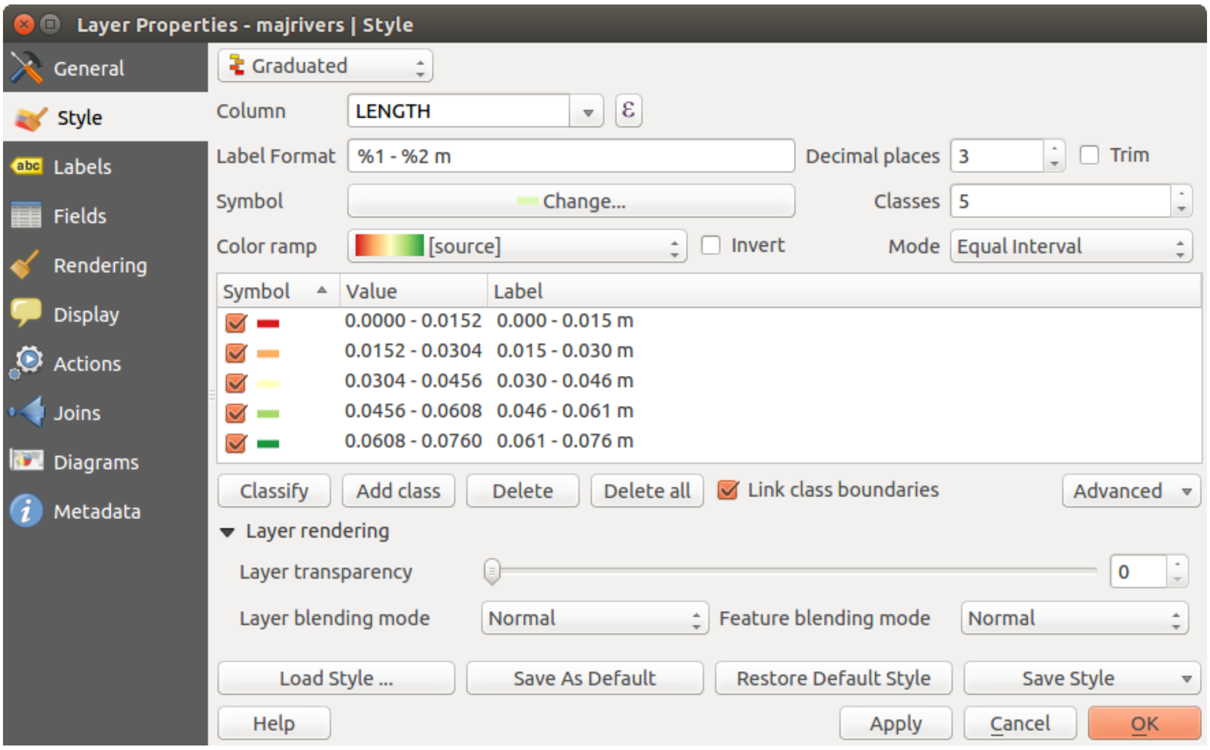

Figura 12.13: Graduated Symbolizing options

- Pretty Breaks: the same of natural breaks but the extremes number of each class are integers.

The listbox in the center part of the *Style* menu lists the classes together with their ranges, labels and symbols that will be rendered.

Click on **Classify** button to create classes using the choosen mode. Each classes can be disabled unchecking the checkbox at the left of the class name.

You can change symbol, value and/or label of the clic, just double clicking on the item you want to change.

Right-clic shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The example in figure_symbology_4 shows the graduated rendering dialog for the rivers layer of the QGIS sample dataset.

Truco: Thematic maps using an expression

Categorized and graduated thematic maps can now be created using the result of an expression. In the properties dialog for vector layers, the attribute chooser has been augmented with a ε... *Set column expression* function. So now you no longer need to write the classification attribute to a new column in your attribute table if you want the classification attribute to be a composite of multiple fields, or a formula of some sort.

Rule-based rendering

The Rule-based Renderer is used to render all the features from a layer, using rule based symbols whose color reflects the assignment of a selected feature's attribute to a class. The rules are based on SQL statements. The dialog allows rule grouping by filter or scale, and you can decide if you want to enable symbol levels or use only the first-matched rule.

The example in figure_symbology_5 shows the rule-based rendering dialog for the rivers layer of the QGIS sample dataset.

To create a rule, activate an existing row by double-clicking on it, or click on '+' and click on the new rule. In the *Rule properties* dialog, you can define a label for the rule. Press the ... button to open the expression string builder. In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box (see *Expressions*). You can create a new rule by copying and pasting an existing rule with the right mouse button. You can also use the 'ELSE' rule that will be run if none of the other rules on that level match. Since QGIS 2.6 the label for the rules appears in a pseudotree in the map legend. Just double-klick the rules in the map legend and the Style menu of the layer properties appears showing the rule that is the background for the symbol in the pseudotree.

Point displacement

The Point Displacement Renderer works to visualize all features of a point layer, even if they have the same location. To do this, the symbols of the points are placed on a displacement circle around a center symbol.

Truco: Export vector symbology

You have the option to export vector symbology from QGIS into Google *.kml, *.dxf and MapInfo *.tab files. Just open the right mouse menu of the layer and click on *Save selection as* → to specify the name of the output file and its format. In the dialog, use the *Symbology export* menu to save the symbology either as *Feature symbology* → or as *Symbol layer symbology* →. If you have used symbol layers, it is recommended to use the second setting.

Inverted Polygon

Inverted polygon renderer allows user to define a symbol to fill in outside of the layer's polygons. As before you can select a subrenderers. These subrenderers are the same as for the main renderers.

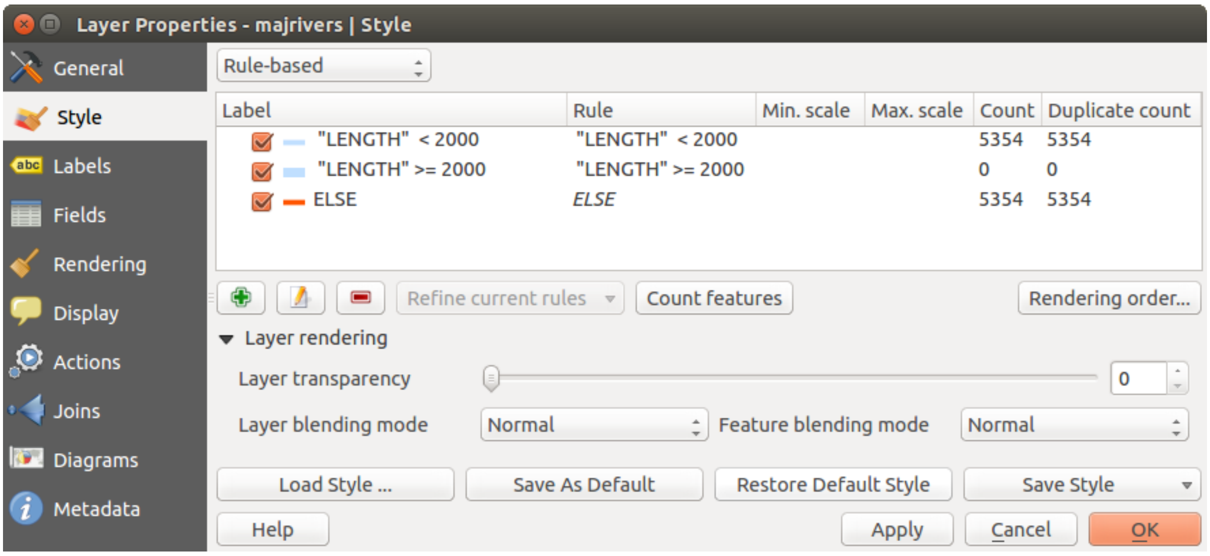

Figura 12.14: Rule-based Symbolizing options

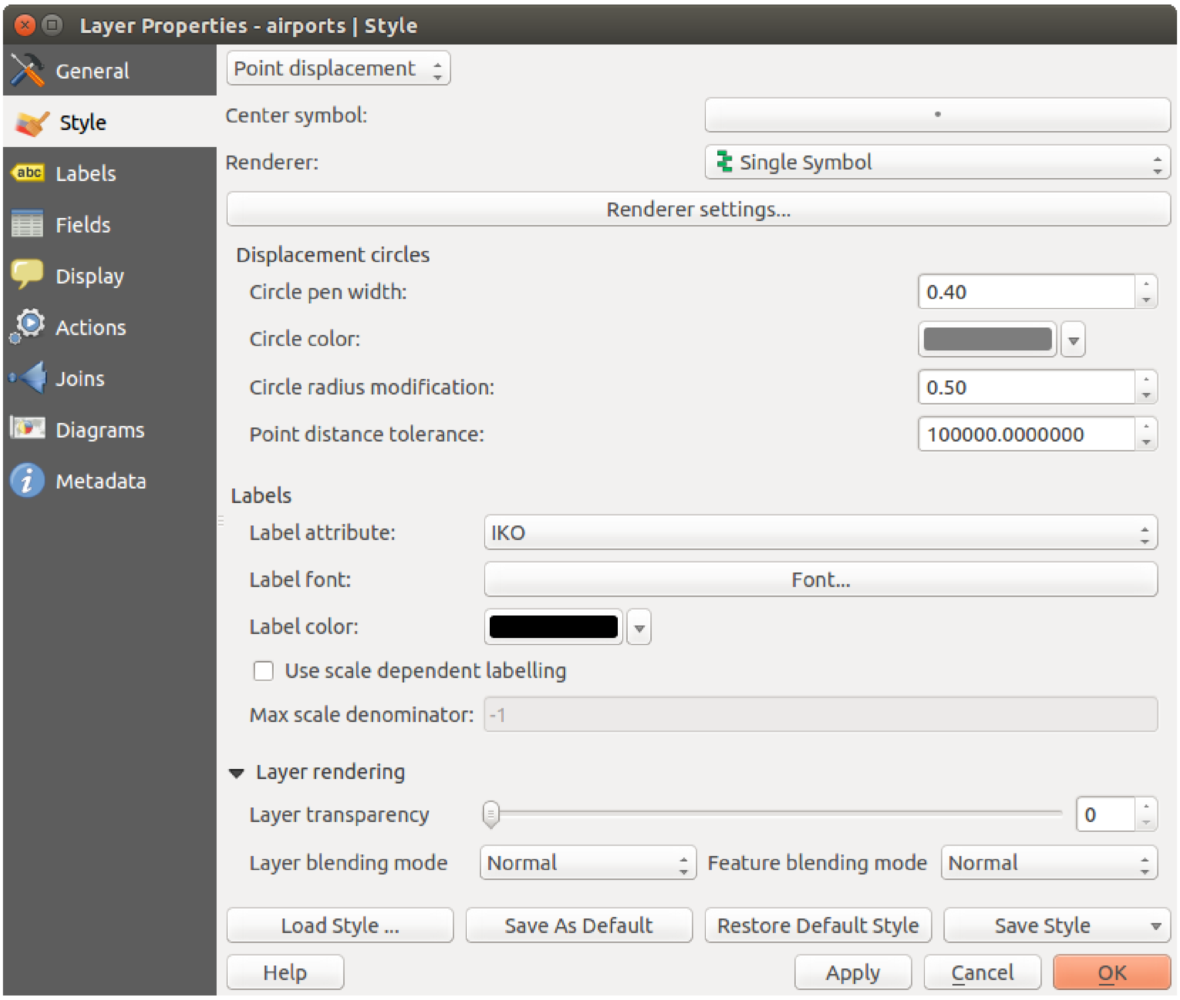

Figura 12.15: Point displacement dialog

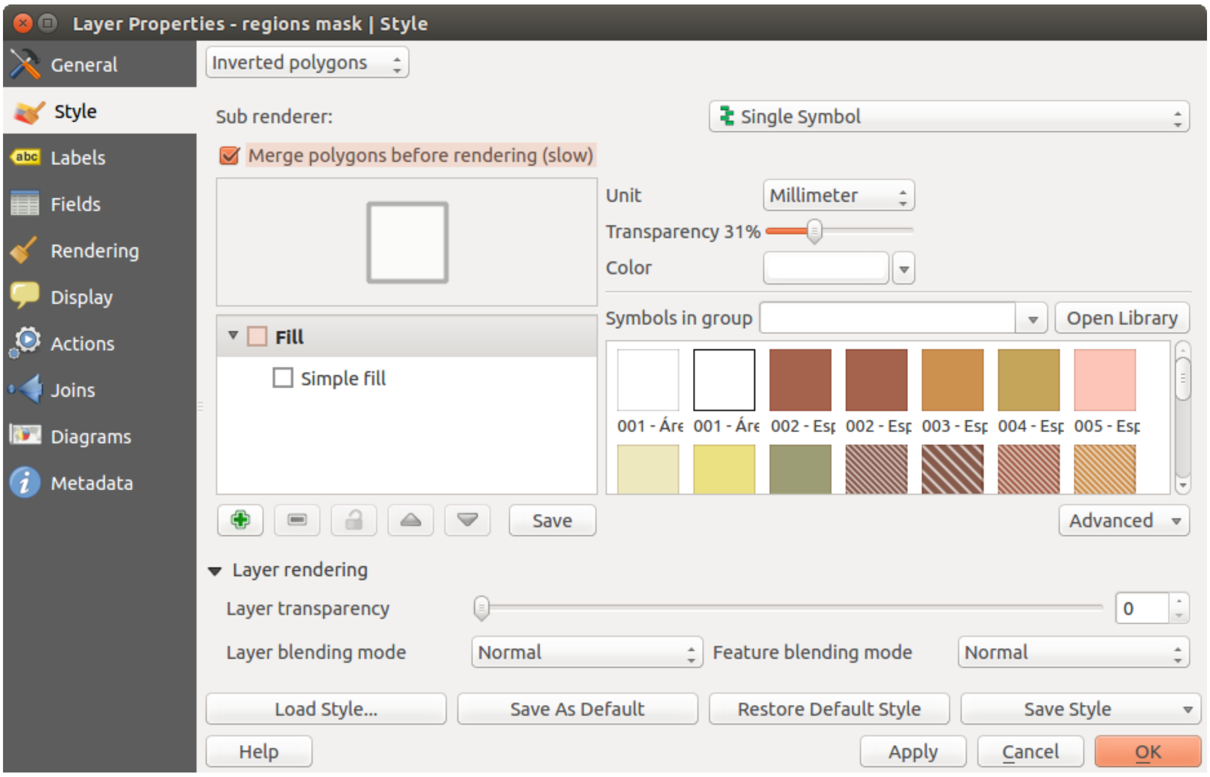

Figura 12.16: Inverted Polygon dialog

Color Picker

Regardless the type of style to be used, the *select color* dialog will show when you click to choose a color - either border or fill color. This dialog has four different tabs which allow you to select colors by color ramp, color wheel, color swatches or color picker.

Whatever method you use, the selected color is always described through color sliders for HSV (Hue, Saturation, Value) and RGB (Red, Green, Blue) values. There is also an *opacity* slider to set transparency level. On the lower left part of the dialog you can see a comparison between the *current* and the *new* color you are presently selecting and on the lower right part you have the option to add the color you just tweaked into a color slot button.

With color ramp or with color wheel, you can browse to all possible color combinations. There are other possibilities though. By using *color swatches* you can choose from a preselected list. This selected list is populated with one of three methods: *Recent colors*, *Standard colors* or *Project colors*

Another option is to use the color picker which allows you to sample a color from under your mouse pointer at any part of QGIS or even from another application by pressing the space bar. Please note that the color picker is OS dependent and is currently not supported by OSX.

Truco: quick color picker + copy/paste colors

You can quickly choose from *Recent colors*, from *Standard colors* or simply *copy* or *paste* a color by clicking the drop-down arrow that follows a current color box.

Layer rendering

- *Layer transparency* : You can make the underlying layer in the map canvas visible with this tool. Use the slider to adapt the visibility of your vector layer to your needs. You can also make a precise

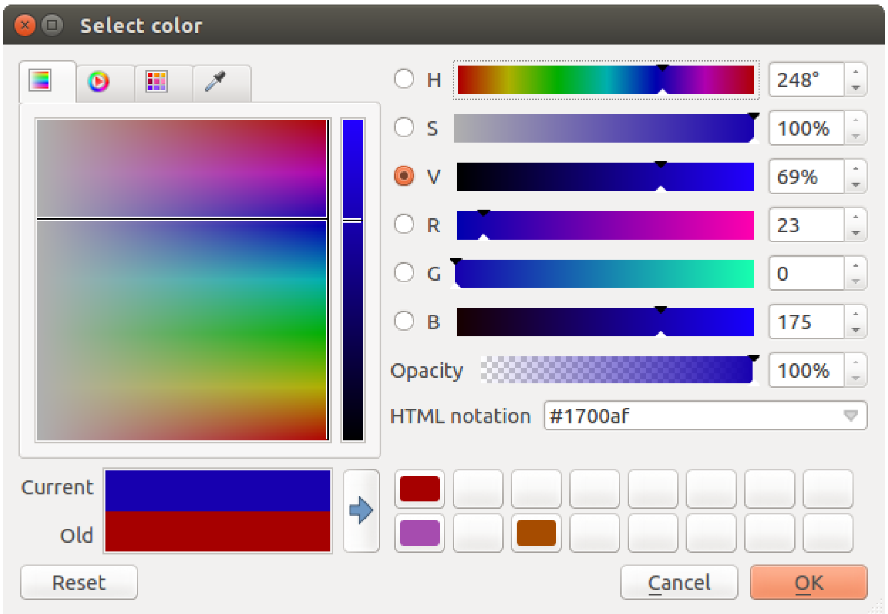

Figura 12.17: Color picker ramp tab

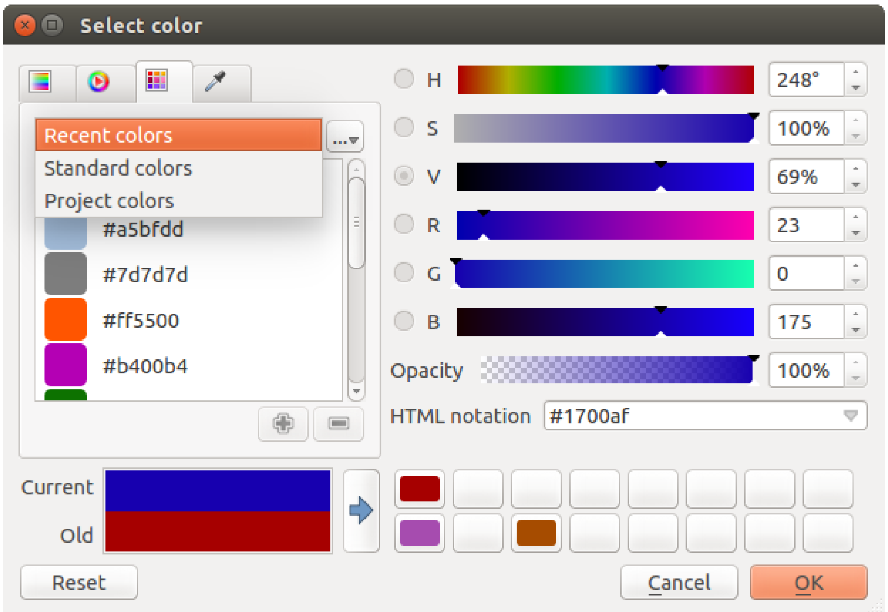

Figura 12.18: Color picker swatcher tab

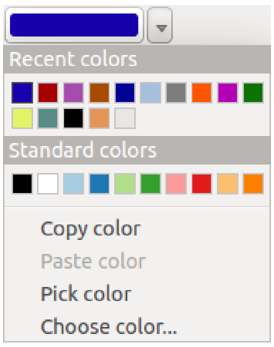

Figura 12.19: Quick color picker menu

definition of the percentage of visibility in the the menu beside the slider.

- *Layer blending mode* and *Feature blending mode*: You can achieve special rendering effects with these tools that you may previously only know from graphics programs. The pixels of your overlaying and underlaying layers are mixed through the settings described below.
  - Normal: This is the standard blend mode, which uses the alpha channel of the top pixel to blend with the pixel beneath it. The colors aren't mixed.
  - Lighten: This selects the maximum of each component from the foreground and background pixels. Be aware that the results tend to be jagged and harsh.
  - Screen: Light pixels from the source are painted over the destination, while dark pixels are not. This mode is most useful for mixing the texture of one layer with another layer (e.g., you can use a hillshade to texture another layer).
  - Dodge: Dodge will brighten and saturate underlying pixels based on the lightness of the top pixel. So, brighter top pixels cause the saturation and brightness of the underlying pixels to increase. This works best if the top pixels aren't too bright; otherwise the effect is too extreme.
  - Addition: This blend mode simply adds pixel values of one layer with the other. In case of values above one (in the case of RGB), white is displayed. This mode is suitable for highlighting features.
  - Darken: This creates a resultant pixel that retains the smallest components of the foreground and background pixels. Like lighten, the results tend to be jagged and harsh.
  - Multiply: Here, the numbers for each pixel of the top layer are multiplied with the corresponding pixels for the bottom layer. The results are darker pictures.
  - Burn: Darker colors in the top layer cause the underlying layers to darken. Burn can be used to tweak and colorise underlying layers.
  - Overlay: This mode combines the multiply and screen blending modes. In the resulting picture, light parts become lighter and dark parts become darker.
  - Soft light: This is very similar to overlay, but instead of using multiply/screen it uses color burn/dodge. This is supposed to emulate shining a soft light onto an image.
  - Hard light: Hard light is also very similar to the overlay mode. It's supposed to emulate projecting a very intense light onto an image.
  - Difference: Difference subtracts the top pixel from the bottom pixel, or the other way around, to always get a positive value. Blending with black produces no change, as the difference with all colors is zero.
  - Subtract: This blend mode simply subtracts pixel values of one layer from the other. In case of negative values, black is displayed.

12.3.2 Labels Menu

The Labels core application provides smart labeling for vector point, line and polygon layers, and it only requires a few parameters. This new application also supports on-the-fly transformed layers. The core functions of the application have been redesigned. In QGIS, there are a number of other features that improve the labeling. The following menus have been created for labeling the vector layers:

- Text
- Formatting
- Buffer
- Background
- Shadow
- Placement
- Rendering

Let us see how the new menus can be used for various vector layers. **Labeling point layers**

Start QGIS and load a vector point layer. Activate the layer in the legend and click on the Layer Labeling Options icon in the QGIS toolbar menu.

The first step is to activate the *Label this layer with* checkbox and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

The following steps describe a simple labeling without using the *Data defined override* functions, which are situated next to the drop-down menus.

You can define the text style in the *Text* menu (see Figure_labels_1). Use the *Type case* option to influence the text rendering. You have the possibility to render the text 'All uppercase', 'All lowercase' or 'Capitalize first letter'. Use the blend modes to create effects known from graphics programs (see blend_modes).

In the *Formatting* menu, you can define a character for a line break in the labels with the 'Wrap on character' function. Use the *Formatted numbers* option to format the numbers in an attribute table. Here, decimal places may be inserted. If you enable this option, three decimal places are initially set by default.

To create a buffer, just activate the *Draw text buffer* checkbox in the *Buffer* menu. The buffer color is variable. Here, you can also use blend modes (see blend_modes).

If the *color buffer's fill* checkbox is activated, it will interact with partially transparent text and give mixed color transparency results. Turning off the buffer fill fixes that issue (except where the interior aspect of the buffer's stroke intersects with the text's fill) and also allows you to make outlined text.

In the *Background* menu, you can define with *Size X* and *Size Y* the shape of your background. Use *Size type* to insert an additional 'Buffer' into your background. The buffer size is set by default here. The background then consists of the buffer plus the background in *Size X* and *Size Y*. You can set a *Rotation* where you can choose between 'Sync with label', 'Offset of label' and 'Fixed'. Using 'Offset of label' and 'Fixed', you can rotate the background. Define an *Offset X,Y* with X and Y values, and the background will be shifted. When applying *Radius X,Y*, the background gets rounded corners. Again, it is possible to mix the background with the underlying layers in the map canvas using the *Blend mode* (see blend_modes).

Use the *Shadow* menu for a user-defined *Drop shadow*. The drawing of the background is very variable. Choose between 'Lowest label component', 'Text', 'Buffer' and 'Background'. The *Offset* angle depends on the orientation of the label. If you choose the *Use global shadow* checkbox, then the zero point of the angle is always oriented to the north and doesn't depend on the orientation of the label. You can influence the appearance of the shadow with the *Blur radius*. The higher the number, the softer the shadows. The appearance of the drop shadow can also be altered by choosing a blend mode (see blend_modes).

Choose the *Placement* menu for the label placement and the labeling priority. Using the *Offset from point* setting, you now have the option to use *Quadrants* to place your label. Additionally, you can alter the angle of the label placement with the *Rotation* setting. Thus, a placement in a certain quadrant with a certain rotation is possible.

In the *Rendering* menu, you can define label and feature options. Under *Label options*, you find the scale-based visibility setting now. You can prevent QGIS from rendering only selected labels with the *Show all labels for this layer (including colliding labels)* checkbox. Under *Feature options*, you can define whether every part of a multipart feature is to be labeled. It's possible to define whether the number of features to be labeled is limited and to *Discourage labels from covering features*.

Labeling line layers

The first step is to activate the *Label this layer* checkbox in the *Label settings* tab and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

After that, you can define the text style in the *Text* menu. Here, you can use the same settings as for point layers.

Also, in the *Formatting* menu, the same settings as for point layers are possible.

The *Buffer* menu has the same functions as described in section labeling_point_layers.

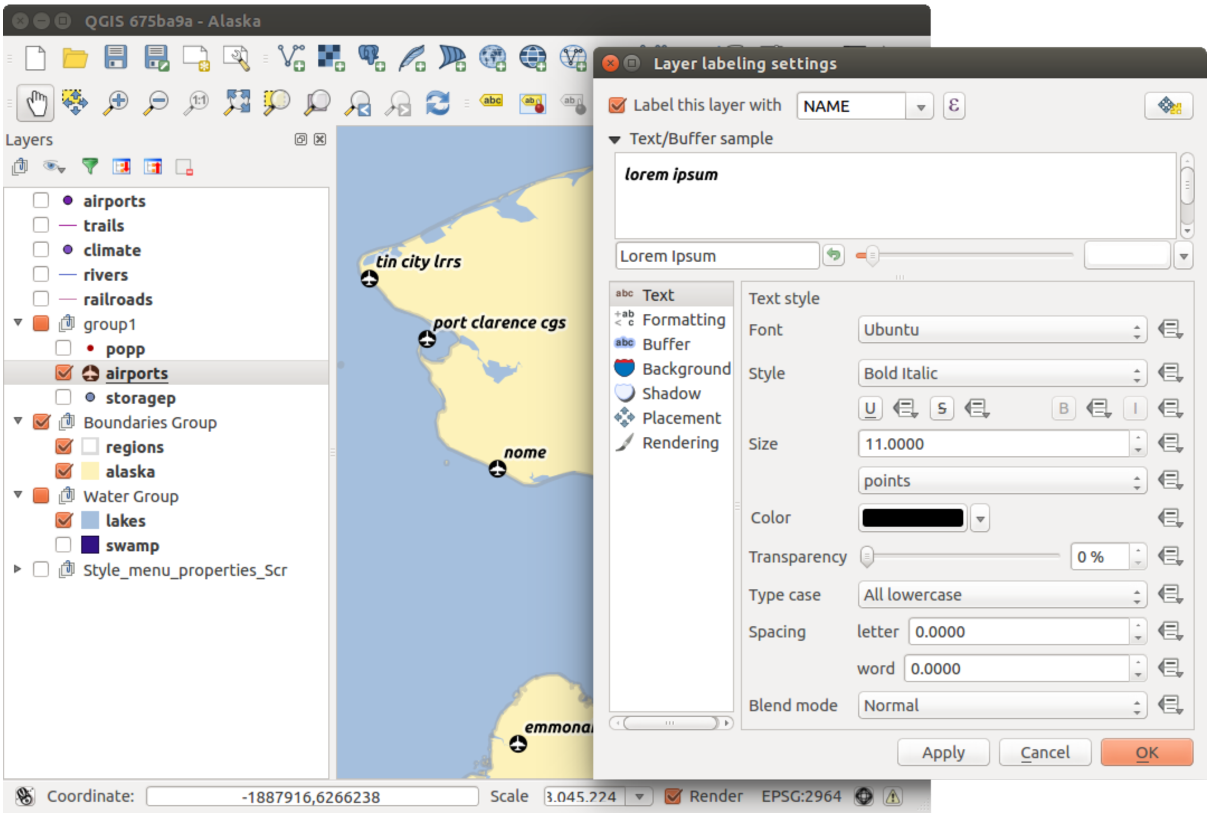

Figura 12.20: Smart labeling of vector point layers

The *Background* menu has the same entries as described in section labeling_point_layers.

Also, the *Shadow* menu has the same entries as described in section labeling_point_layers.

In the *Placement* menu, you find special settings for line layers. The label can be placed *Parallel*, *Curved* or *Horizontal*. With the *Parallel* and *Curved* option, you can define the position *Above line*, *On line* and *Below line*. It's possible to select several options at once. In that case, QGIS will look for the optimal position of the label. Remember that here you can also use the line orientation for the position of the label. Additionally, you can define a *Maximum angle between curved characters* when selecting the *Curved* option (see Figure_labels_2).

You can set up a minimum distance for repeating labels. Distance can be in mm or in map units.

Some Placement setup will display more options, for example, *Curved* and *Parallel* Placements will allow the user to set up the position of the label (above, belw or on the line), *distance* from the line and for *Curved*, the user can also setup inside/outside max angle between curved label.

The *Rendering* menu has nearly the same entries as for point layers. In the *Feature options*, you can now *Suppress labeling of features smaller than*.

Labeling polygon layers

The first step is to activate the *Label this layer* checkbox and select an attribute column to use for labeling. Click ε... if you want to define labels based on expressions - See labeling_with_expressions.

In the *Text* menu, define the text style. The entries are the same as for point and line layers.

The *Formatting* menu allows you to format multiple lines, also similar to the cases of point and line layers.

As with point and line layers, you can create a text buffer in the *Buffer* menu.

Use the *Background* menu to create a complex user-defined background for the polygon layer. You can use the menu also as with the point and line layers.

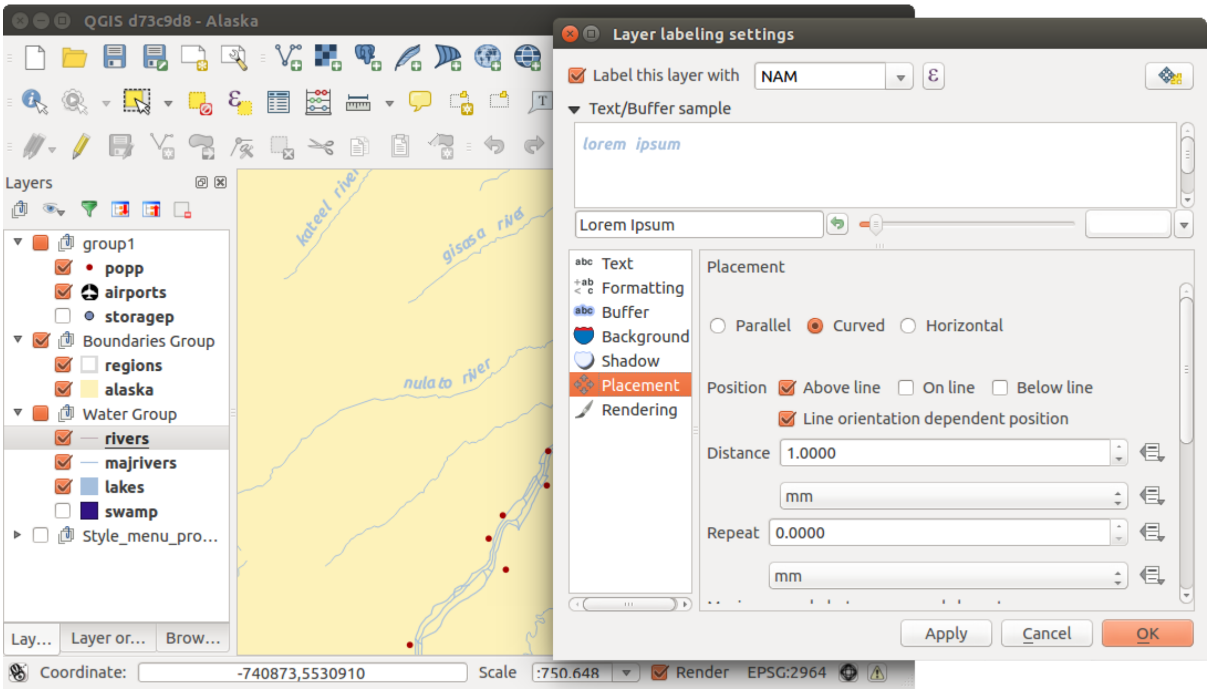

Figura 12.21: Smart labeling of vector line layers

The entries in the *Shadow* menu are the same as for point and line layers.

In the *Placement* menu, you find special settings for polygon layers (see Figure_labels_3). *Offset from centroid*, *Horizontal (slow)*, *Around centroid*, *Free* and *Using perimeter* are possible.

In the *Offset from centroid* settings, you can specify if the centroid is of the *visible polygon* or *whole polygon*. That means that either the centroid is used for the polygon you can see on the map or the centroid is determined for the whole polygon, no matter if you can see the whole feature on the map. You can place your label with the quadrants here, and define offset and rotation. The *Around centroid* setting makes it possible to place the label around the centroid with a certain distance. Again, you can define *visible polygon* or *whole polygon* for the centroid. With the *Using perimeter* settings, you can define a position and a distance for the label. For the position, *Above line*, *On line*, *Below line* and *Line orientation dependent position* are possible.

Related to the choose of Label Placement, several options will appear. As for Point Placement you can choose the distance for the polygon outline, repeat the label around the polygon perimeter.

The entries in the *Rendering* menu are the same as for line layers. You can also use *Suppress labeling of features smaller than* in the *Feature options*. **Define labels based on expressions**

QGIS allows to use expressions to label features. Just click the icon in the Labels menu of the properties dialog. In figure_labels_4 you see a sample expression to label the alaska regions with name and area size, based on the field 'NAME_2', some descriptive text and the function '$area()' in combination with 'format_number()' to make it look nicer.

Expression based labeling is easy to work with. All you have to take care of is, that you need to combine all elements (strings, fields and functions) with a string concatenation sign '||' and that fields a written in "double quotes" and strings in 'single quotes'. Let's have a look at some examples:

```
# label based on two fields 'name' and 'place' with a comma as separater
"name" || ', ' || "place"

-> John Smith, Paris

# label based on two fields 'name' and 'place' separated by comma
```

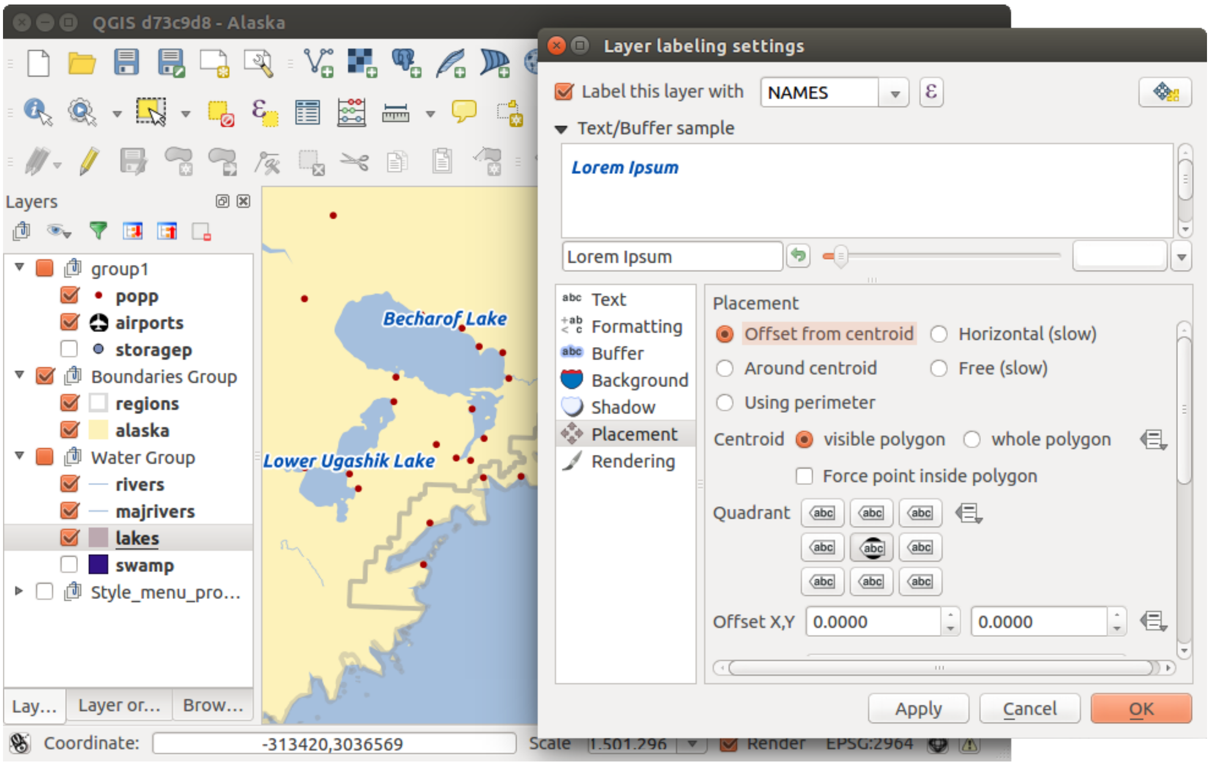

Figura 12.22: Smart labeling of vector polygon layers

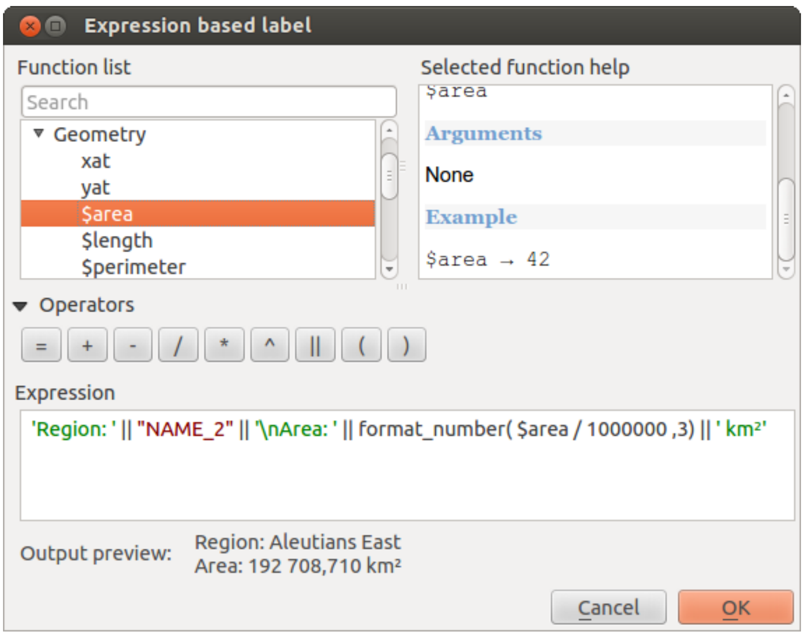

Figura 12.23: Using expressions for labeling

```
'My name is ' || "name" || 'and I live in ' || "place"

-> My name is John Smith and I live in Paris

# label based on two fields 'name' and 'place' with a descriptive text
# and a line break (\n)
'My name is ' || "name" || '\nI live in ' || "place"

-> My name is John Smith
   I live in Paris

# create a multi-line label based on a field and the $area function
# to show the place name and its area size based on unit meter.
'The area of ' || "place" || 'has a size of ' || $area || 'm²'

-> The area of Paris has a size of 105000000 m²

# create a CASE ELSE condition. If the population value in field
# population is <= 50000 it is a town, otherwise a city.
'This place is a ' || CASE WHEN "population <= 50000" THEN 'town' ELSE 'city' END

-> This place is a town
```

As you can see in the expression builder, you have hundreds if functions available to create simple and very complex expressions to label your data in QGIS. See *Expressions* chapter for more information and example on expressions.

Using data-defined override for labeling

With the data-defined override functions, the settings for the labeling are overridden by entries in the attribute table. You can activate and deactivate the function with the right-mouse button. Hover over the symbol and you see the information about the data-defined override, including the current definition field. We now describe an example using the data-defined override function for the Move label function (see figure_labels_5).

1. Import `lakes.shp` from the QGIS sample dataset.
2. Double-click the layer to open the Layer Properties. Click on *Labels* and *Placement*. Select *Offset from centroid*.
3. Look for the *Data defined* entries. Click the icon to define the field type for the *Coordinate*. Choose 'xlabel' for X and 'ylabel' for Y. The icons are now highlighted in yellow.
4. Zoom into a lake.
5. Go to the Label toolbar and click the icon. Now you can shift the label manually to another position (see figure_labels_6). The new position of the label is saved in the 'xlabel' and 'ylabel' columns of the attribute table.

12.3.3 Fields Menu

Within the *Fields* menu, the field attributes of the selected dataset can be manipulated. The buttons New Column and Delete Column can be used when the dataset is in Editing mode.

Edit Widget

Within the *Fields* menu, you also find an **edit widget** column. This column can be used to define values or a range of values that are allowed to be added to the specific attribute table column. If you click on the **[edit widget]** button, a dialog opens, where you can define different widgets. These widgets are:

- **Checkbox**: Displays a checkbox, and you can define what attribute is added to the column when the checkbox is activated or not.

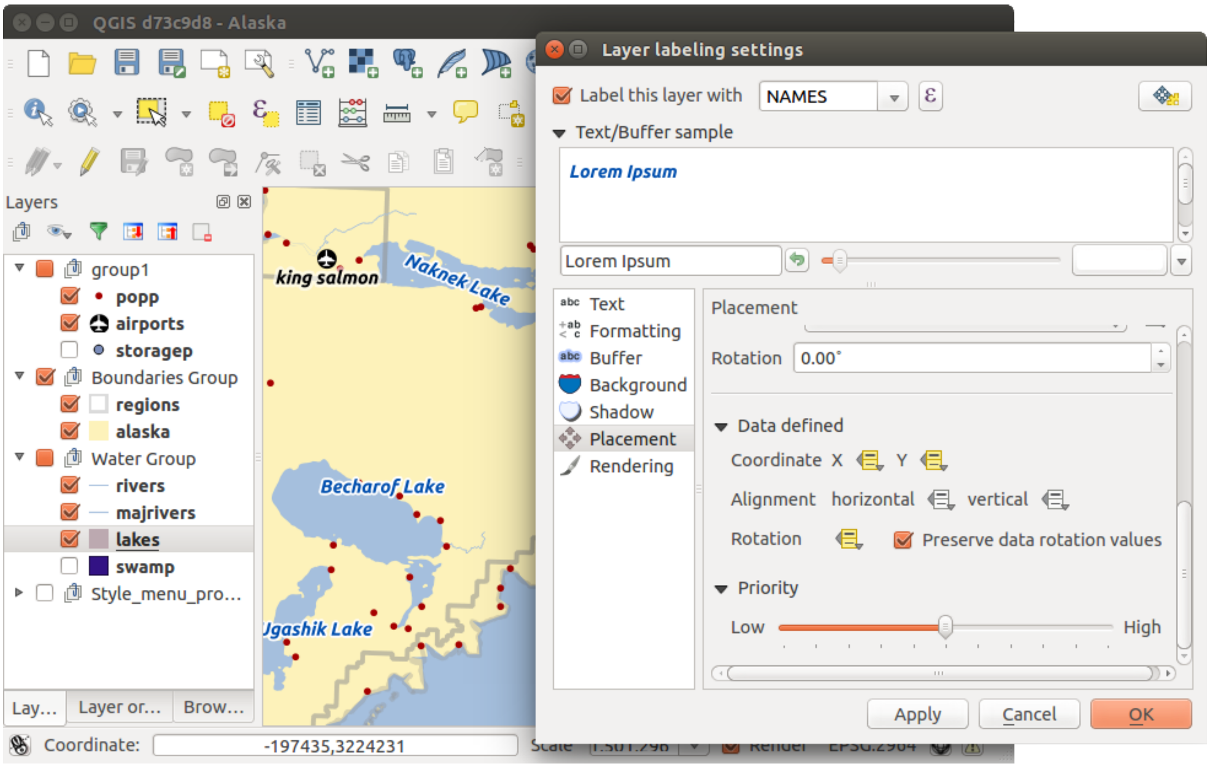

Figura 12.24: Labeling of vector polygon layers with data-defined override

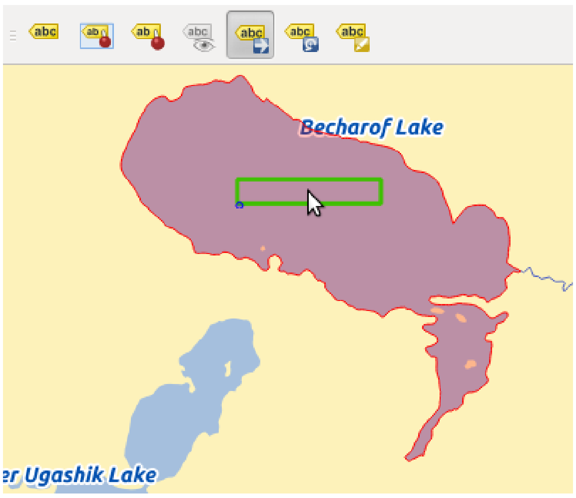

Figura 12.25: Move labels

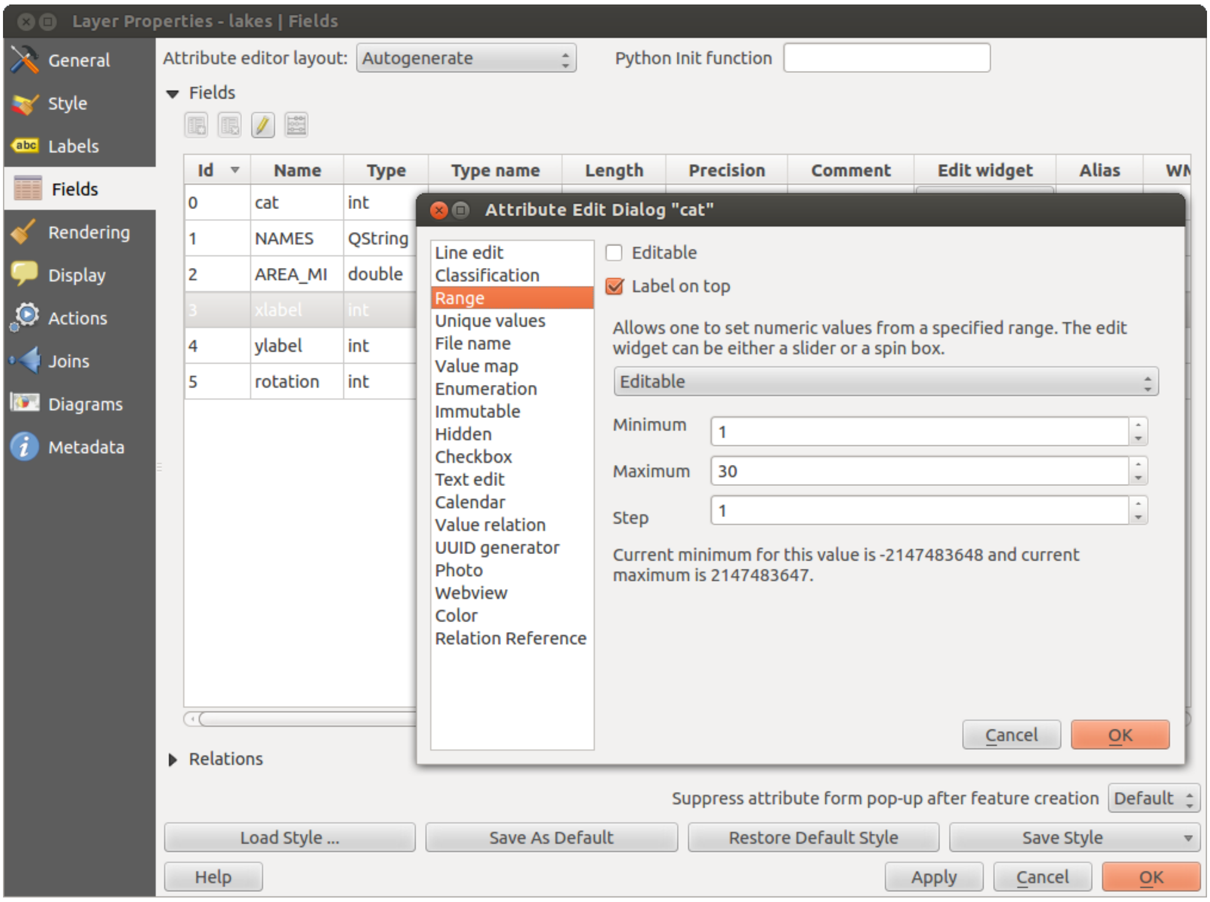

Figura 12.26: Dialog to select an edit widget for an attribute column

- **Classification**: Displays a combo box with the values used for classification, if you have chosen 'unique value' as legend type in the *Style* menu of the properties dialog.
- **Color**: Displays a color button allowing user to choose a color from the color dialog window.
- **Date/Time**: Displays a line fields which can opens a calendar widget to enter a date, a time or both. Column type must be text. You can select a custom format, pop-up a calendar, etc.
- **Enumeration**: Opens a combo box with values that can be used within the columns type. This is currently only supported by the PostgreSQL provider.
- **File name**: Simplifies the selection by adding a file chooser dialog.
- **Hidden**: A hidden attribute column is invisible. The user is not able to see its contents.
- **Photo**: Field contains a filename for a picture. The width and height of the field can be defined.
- **Range**: Allows you to set numeric values from a specific range. The edit widget can be either a slider or a spin box.
- **Relation Reference**: This widged lets you embed the feature form of the referenced layer on the feature form of the actual layer. See *Creating one to many relations*.
- **Text edit** (default): This opens a text edit field that allows simple text or multiple lines to be used. If you choose multiple lines you can also choose html content.
- **Unique values**: You can select one of the values already used in the attribute table. If 'Editable' is activated, a line edit is shown with autocompletion support, otherwise a combo box is used.
- **UUID Generator**: Generates a read-only UUID (Universally Unique Identifiers) field, if empty.
- **Value map**: A combo box with predefined items. The value is stored in the attribute, the description is shown in the combo box. You can define values manually or load them from a layer or a CSV file.
- **Value Relation**: Offers values from a related table in a combobox. You can select layer, key column and value column.
- **Webview**: Field contains a URL. The width and height of the field is variable.

With the **Attribute editor layout**, you can now define built-in forms for data entry jobs (see figure_fields_2). Choose 'Drag and drop designer' and an attribute column. Use the icon to create a category that will then be shown during the digitizing session (see figure_fields_3). The next step will be to assign the relevant fields to the category with the icon. You can create more categories and use the same fields again. When creating a new category, QGIS will insert a new tab for the category in the built-in form.

Other options in the dialog are 'Autogenerate' and 'Provide ui-file'. 'Autogenerate' just creates editors for all fields and tabulates them. The 'Provide ui-file' option allows you to use complex dialogs made with the Qt-Designer. Using a UI-file allows a great deal of freedom in creating a dialog. For detailed information, see http://nathanw.net/2011/09/05/qgis-tips-custom-feature-forms-with-python-logic/.

QGIS dialogs can have a Python function that is called when the dialog is opened. Use this function to add extra logic to your dialogs. An example is (in module MyForms.py):

```
def open(dialog,layer,feature):
geom = feature.geometry()
control = dialog.findChild(QWidged,"My line edit")
```

Reference in Python Init Function like so: MyForms.open

MyForms.py must live on PYTHONPATH, in .qgis2/python, or inside the project folder.

12.3.4 General Menu

Use this menu to make general settings for the vector layer. There are several options available:

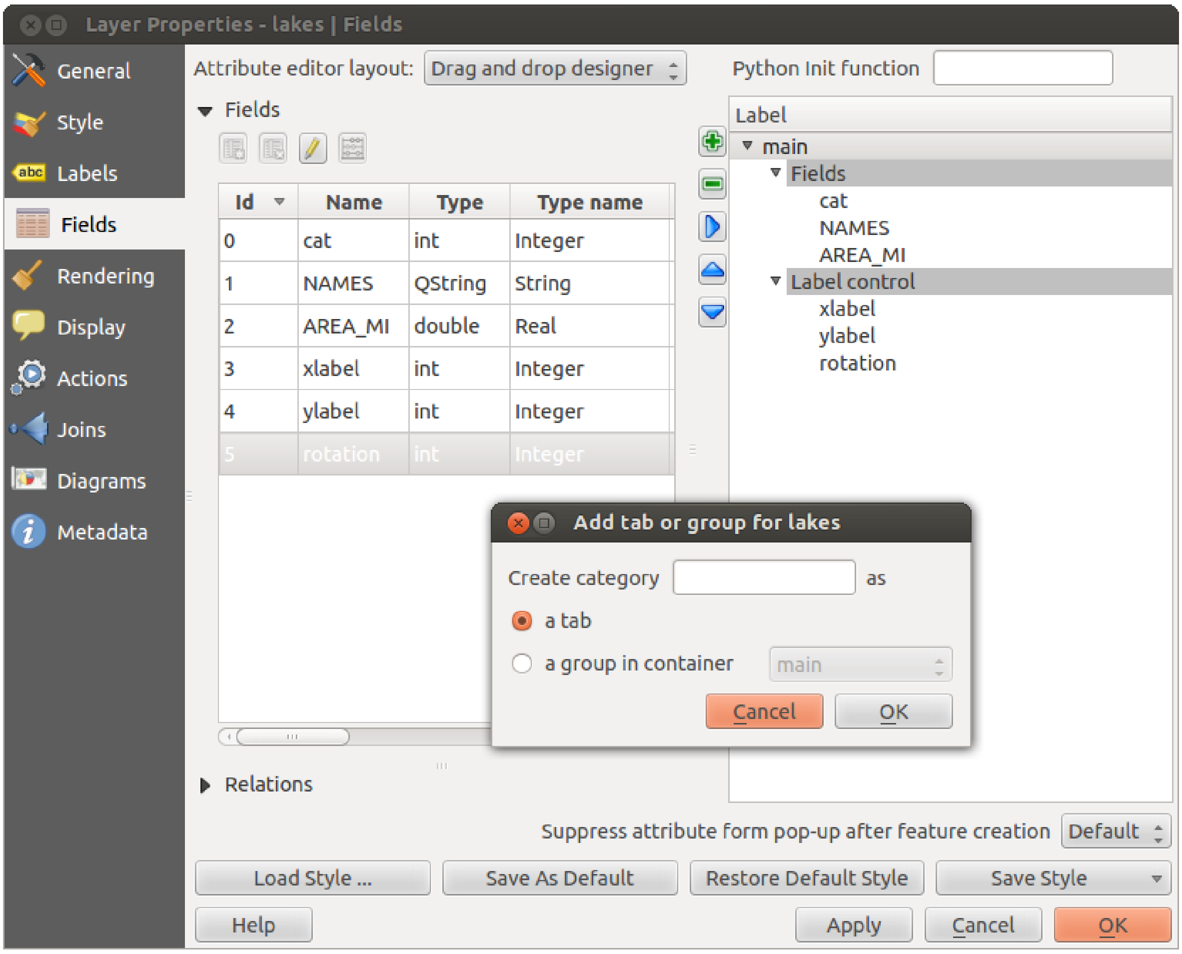

Figura 12.27: Dialog to create categories with the **Attribute editor layout**

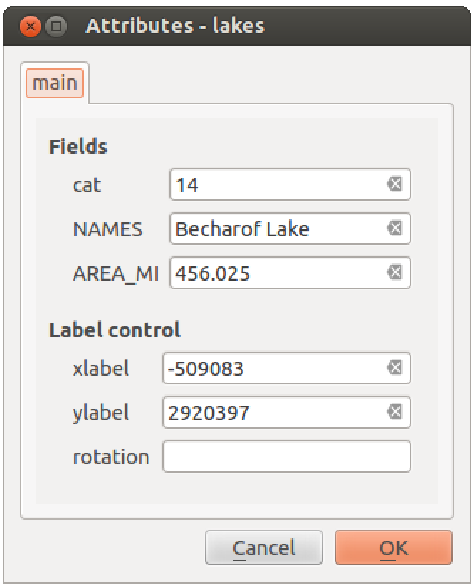

Figura 12.28: Resulting built-in form in a data entry session

Layer Info

- Change the display name of the layer in *displayed as*
- Define the *Layer source* of the vector layer
- Define the *Data source encoding* to define provider-specific options and to be able to read the file

Coordinate Reference System

- *Specify* the coordinate reference system. Here, you can view or change the projection of the specific vector layer.
- Create a *Spatial Index* (only for OGR-supported formats)
- *Update Extents* information for a layer
- View or change the projection of the specific vector layer, clicking on *Specify ...*

Scale dependent visibility

- You can set the *Maximum (inclusive)* and *Minimum (exclusive)* scale. The scale can also be set by the **[Current]** buttons.

Feature subset

- With the **[Query Builder]** button, you can create a subset of the features in the layer that will be visualized (also refer to section *Constructor de consultas*).

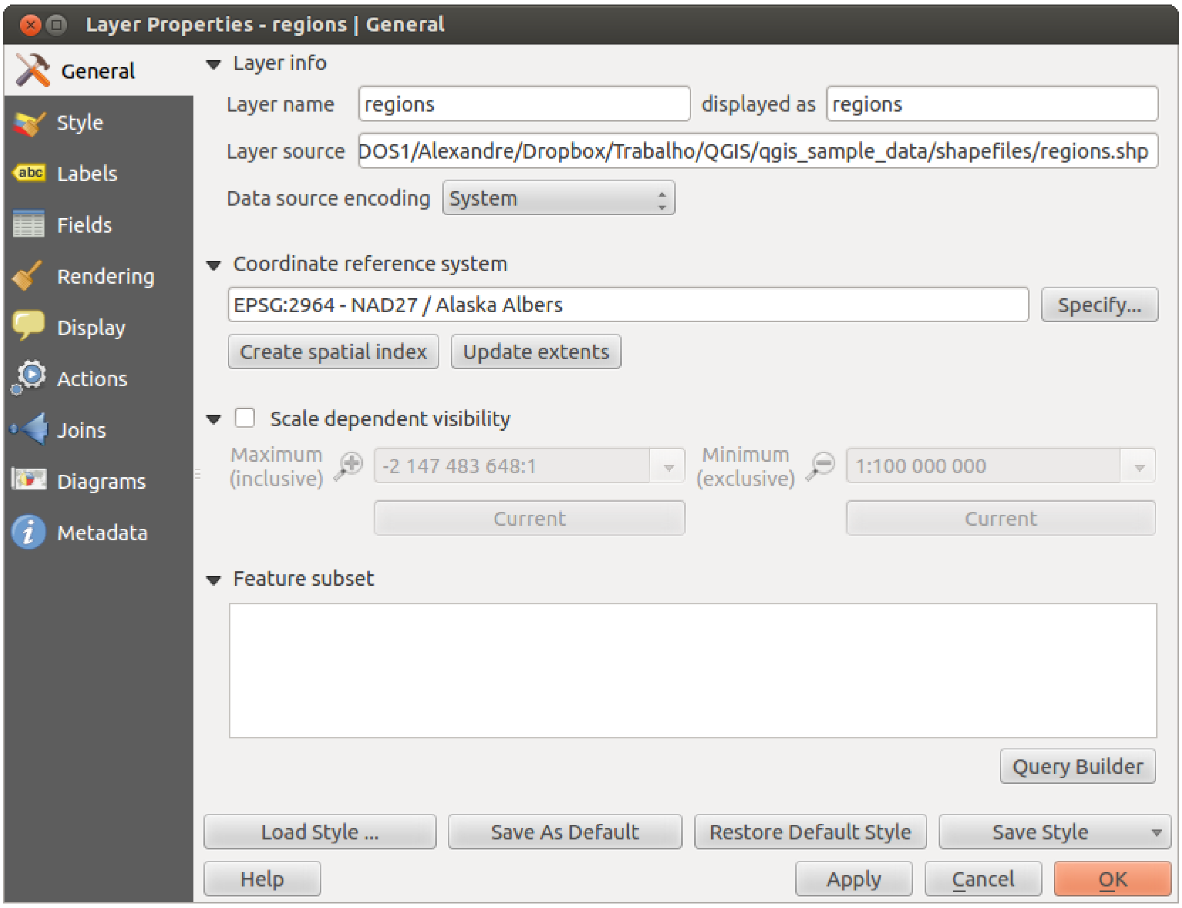

Figura 12.29: General menu in vector layers properties dialog

12.3.5 Rendering Menu

QGIS 2.2 introduces support for on-the-fly feature generalisation. This can improve rendering times when drawing many complex features at small scales. This feature can be enabled or disabled in the layer settings using the *Simplify geometry* option. There is also a new global setting that enables generalisation by default for newly added layers (see section *Opciones*). **Note**: Feature generalisation may introduce artefacts into your rendered output in some cases. These may include slivers between polygons and inaccurate rendering when using offset-based symbol layers.

12.3.6 Display Menu

This menu is specifically created for Map Tips. It includes a new feature: Map Tip display text in HTML. While you can still choose a *Field* to be displayed when hovering over a feature on the map, it is now possible to insert HTML code that creates a complex display when hovering over a feature. To activate Map Tips, select the menu option *View* → *MapTips*. Figure Display 1 shows an example of HTML code.

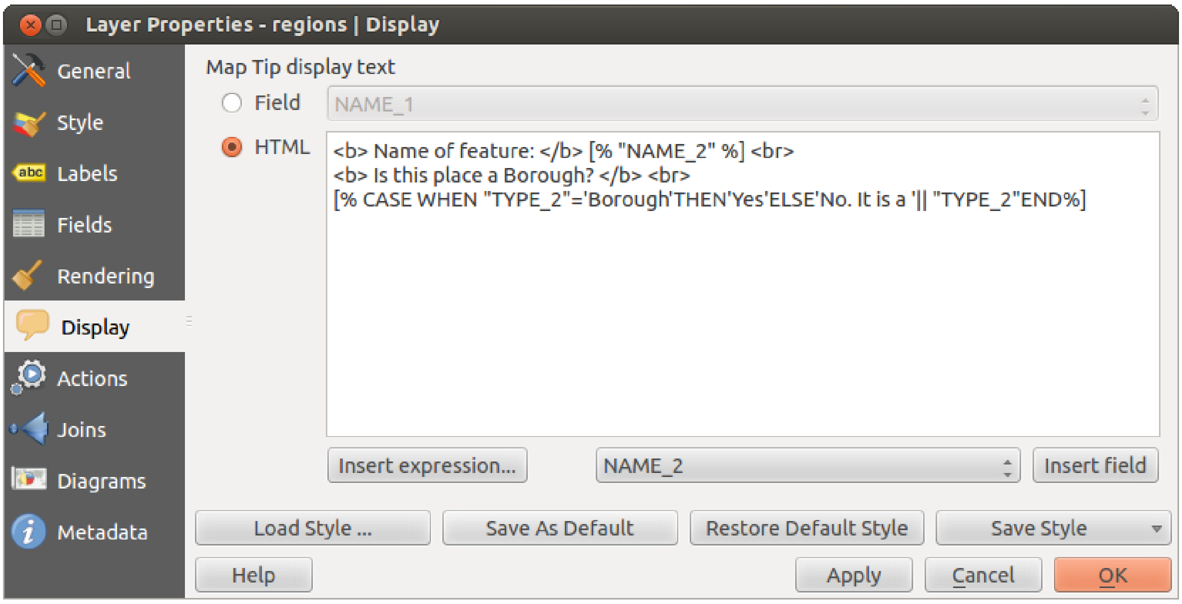

Figura 12.30: HTML code for map tip

12.3.7 Actions Menu

QGIS provides the ability to perform an action based on the attributes of a feature. This can be used to perform any number of actions, for example, running a program with arguments built from the attributes of a feature or passing parameters to a web reporting tool.

Actions are useful when you frequently want to run an external application or view a web page based on one or more values in your vector layer. They are divided into six types and can be used like this:

- Generic, Mac, Windows and Unix actions start an external process.
- Python actions execute a Python expression.
- Generic and Python actions are visible everywhere.
- Mac, Windows and Unix actions are visible only on the respective platform (i.e., you can define three 'Edit' actions to open an editor and the users can only see and execute the one 'Edit' action for their platform to run the editor).

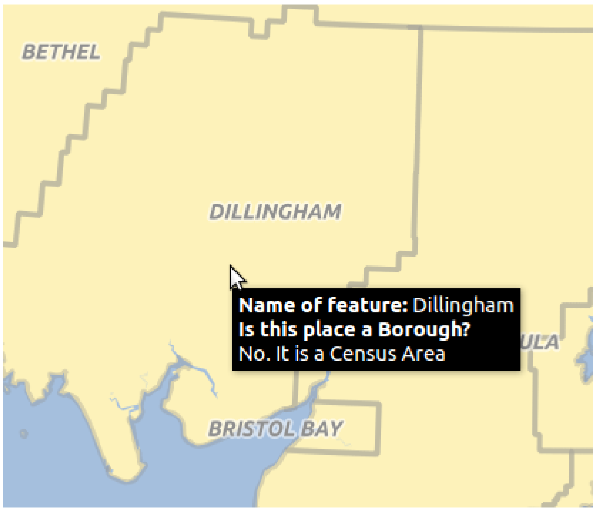

Figura 12.31: Map tip made with HTML code

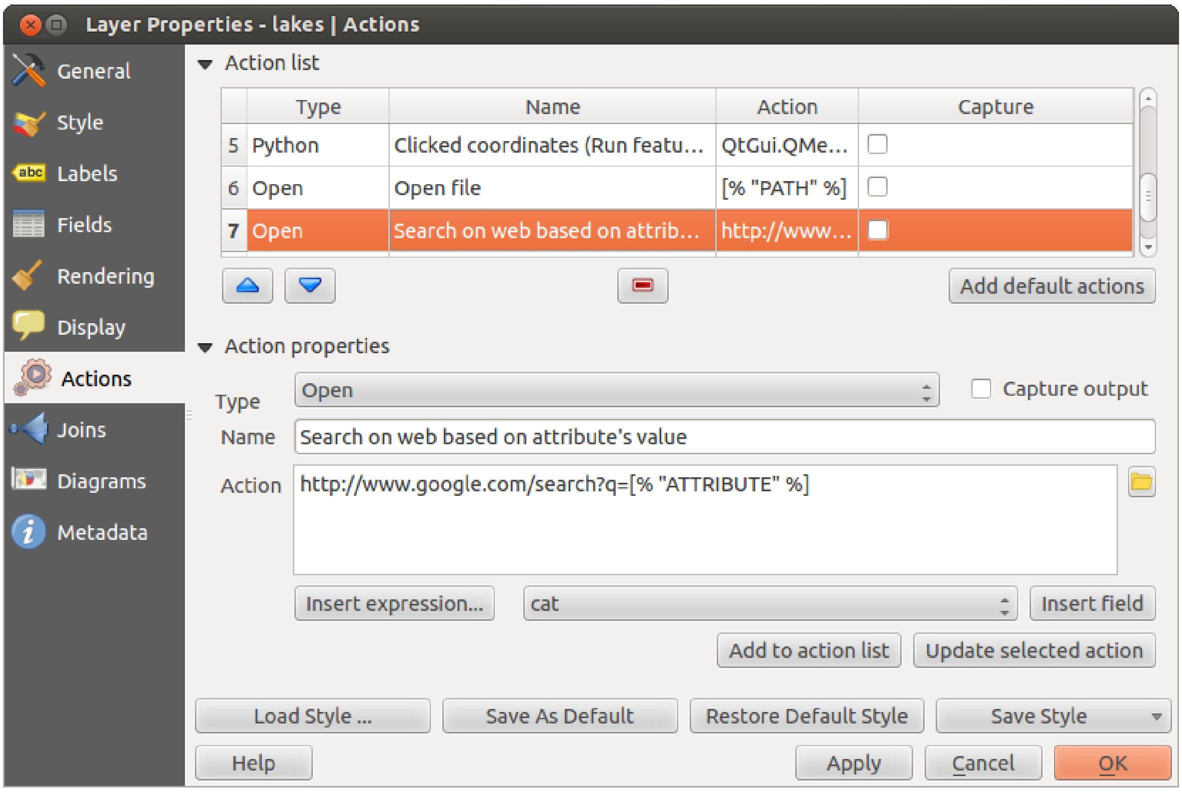

Figura 12.32: Overview action dialog with some sample actions

There are several examples included in the dialog. You can load them by clicking on **[Add default actions]**. One example is performing a search based on an attribute value. This concept is used in the following discussion.

Defining Actions

Attribute actions are defined from the vector *Layer Properties* dialog. To define an action, open the vector *Layer Properties* dialog and click on the *Actions* menu. Go to the *Action properties*. Select 'Generic' as type and provide a descriptive name for the action. The action itself must contain the name of the application that will be executed when the action is invoked. You can add one or more attribute field values as arguments to the application. When the action is invoked, any set of characters that start with a `%` followed by the name of a field will be replaced by the value of that field. The special characters %% will be replaced by the value of the field that was selected from the identify results or attribute table (see using_actions below). Double quote marks can be used to group text into a single argument to the program, script or command. Double quotes will be ignored if preceded by a backslash.

If you have field names that are substrings of other field names (e.g., `col1` and `col10`), you should indicate that by surrounding the field name (and the % character) with square brackets (e.g., `[%col10]`). This will prevent the `%col10` field name from being mistaken for the `%col1` field name with a `0` on the end. The brackets will be removed by QGIS when it substitutes in the value of the field. If you want the substituted field to be surrounded by square brackets, use a second set like this: `[[%col10]]`.

Using the *Identify Features* tool, you can open the *Identify Results* dialog. It includes a *(Derived)* item that contains information relevant to the layer type. The values in this item can be accessed in a similar way to the other fields by preceeding the derived field name with `(Derived).`. For example, a point layer has an `X` and `Y` field, and the values of these fields can be used in the action with `%(Derived).X` and `%(Derived).Y`. The derived attributes are only available from the *Identify Results* dialog box, not the *Attribute Table* dialog box.

Two example actions are shown below:

- `konqueror http://www.google.com/search?q=%nam`
- `konqueror http://www.google.com/search?q=%%`

In the first example, the web browser konqueror is invoked and passed a URL to open. The URL performs a Google search on the value of the `nam` field from our vector layer. Note that the application or script called by the action must be in the path, or you must provide the full path. To be certain, we could rewrite the first example as: `/opt/kde3/bin/konqueror http://www.google.com/search?q=%nam`. This will ensure that the konqueror application will be executed when the action is invoked.

The second example uses the %% notation, which does not rely on a particular field for its value. When the action is invoked, the %% will be replaced by the value of the selected field in the identify results or attribute table.

Using Actions

Actions can be invoked from either the *Identify Results* dialog, an *Attribute Table* dialog or from *Run Feature Action* (recall that these dialogs can be opened by clicking Identify Features or Open Attribute Table or Run Feature Action). To invoke an action, right click on the record and choose the action from the pop-up menu. Actions are listed in the popup menu by the name you assigned when defining the action. Click on the action you wish to invoke.

If you are invoking an action that uses the `%%` notation, right-click on the field value in the *Identify Results* dialog or the *Attribute Table* dialog that you wish to pass to the application or script.

Here is another example that pulls data out of a vector layer and inserts it into a file using bash and the `echo` command (so it will only work on or perhaps). The layer in question has fields for a species name `taxon_name`, latitude `lat` and longitude `long`. We would like to be able to make a spatial selection of localities and export these field values to a text file for the selected record (shown in yellow in the QGIS map area). Here is the action to achieve this:

```
bash -c "echo \"%taxon_name %lat %long\" >> /tmp/species_localities.txt"
```

After selecting a few localities and running the action on each one, opening the output file will show something like this:

```
Acacia mearnsii -34.0800000000 150.0800000000
Acacia mearnsii -34.9000000000 150.1200000000
```

```
Acacia mearnsii -35.2200000000 149.9300000000
Acacia mearnsii -32.2700000000 150.4100000000
```

As an exercise, we can create an action that does a Google search on the `lakes` layer. First, we need to determine the URL required to perform a search on a keyword. This is easily done by just going to Google and doing a simple search, then grabbing the URL from the address bar in your browser. From this little effort, we see that the format is http://google.com/search?q=qgis, where `QGIS` is the search term. Armed with this information, we can proceed:

1. Make sure the `lakes` layer is loaded.
2. Open the *Layer Properties* dialog by double-clicking on the layer in the legend, or right-click and choose *Properties* from the pop-up menu.
3. Click on the *Actions* menu.
4. Enter a name for the action, for example `Google Search`.
5. For the action, we need to provide the name of the external program to run. In this case, we can use Firefox. If the program is not in your path, you need to provide the full path.
6. Following the name of the external application, add the URL used for doing a Google search, up to but not including the search term: `http://google.com/search?q=`
7. The text in the *Action* field should now look like this: `firefox http://google.com/search?q=`
8. Click on the drop-down box containing the field names for the `lakes` layer. It's located just to the left of the **[Insert Field]** button.
9. From the drop-down box, select 'NAMES' and click **[Insert Field]**.
10. Your action text now looks like this:

    `firefox http://google.com/search?q=%NAMES`
11. To finalize the action, click the **[Add to action list]** button.

This completes the action, and it is ready to use. The final text of the action should look like this:

```
firefox http://google.com/search?q=%NAMES
```

We can now use the action. Close the *Layer Properties* dialog and zoom in to an area of interest. Make sure the `lakes` layer is active and identify a lake. In the result box you'll now see that our action is visible:

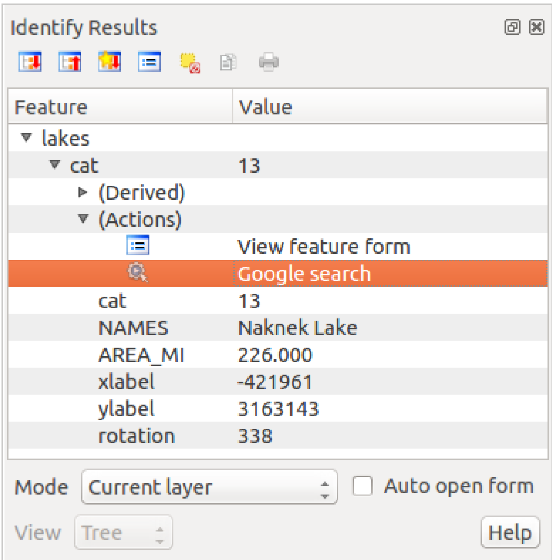

Figura 12.33: Select feature and choose action

When we click on the action, it brings up Firefox and navigates to the URL http://www.google.com/search?q=Tustumena. It is also possible to add further attribute fields to the action. Therefore, you can add a + to the end of the action text, select another field and click on **[Insert Field]**. In this example, there is just no other field available that would make sense to search for.

You can define multiple actions for a layer, and each will show up in the *Identify Results* dialog.

There are all kinds of uses for actions. For example, if you have a point layer containing locations of images or photos along with a file name, you could create an action to launch a viewer to display the image. You could also use actions to launch web-based reports for an attribute field or combination of fields, specifying them in the same way we did in our Google search example.

We can also make more complex examples, for instance, using **Python** actions.

Usually, when we create an action to open a file with an external application, we can use absolute paths, or eventually relative paths. In the second case, the path is relative to the location of the external program executable file. But what about if we need to use relative paths, relative to the selected layer (a file-based one, like a shapefile or SpatiaLite)? The following code will do the trick:

```
command = "firefox";
imagerelpath = "images_test/test_image.jpg";
layer = qgis.utils.iface.activeLayer();
import os.path;
layerpath = layer.source() if layer.providerType() == 'ogr'
  else (qgis.core.QgsDataSourceURI(layer.source()).database()
  if layer.providerType() == 'spatialite' else None);
path = os.path.dirname(str(layerpath));
image = os.path.join(path,imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

We just have to remember that the action is one of type *Python* and the *command* and *imagerelpath* variables must be changed to fit our needs.

But what about if the relative path needs to be relative to the (saved) project file? The code of the Python action would be:

```
command="firefox";
imagerelpath="images/test_image.jpg";
projectpath=qgis.core.QgsProject.instance().fileName();
import os.path; path=os.path.dirname(str(projectpath)) if projectpath != '' else None;
image=os.path.join(path, imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

Another Python action example is the one that allows us to add new layers to the project. For instance, the following examples will add to the project respectively a vector and a raster. The names of the files to be added to the project and the names to be given to the layers are data driven (*filename* and *layername* are column names of the table of attributes of the vector where the action was created):

```
qgis.utils.iface.addVectorLayer('/yourpath/[% "filename" %].shp','[% "layername" %]',
  'ogr')
```

To add a raster (a TIF image in this example), it becomes:

```
qgis.utils.iface.addRasterLayer('/yourpath/[% "filename" %].tif','[% "layername" %]
')
```

12.3.8 Joins Menu

The *Joins* menu allows you to join a loaded attribute table to a loaded vector layer. After clicking , the *Add vector join* dialog appears. As key columns, you have to define a join layer you want to connect with the target vector layer. Then, you have to specify the join field that is common to both the join layer and the target layer. Now you can also specify a subset of fields from the joined layer based on the checkbox *Choose which fields are joined*. As a result of the join, all information from the join layer and the target layer are displayed in the attribute table of the target layer as joined information. If you specified a subset of fields only these fields are displayed in the attribute table of the target layer.

QGIS currently has support for joining non-spatial table formats supported by OGR (e.g., CSV, DBF and Excel), delimited text and the PostgreSQL provider (see figure_joins_1).

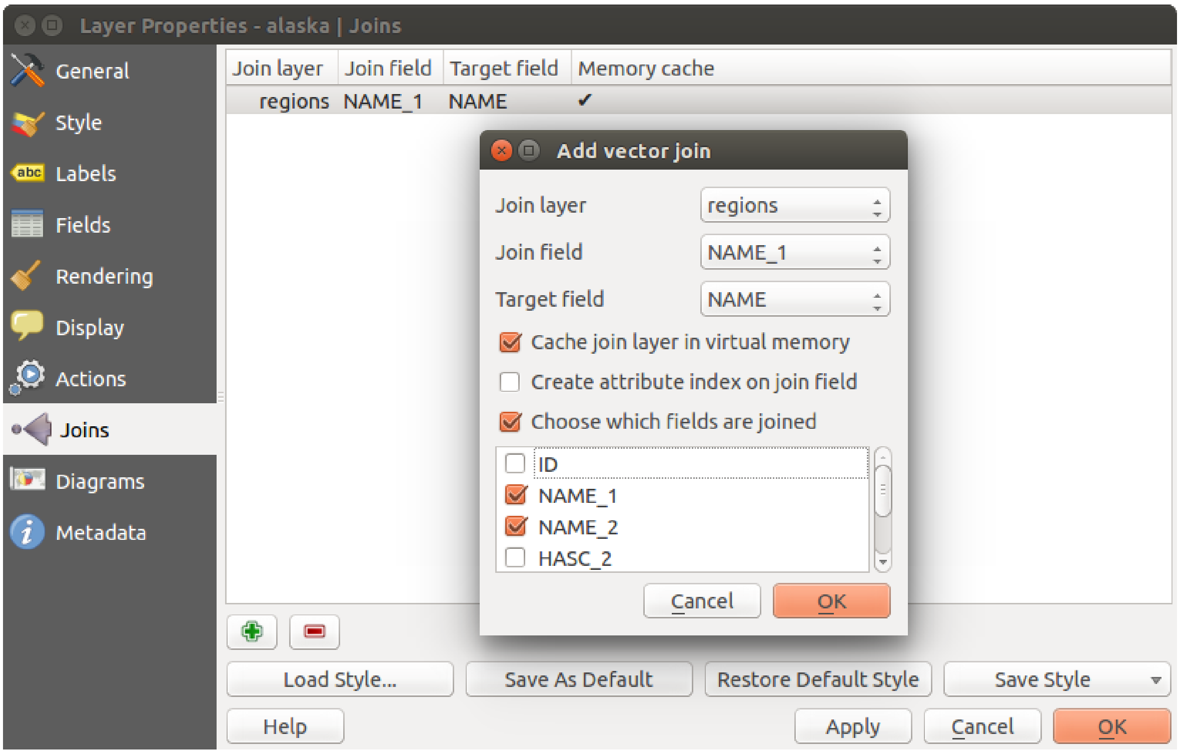

Figura 12.34: Join an attribute table to an existing vector layer

Additionally, the add vector join dialog allows you to:

- *Cache join layer in virtual memory*
- *Create attribute index on the join field*

12.3.9 Diagrams Menu

The *Diagrams* menu allows you to add a graphic overlay to a vector layer (see figure_diagrams_1).

The current core implementation of diagrams provides support for pie charts, text diagrams and histograms.

The menu is divided into four tabs: *Appearance*, *Size*, *Postion* and *Options*.

In the cases of the text diagram and pie chart, text values of different data columns are displayed one below the other with a circle or a box and dividers. In the *Size* tab, diagram size is based on a fixed size or on linear scaling according to a classification attribute. The placement of the diagrams, which is done in the *Position* tab, interacts with the new labeling, so position conflicts between diagrams and labels are detected and solved. In addition, chart positions can be fixed manually.

We will demonstrate an example and overlay on the Alaska boundary layer a text diagram showing temperature data from a climate vector layer. Both vector layers are part of the QGIS sample dataset (see section *Datos de ejemplo*).

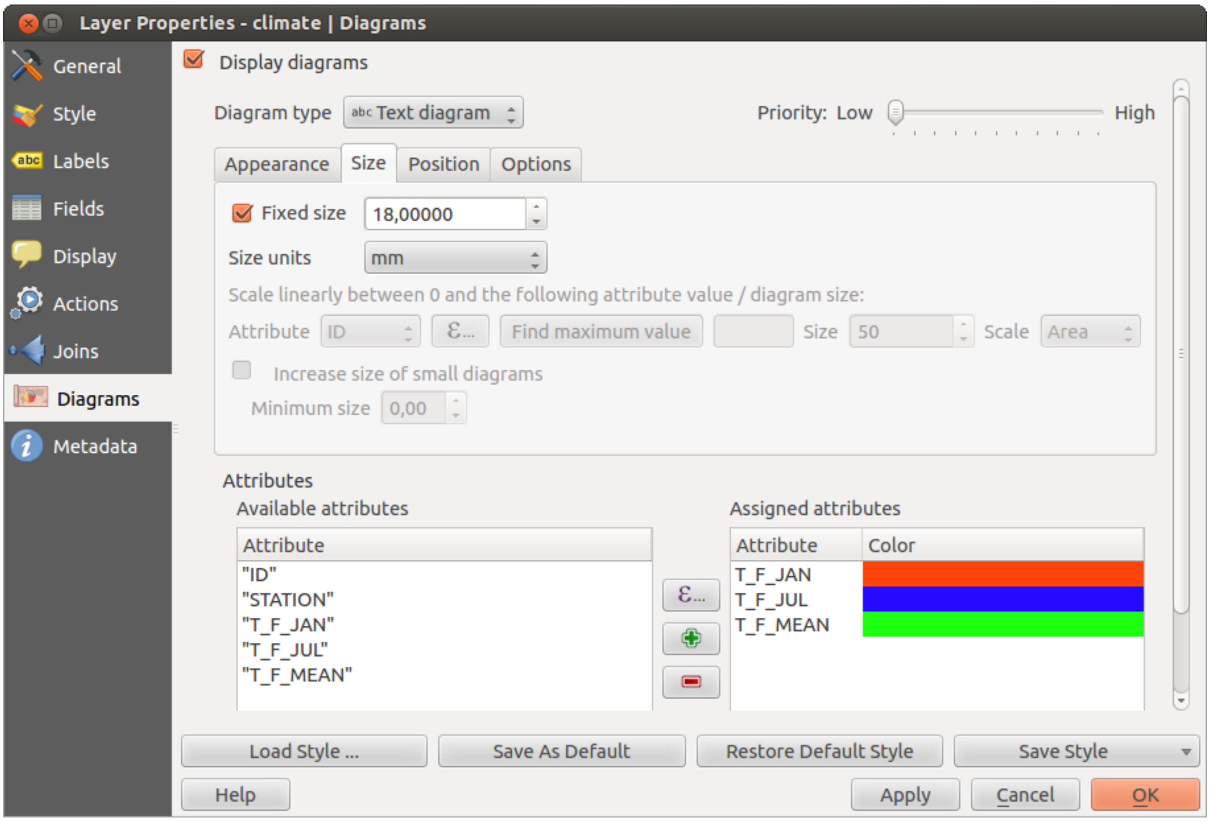

Figura 12.35: Vector properties dialog with diagram menu

1. First, click on the Load Vector icon, browse to the QGIS sample dataset folder, and load the two vector shape layers `alaska.shp` and `climate.shp`.
2. Double click the `climate` layer in the map legend to open the *Layer Properties* dialog.
3. Click on the *Diagrams* menu, activate *Display diagrams*, and from the *Diagram type* combo box, select 'Text diagram'.
4. In the *Appearance* tab, we choose a light blue as background color, and in the *Size* tab, we set a fixed size to 18 mm.
5. In the *Position* tab, placement could be set to 'Around Point'.
6. In the diagram, we want to display the values of the three columns `T_F_JAN`, `T_F_JUL` and `T_F_MEAN`. First select `T_F_JAN` as *Attributes* and click the button, then `T_F_JUL`, and finally `T_F_MEAN`.
7. Now click **[Apply]** to display the diagram in the QGIS main window.
8. You can adapt the chart size in the *Size* tab. Deactivate the *Fixed size* and set the size of the diagrams on the basis of an attribute with the **[Find maximum value]** button and the *Size* menu. If the diagrams appear too small on the screen, you can activate the *Increase size of small diagrams* checkbox and define the minimum size of the diagrams.
9. Change the attribute colors by double clicking on the color values in the *Assigned attributes* field. Figure_diagrams_2 gives an idea of the result.
10. Finally, click **[Ok]**.

Remember that in the *Position* tab, a *Data defined position* of the diagrams is possible. Here, you can use attributes to define the position of the diagram. You can also set a scale-dependent visibility in the *Appearance* tab.

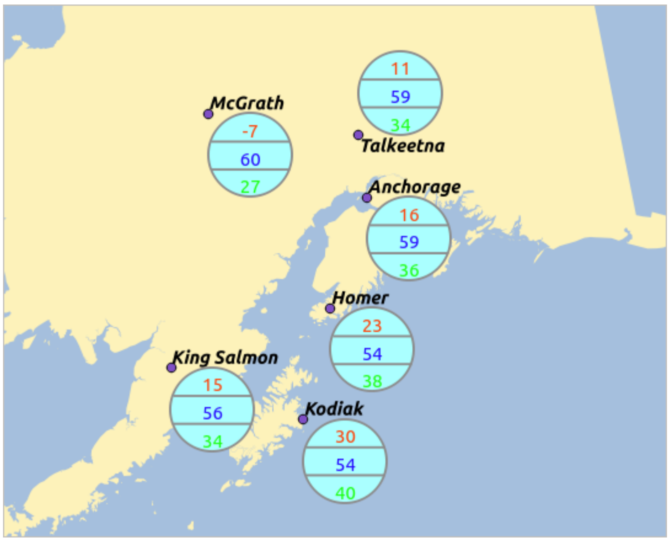

Figura 12.36: Diagram from temperature data overlayed on a map

The size and the attributes can also be an expression. Use the button to add an expression. See *Expressions* chapter for more information and example.

12.3.10 Metadata Menu

The *Metadata* menu consists of *Description*, *Attribution*, *MetadataURL* and *Properties* sections.

In the *Properties* section, you get general information about the layer, including specifics about the type and location, number of features, feature type, and editing capabilities. The *Extents* table provides you with layer extent information and the *Layer Spatial Reference System*, which is information about the CRS of the layer. This is a quick way to get information about the layer.

Additionally, you can add or edit a title and abstract for the layer in the *Description* section. It's also possible to define a *Keyword list* here. These keyword lists can be used in a metadata catalogue. If you want to use a title from an XML metadata file, you have to fill in a link in the *DataUrl* field. Use *Attribution* to get attribute data from an XML metadata catalogue. In *MetadataUrl*, you can define the general path to the XML metadata catalogue. This information will be saved in the QGIS project file for subsequent sessions and will be used for QGIS server.

.

12.4 Expressions

The **Expressions** feature are available through the field calculator or the add a new column button in the attribut table or the Field tab in the Layer properties ; through the graduaded, categorized and rule-based rendering in the Style tab of the Layer properties ; through the expression-based labeling ... in the Labeling core application ; through the feature selection and through the diagram tab of the Layer properties.

There are powerful way to manipulate attribute value in order to dynamicly change the final value in order to change the geometry style, the content of the label, the value for diagram, select some feature or create virtual column.

12.4.1 Functions List

The **Function List** contains functions as well as fields and values. View the help function in the **Selected Function Help**. In **Expression** you see the calculation expressions you create with the **Function List**. For the most

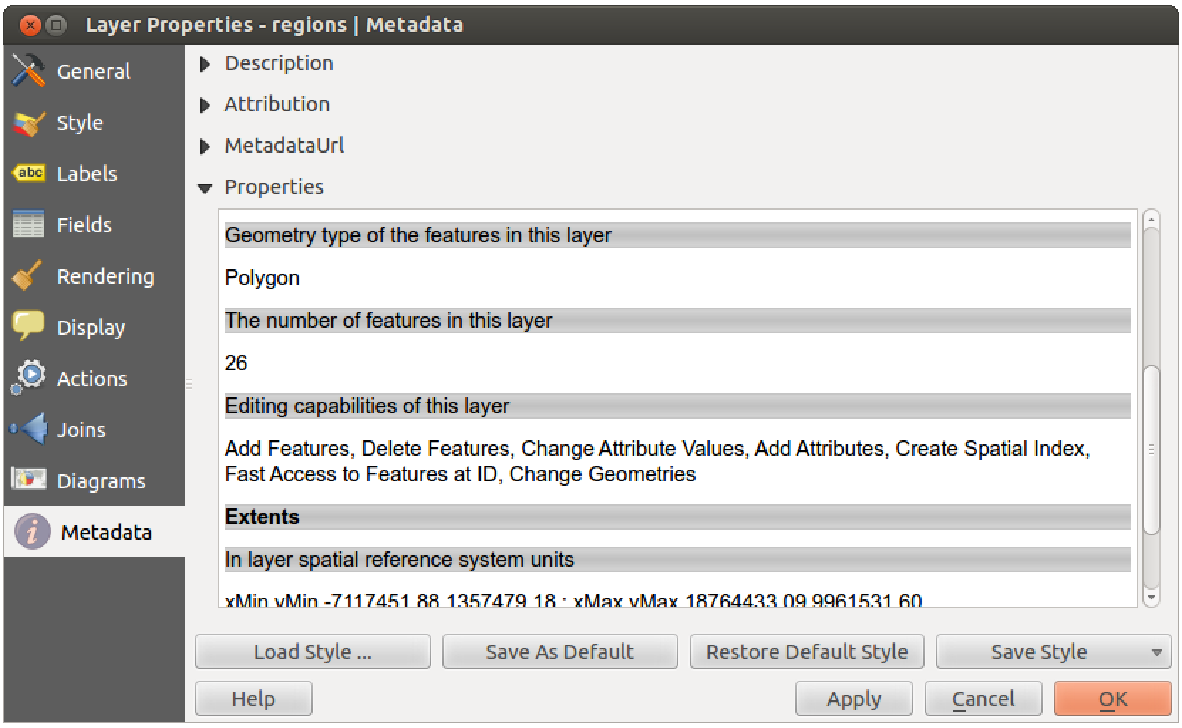

Figura 12.37: Metadata menu in vector layers properties dialog

commonly used operators, see **Operators**.

In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the Field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box. To display the values of a field, you just right click on the appropriate field. You can choose between *Load top 10 unique values* and *Load all unique values*. On the right side, the **Field Values** list opens with the unique values. To add a value to the Field calculator **Expression** box, double click its name in the **Field Values** list.

The *Operators*, *Math*, *Conversions*, *String*, *Geometry* and *Record* groups provide several functions. In *Operators*, you find mathematical operators. Look in *Math* for mathematical functions. The *Conversions* group contains functions that convert one data type to another. The *String* group provides functions for data strings. In the *Geometry* group, you find functions for geometry objects. With *Record* group functions, you can add a numeration to your data set. To add a function to the Field calculator **Expression** box, click on the > and then double click the function.

Operators

This group contains operators (e.g., +, -, *).

```
a + b      a plus b
a - b      a minus b
a * b      a multiplied by b
a / b      a divided by b
a % b     a modulo b (for example, 7 % 2 = 1, or 2 fits into 7 three
           times with remainder 1)
a ^ b      a power b (for example, 2^2=4 or 2^3=8)
a = b      a and b are equal
a > b      a is larger than b
a < b      a is smaller than b
a <> b     a and b are not equal
a != b     a and b are not equal
```

```
a <= b     a is less than or equal to b
a >= b     a is larger than or equal to b
a ~ b      a matches the regular expression b
+ a        positive sign
- a        negative value of a
||         joins two values together into a string 'Hello' || ' world'
LIKE       returns 1 if the string matches the supplied pattern
ILIKE      returns 1 if the string matches case-insensitive the supplied
           pattern (ILIKE can be used instead of LIKE to make the match
           case-insensitive)
IS         returns 1 if a is the same as b
OR         returns 1 when condition a or b is true
AND        returns 1 when condition a and b are true
NOT        returns 1 if a is not the same as b
column name "column name"     value of the field column name, take
                              care to not be confused with simple
                              quote, see below
'string'                      a string value, take care to not be
                              confused with double quote, see above
NULL                          null value
a IS NULL                     a has no value
a IS NOT NULL                 a has a value
a IN (value[,value])          a is below the values listed
a NOT IN (value[,value])      a is not below the values listed
```

Some example:

- Joins a string and a value from a column name:

  ```
  'My feature's id is: ' || "gid"
  ```

- Test if the "description" attribute field starts with the 'Hello' string in the value (note the position of the % caracter):

  ```
  "description" LIKE 'Hello%'
  ```

Conditionals

This group contains functions to handle conditional checks in expressions.

```
CASE                          evaluates multiple expressions and returns a
                              result
CASE ELSE                     evaluates multiple expressions and returns a
                              result
coalesce                      returns the first non-NULL value from the
                              expression list
regexp_match                  returns true if any part of a string matches
                              the supplied regular expression
```

Some example:

- Send back a value if the first condition is true, else another value:

  ```
  CASE WHEN "software" LIKE '%QGIS%' THEN 'QGIS' ELSE 'Other'
  ```

Mathematical Functions

This group contains math functions (e.g., square root, sin and cos).

```
sqrt(a)                       square root of a
abs                           returns the absolute value of a number
sin(a)                        sine of a
```

```
cos(a)                         cosine of a
tan(a)                         tangent of a
asin(a)                        arcsin of a
acos(a)                        arccos of a
atan(a)                        arctan of a
atan2(y,x)                     arctan of y/x using the signs of the two
                               arguments to determine the quadrant of the
                               result
exp                            exponential of a value
ln                             value of the natural logarithm of the passed
                               expression
log10                          value of the base 10 logarithm of the passed
                               expression
log                            value of the logarithm of the passed value
                               and base
round                          round to number of decimal places
rand                           random integer within the range specified by
                               the minimum
                               and maximum argument (inclusive)
randf                          random float within the range specified by
                               the minimum
                               and maximum argument (inclusive)
max                            largest value in a set of values
min                            smallest value in a set of values
clamp                          restricts an input value to a specified
                               range
scale_linear                   transforms a given value from an input
                               domain to an output
                               range using linear interpolation
scale_exp                      transforms a given value from an input
                               domain to an output
                               range using an exponential curve
floor                          rounds a number downwards
ceil                           rounds a number upwards
$pi                            pi as value for calculations
```

Conversions

This group contains functions to convert one data type to another (e.g., string to integer, integer to string).

```
toint                         converts a string to integer number
toreal                        converts a string to real number
tostring                      converts number to string
todatetime                    converts a string into Qt data time type
todate                        converts a string into Qt data type
totime                        converts a string into Qt time type
tointerval                    converts a string to an interval type (can be
                              used to take days, hours, months, etc. off a
                              date)
```

Date and Time Functions

This group contains functions for handling date and time data.

```
$now        current date and time
age         difference between two dates
year        extract the year part from a date, or the number of years from
            an interval
month       extract the month part from a date, or the number of months
            from an interval
```

```
week       extract the week number from a date, or the number of weeks
           from an interval
day        extract the day from a date, or the number of days from an
           interval
hour       extract the hour from a datetime or time, or the number
           of hours from an interval
minute     extract the minute from a datetime or time, or the number
           of minutes from an interval
second     extract the second from a datetime or time, or the number
           of minutes from an interval
```

Some example:

- Get the month and the year of today in the format "10/2014"

  ```
  month($now) || '/' || year($now)
  ```

String Functions

This group contains functions that operate on strings (e.g., that replace, convert to upper case).

```
lower                          convert string a to lower case
upper                          convert string a to upper case
title                          converts all words of a string to title
                               case (all words lower case with leading
                               capital letter)
trim                           removes all leading and trailing white
                               space (spaces, tabs, etc.) from a string
wordwrap                       returns a string wrapped to a maximum/
                               minimum number of characters
length                         length of string a
replace                        returns a string with the supplied string
                               replaced
regexp_replace(a,this,that)    returns a string with the supplied regular
                               expression replaced
regexp_substr                  returns the portion of a string which matches
                               a supplied regular expression
substr(*a*,from,len)           returns a part of a string
concat                         concatenates several strings to one
strpos                         returns the index of a regular expression
                               in a string
left                           returns a substring that contains the n
                               leftmost characters of the string
right                          returns a substring that contains the n
                               rightmost characters of the string
rpad                           returns a string with supplied width padded
                               using the fill character
lpad                           returns a string with supplied width padded
                               using the fill character
format                         formats a string using supplied arguments
format_number                  returns a number formatted with the locale
                               separator for thousands (also truncates the
                               number to the number of supplied places)
format_date                    formats a date type or string into a custom
                               string format
```

Color Functions

This group contains functions for manipulating colors.

```
color_rgb       returns a string representation of a color based on its
                red, green, and blue components
color_rgba      returns a string representation of a color based on its
                red, green, blue, and alpha (transparency) components
ramp_color      returns a string representing a color from a color ramp
color_hsl       returns a string representation of a color based on its
                hue, saturation, and lightness attributes
color_hsla      returns a string representation of a color based on its
                hue, saturation, lightness and alpha (transparency)
                attributes
color_hsv       returns a string representation of a color based on its
                hue, saturation, and value attributes
color_hsva      returns a string representation of a color based on its
                hue, saturation, value and alpha (transparency) attributes
color_cmyk      returns a string representation of a color based on its
                cyan, magenta, yellow and black components
color_cmyka     returns a string representation of a color based on its
                cyan, magenta, yellow, black and alpha (transparency)
                components
```

Geometry Functions

This group contains functions that operate on geometry objects (e.g., length, area).

```
$geometry        returns the geometry of the current feature (can be used
                 for processing with other functions)
$area            returns the area size of the current feature
$length          returns the length size of the current feature
$perimeter       returns the perimeter length of the current feature
$x               returns the x coordinate of the current feature
$y               returns the y coordinate of the current feature
xat              retrieves the nth x coordinate of the current feature.
                 n given as a parameter of the function
yat              retrieves the nth y coordinate of the current feature.
                 n given as a parameter of the function
xmin             returns the minimum x coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
xmax             returns the maximum x coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
ymin             returns the minimum y coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
ymax             returns the maximum y coordinate of a geometry.
                 Calculations are in the Spatial Reference System of this
                 Geometry
geomFromWKT      returns a geometry created from a well-known text (WKT)
                 representation
geomFromGML      returns a geometry from a GML representation of geometry
bbox
disjoint         returns 1 if the geometries do not share any space
                 together
intersects       returns 1 if the geometries spatially intersect
                 (share any portion of space) and 0 if they don't
touches          returns 1 if the geometries have at least one point in
                 common, but their interiors do not intersect
crosses          returns 1 if the supplied geometries have some, but not
                 all, interior points in common
contains         returns true if and only if no points of b lie in the
                 exterior of a, and at least one point of the interior
                 of b lies in the interior of a
```

```
overlaps          returns 1 if the geometries share space, are of the
                  same dimension, but are not completely contained by
                  each other
within            returns 1 if geometry a is completely inside geometry b
buffer            returns a geometry that represents all points whose
                  distance from this geometry is less than or equal to
                  distance
centroid          returns the geometric center of a geometry
bounds            returns a geometry which represents the bounding box of
                  an input geometry. Calculations are in the Spatial
                  Reference System of this Geometry.
bounds_width      returns the width of the bounding box of a geometry.
                  Calculations are in the Spatial Reference System of
                  this Geometry.
bounds_height     returns the height of the bounding box of a geometry.
                  Calculations are in the Spatial Reference System of
                  this Geometry.
convexHull        returns the convex hull of a geometry (this represents
                  the minimum convex geometry that encloses all geometries
                  within the set)
difference        returns a geometry that represents that part of geometry
                  a that does not intersect with geometry b
distance          returns the minimum distance (based on spatial ref)
                  between two geometries in projected units
intersection      returns a geometry that represents the shared portion
                  of geometry a and geometry b
symDifference     returns a geometry that represents the portions of a and
                  b that do not intersect
combine           returns the combination of geometry a and geometry b
union             returns a geometry that represents the point set union of
                  the geometries
geomToWKT         returns the well-known text (WKT) representation of the
                  geometry without SRID metadata
```

Record Functions

This group contains functions that operate on record identifiers.

```
$rownum                  returns the number of the current row
$id                      returns the feature id of the current row
$currentfeature          returns the current feature being evaluated.
                         This can be used with the 'attribute' function
                         to evaluate attribute values from the current
                         feature.
$scale                   returns the current scale of the map canvas
$uuid                    generates a Universally Unique Identifier (UUID)
                         for each row. Each UUID is 38 characters long.
getFeature               returns the first feature of a layer matching a
                         given attribute value.
attribute                returns the value of a specified attribute from
                         a feature.
$map                     returns the id of the current map item if the map
                         is being drawn in a composition, or "canvas" if
                         the map is being drawn within the main QGIS
                         window.
```

Fields and Values

Contains a list of fields from the layer. Sample values can also be accessed via right-click.

Select the field name from the list, then right-click to access a context menu with options to load sample values from the selected field.

Fields name should be double-quoted. Values or string should be simple-quoted.

.

12.5 Editing

QGIS supports various capabilities for editing OGR, SpatiaLite, PostGIS, MSSQL Spatial and Oracle Spatial vector layers and tables.

Nota: The procedure for editing GRASS layers is different - see section *Digitizing and editing a GRASS vector layer* for details.

Truco: Concurrent Edits

This version of QGIS does not track if somebody else is editing a feature at the same time as you are. The last person to save their edits wins.

12.5.1 Setting the Snapping Tolerance and Search Radius

Before we can edit vertices, we must set the snapping tolerance and search radius to a value that allows us an optimal editing of the vector layer geometries.

Snapping tolerance

Snapping tolerance is the distance QGIS uses to `search` for the closest vertex and/or segment you are trying to connect to when you set a new vertex or move an existing vertex. If you aren't within the snapping tolerance, QGIS will leave the vertex where you release the mouse button, instead of snapping it to an existing vertex and/or segment. The snapping tolerance setting affects all tools that work with tolerance.

1. A general, project-wide snapping tolerance can be defined by choosing *Settings* → *Options*. On Mac, go to *QGIS* → *Preferences...*. On Linux: *Edit* → *Options*. In the *Digitizing* tab, you can select between 'to vertex', 'to segment' or 'to vertex and segment' as default snap mode. You can also define a default snapping tolerance and a search radius for vertex edits. The tolerance can be set either in map units or in pixels. The advantage of choosing pixels is that the snapping tolerance doesn't have to be changed after zoom operations. In our small digitizing project (working with the Alaska dataset), we define the snapping units in feet. Your results may vary, but something on the order of 300 ft at a scale of 1:10000 should be a reasonable setting.
2. A layer-based snapping tolerance can be defined by choosing *Settings* → (or *File* →) *Snapping options...* to enable and adjust snapping mode and tolerance on a layer basis (see figure_edit_1).

Note that this layer-based snapping overrides the global snapping option set in the Digitizing tab. So, if you need to edit one layer and snap its vertices to another layer, then enable snapping only on the `snap to` layer, then decrease the global snapping tolerance to a smaller value. Furthermore, snapping will never occur to a layer that is not checked in the snapping options dialog, regardless of the global snapping tolerance. So be sure to mark the checkbox for those layers that you need to snap to.

Search radius

Search radius is the distance QGIS uses to `search` for the closest vertex you are trying to move when you click on the map. If you aren't within the search radius, QGIS won't find and select any vertex for editing, and it will pop up an annoying warning to that effect. Snap tolerance and search radius are set in map units or pixels, so you may find you need to experiment to get them set right. If you specify too big of a tolerance, QGIS may snap to the

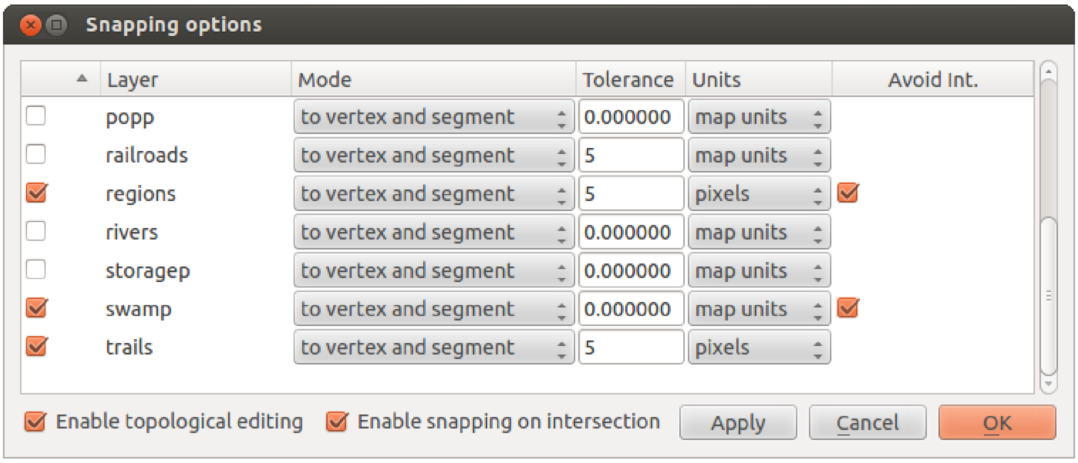

Figura 12.38: Edit snapping options on a layer basis

wrong vertex, especially if you are dealing with a large number of vertices in close proximity. Set search radius too small, and it won't find anything to move.

The search radius for vertex edits in layer units can be defined in the *Digitizing* tab under *Settings* → *Options*. This is the same place where you define the general, project- wide snapping tolerance.

12.5.2 Zooming and Panning

Before editing a layer, you should zoom in to your area of interest. This avoids waiting while all the vertex markers are rendered across the entire layer.

Apart from using the pan and zoom-in / zoom-out icons on the toolbar with the mouse, navigating can also be done with the mouse wheel, spacebar and the arrow keys.

Zooming and panning with the mouse wheel

While digitizing, you can press the mouse wheel to pan inside of the main window, and you can roll the mouse wheel to zoom in and out on the map. For zooming, place the mouse cursor inside the map area and roll it forward (away from you) to zoom in and backwards (towards you) to zoom out. The mouse cursor position will be the center of the zoomed area of interest. You can customize the behavior of the mouse wheel zoom using the *Map tools* tab under the *Settings* → *Options* menu.

Panning with the arrow keys

Panning the map during digitizing is possible with the arrow keys. Place the mouse cursor inside the map area, and click on the right arrow key to pan east, left arrow key to pan west, up arrow key to pan north, and down arrow key to pan south.

You can also use the space bar to temporarily cause mouse movements to pan the map. The `PgUp` and `PgDown` keys on your keyboard will cause the map display to zoom in or out without interrupting your digitizing session.

12.5.3 Topological editing

Besides layer-based snapping options, you can also define topological functionalities in the *Snapping options...* dialog in the *Settings* (or *File*) menu. Here, you can define *Enable topological editing*, and/or for polygon layers, you can activate the column *Avoid Int.*, which avoids intersection of new polygons.

Enable topological editing

The option *Enable topological editing* is for editing and maintaining common boundaries in polygon mosaics. QGIS 'detects' a shared boundary in a polygon mosaic, so you only have to move the vertex once, and QGIS will take care of updating the other boundary.

Avoid intersections of new polygons

The second topological option in the *Avoid Int.* column, called *Avoid intersections of new polygons*, avoids overlaps in polygon mosaics. It is for quicker digitizing of adjacent polygons. If you already have one polygon, it is possible with this option to digitize the second one such that both intersect, and QGIS then cuts the second polygon to the common boundary. The advantage is that you don't have to digitize all vertices of the common boundary.

Enable snapping on intersections

Another option is to use *Enable snapping on intersection*. It allows you to snap on an intersection of background layers, even if there's no vertex on the intersection.

12.5.4 Digitizing an existing layer

By default, QGIS loads layers read-only. This is a safeguard to avoid accidentally editing a layer if there is a slip of the mouse. However, you can choose to edit any layer as long as the data provider supports it, and the underlying data source is writable (i.e., its files are not read-only).

In general, tools for editing vector layers are divided into a digitizing and an advanced digitizing toolbar, described in section *Advanced digitizing*. You can select and unselect both under *View* → *Toolbars* →. Using the basic digitizing tools, you can perform the following functions:

Icon	Purpose	Icon	Purpose
	Current edits		Toggle editing
	Adding Features: Capture Point		Adding Features: Capture Line
	Adding Features: Capture Polygon		Move Feature
	Node Tool		Delete Selected
	Cut Features		Copy Features
	Paste Features		Save layer edits

Table Editing: Vector layer basic editing toolbar

All editing sessions start by choosing the Toggle editing option. This can be found in the context menu after right clicking on the legend entry for a given layer.

Alternatively, you can use the Toggle Editing Toggle editing button from the digitizing toolbar to start or stop the editing mode. Once the layer is in edit mode, markers will appear at the vertices, and additional tool buttons on the editing toolbar will become available.

Truco: Save Regularly

Remember to Save Layer Edits regularly. This will also check that your data source can accept all the changes.

Adding Features

You can use the Add Feature, Add Feature or Add Feature icons on the toolbar to put the QGIS cursor into digitizing mode.

For each feature, you first digitize the geometry, then enter its attributes. To digitize the geometry, left-click on the map area to create the first point of your new feature.

For lines and polygons, keep on left-clicking for each additional point you wish to capture. When you have finished adding points, right-click anywhere on the map area to confirm you have finished entering the geometry of that feature.

The attribute window will appear, allowing you to enter the information for the new feature. Figure_edit_2 shows setting attributes for a fictitious new river in Alaska. In the *Digitizing* menu under the *Settings* → *Options* menu, you can also activate *Suppress attributes pop-up windows after each created feature* and *Reuse last entered attribute values*.

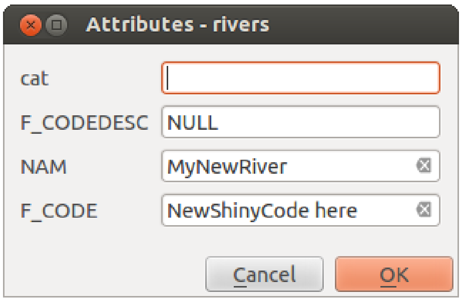

Figura 12.39: Enter Attribute Values Dialog after digitizing a new vector feature

With the Move Feature(s) icon on the toolbar, you can move existing features.

Truco: Attribute Value Types

For editing, the attribute types are validated during entry. Because of this, it is not possible to enter a number into a text column in the dialog *Enter Attribute Values* or vice versa. If you need to do so, you should edit the attributes in a second step within the *Attribute table* dialog.

Current Edits

This feature allows the digitization of multiple layers. Choose *Save for Selected Layers* to save all changes you made in multiple layers. You also have the opportunity to *Rollback for Selected Layers*, so that the digitization may be withdrawn for all selected layers. If you want to stop editing the selected layers, *Cancel for Selected Layer(s)* is an easy way.

The same functions are available for editing all layers of the project.

Node Tool

For shapefile-based layers as well as SpatialLite, PostgreSQL/PostGIS, MSSQL Spatial, and Oracle Spatial tables, the Node Tool provides manipulation capabilities of feature vertices similar to CAD programs. It is possible to simply select multiple vertices at once and to move, add or delete them altogether. The node tool also works with 'on the fly' projection turned on, and it supports the topological editing feature. This tool is, unlike other tools in QGIS, persistent, so when some operation is done, selection stays active for this feature and tool. If the node tool is unable to find any features, a warning will be displayed.

It is important to set the property *Settings* → Options → *Digitizing* → *Search Radius:* 1,00 to a number greater than zero (i.e., 10). Otherwise, QGIS will not be able to tell which vertex is being edited.

Truco: Vertex Markers

The current version of QGIS supports three kinds of vertex markers: 'Semi-transparent circle', 'Cross' and 'None'. To change the marker style, choose *Options* from the *Settings* menu, click on the *Digitizing* tab and select the appropriate entry.

Basic operations

Start by activating the Node Tool and selecting a feature by clicking on it. Red boxes will appear at each vertex of this feature.

- **Selecting vertices**: You can select vertices by clicking on them one at a time, by clicking on an edge to select the vertices at both ends, or by clicking and dragging a rectangle around some vertices. When a vertex is selected, its color changes to blue. To add more vertices to the current selection, hold down the `Ctrl` key while clicking. Hold down `Ctrl` or `Shift` when clicking to toggle the selection state of vertices (vertices that are currently unselected will be selected as usual, but also vertices that are already selected will become unselected).
- **Adding vertices**: To add a vertex, simply double click near an edge and a new vertex will appear on the edge near to the cursor. Note that the vertex will appear on the edge, not at the cursor position; therefore, it should be moved if necessary.
- **Deleting vertices**: After selecting vertices for deletion, click the `Delete` key. Note that you cannot use the Node Tool to delete a complete feature; QGIS will ensure it retains the minimum number of vertices for the feature type you are working on. To delete a complete feature use the Delete Selected tool.
- **Moving vertices**: Select all the vertices you want to move. Click on a selected vertex or edge and drag in the direction you wish to move. All the selected vertices will move together. If snapping is enabled, the whole selection can jump to the nearest vertex or line.

Each change made with the node tool is stored as a separate entry in the Undo dialog. Remember that all operations support topological editing when this is turned on. On-the-fly projection is also supported, and the node tool provides tooltips to identify a vertex by hovering the pointer over it.

Cutting, Copying and Pasting Features

Selected features can be cut, copied and pasted between layers in the same QGIS project, as long as destination layers are set to Toggle editing beforehand.

Features can also be pasted to external applications as text. That is, the features are represented in CSV format, with the geometry data appearing in the OGC Well-Known Text (WKT) format.

However, in this version of QGIS, text features from outside QGIS cannot be pasted to a layer within QGIS. When would the copy and paste function come in handy? Well, it turns out that you can edit more than one layer at a time and copy/paste features between layers. Why would we want to do this? Say we need to do some work on a new layer but only need one or two lakes, not the 5,000 on our `big_lakes` layer. We can create a new layer and use copy/paste to plop the needed lakes into it.

As an example, we will copy some lakes to a new layer:

1. Load the layer you want to copy from (source layer)
2. Load or create the layer you want to copy to (target layer)
3. Start editing for target layer
4. Make the source layer active by clicking on it in the legend

5. Use the Select Single Feature tool to select the feature(s) on the source layer
6. Click on the Copy Features tool
7. Make the destination layer active by clicking on it in the legend
8. Click on the Paste Features tool
9. Stop editing and save the changes

What happens if the source and target layers have different schemas (field names and types are not the same)? QGIS populates what matches and ignores the rest. If you don't care about the attributes being copied to the target layer, it doesn't matter how you design the fields and data types. If you want to make sure everything - the feature and its attributes - gets copied, make sure the schemas match.

Truco: Congruency of Pasted Features

If your source and destination layers use the same projection, then the pasted features will have geometry identical to the source layer. However, if the destination layer is a different projection, then QGIS cannot guarantee the geometry is identical. This is simply because there are small rounding-off errors involved when converting between projections.

Deleting Selected Features

If we want to delete an entire polygon, we can do that by first selecting the polygon using the regular Select Single Feature tool. You can select multiple features for deletion. Once you have the selection set, use the Delete Selected tool to delete the features.

The Cut Features tool on the digitizing toolbar can also be used to delete features. This effectively deletes the feature but also places it on a "spatial clipboard". So, we cut the feature to delete. We could then use the Paste Features tool to put it back, giving us a one-level undo capability. Cut, copy, and paste work on the currently selected features, meaning we can operate on more than one at a time.

Saving Edited Layers

When a layer is in editing mode, any changes remain in the memory of QGIS. Therefore, they are not committed/saved immediately to the data source or disk. If you want to save edits to the current layer but want to continue editing without leaving the editing mode, you can click the Save Layer Edits button. When you turn editing mode off with Toggle editing (or quit QGIS for that matter), you are also asked if you want to save your changes or discard them.

If the changes cannot be saved (e.g., disk full, or the attributes have values that are out of range), the QGIS in-memory state is preserved. This allows you to adjust your edits and try again.

Truco: Data Integrity

It is always a good idea to back up your data source before you start editing. While the authors of QGIS have made every effort to preserve the integrity of your data, we offer no warranty in this regard.

12.5.5 Advanced digitizing

Icon	Purpose	Icon	Purpose
	Undo		Redo
	Rotate Feature(s)		Simplify Feature
	Add Ring		Add Part
	Fill Ring		Delete Ring
	Delete Part		Reshape Features
	Offset Curve		Split Features
	Split Parts		Merge Selected Features
	Merge Attributes of Selected Features		Rotate Point Symbols

Table Advanced Editing: Vector layer advanced editing toolbar

Undo and Redo

The Undo and Redo tools allows you to undo or redo vector editing operations. There is also a dockable widget, which shows all operations in the undo/redo history (see Figure_edit_3). This widget is not displayed by default; it can be displayed by right clicking on the toolbar and activating the Undo/Redo checkbox. Undo/Redo is however active, even if the widget is not displayed.

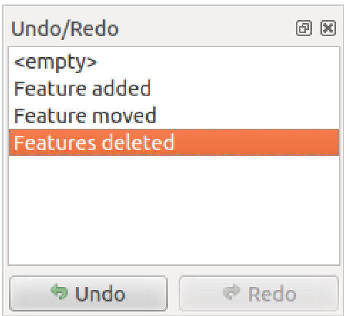

Figura 12.40: Redo and Undo digitizing steps

When Undo is hit, the state of all features and attributes are reverted to the state before the reverted operation happened. Changes other than normal vector editing operations (for example, changes done by a plugin), may or may not be reverted, depending on how the changes were performed.

To use the undo/redo history widget, simply click to select an operation in the history list. All features will be reverted to the state they were in after the selected operation.

Rotate Feature(s)

Use Rotate Feature(s) to rotate one or multiple selected features in the map canvas. You first need to select the features and then press the Rotate Feature(s) icon. The centroid of the feature(s) appears and will be the rotation anchor point. If you selected multiple features, the rotation anchor point will be the common center of the features. Press and drag the left mouse button in the desired direction to rotate the selected features.

It's also possible to create a user-defined rotation anchor point around which the selected feature will rotate. Select the features to rotate and activate the Rotate Feature(s) tool. Press and hold the `Ctrl` button and move the mouse pointer (without pressing the mouse button) to the place where you want the rotation anchor to be moved. Release the `Ctrl` button when the desired rotation anchor point is reached. Now, press and drag the left mouse button in the desired direction to rotate the selected feature(s).

Simplify Feature

The Simplify Feature tool allows you to reduce the number of vertices of a feature, as long as the geometry doesn't change and geometry type is not a multi geometry. First, select a feature. It will be highlighted by a red rubber band and a slider will appear. Moving the slider, the red rubber band will change its shape to show how the feature is being simplified. Click **[OK]** to store the new, simplified geometry. If a feature cannot be simplified (e.g. multi-polygons), a message will appear.

Add Ring

You can create ring polygons using the Add Ring icon in the toolbar. This means that inside an existing area, it is possible to digitize further polygons that will occur as a 'hole', so only the area between the boundaries of the outer and inner polygons remains as a ring polygon.

Add Part

You can add part polygons to a selected multipolygon. The new part polygon must be digitized outside the selected multi-polygon.

Fill Ring

You can use the Fill Ring function to add a ring to a polygon and add a new feature to the layer at the same time. Thus you need not first use the Add Ring icon and then the Add feature function anymore.

Delete Ring

The Delete Ring tool allows you to delete ring polygons inside an existing area. This tool only works with polygon layers. It doesn't change anything when it is used on the outer ring of the polygon. This tool can be used on polygon and multi-polygon features. Before you select the vertices of a ring, adjust the vertex edit tolerance.

Delete Part

The Delete Part tool allows you to delete parts from multifeatures (e.g., to delete polygons from a multi-polygon feature). It won't delete the last part of the feature; this last part will stay untouched. This tool works with all multi-part geometries: point, line and polygon. Before you select the vertices of a part, adjust the vertex edit tolerance.

Reshape Features

You can reshape line and polygon features using the Reshape Features icon on the toolbar. It replaces the line or polygon part from the first to the last intersection with the original line. With polygons, this can sometimes lead to unintended results. It is mainly useful to replace smaller parts of a polygon, not for major overhauls, and the reshape line is not allowed to cross several polygon rings, as this would generate an invalid polygon.

For example, you can edit the boundary of a polygon with this tool. First, click in the inner area of the polygon next to the point where you want to add a new vertex. Then, cross the boundary and add the vertices outside the polygon. To finish, right-click in the inner area of the polygon. The tool will automatically add a node where the new line crosses the border. It is also possible to remove part of the area from the polygon, starting the new line outside the polygon, adding vertices inside, and ending the line outside the polygon with a right click.

Nota: The reshape tool may alter the starting position of a polygon ring or a closed line. So, the point that is represented 'twice' will not be the same any more. This may not be a problem for most applications, but it is something to consider.

Offset Curves

The Offset Curve tool creates parallel shifts of line layers. The tool can be applied to the edited layer (the geometries are modified) or also to background layers (in which case it creates copies of the lines / rings and adds them to the the edited layer). It is thus ideally suited for the creation of distance line layers. The displacement is shown at the bottom left of the taskbar.

To create a shift of a line layer, you must first go into editing mode and then select the feature. You can make the Offset Curve tool active and drag the cross to the desired distance. Your changes may then be saved with the Save Layer Edits tool.

QGIS options dialog (Digitizing tab then **Curve offset tools** section) allows you to configure some parameters like **Join style**, **Quadrant segments**, **Miter limit**.

Split Features

You can split features using the Split Features icon on the toolbar. Just draw a line across the feature you want to split.

Split parts

In QGIS 2.0 it is now possible to split the parts of a multi part feature so that the number of parts is increased. Just draw a line across the part you want to split using the Split Parts icon.

Merge selected features

The Merge Selected Features tool allows you to merge features that have common boundaries. A new dialog will allow you to choose which value to choose between each selected features or select a fonction (Minimum, Maximum, Median, Sum, Skip Attribute) to use for each column.

Merge attributes of selected features

The Merge Attributes of Selected Features tool allows you to merge attributes of features with common boundaries and attributes without merging their boundaries. First, select several features at once. Then press the Merge Attributes of Selected Features button. Now QGIS asks you which attributes are to be applied to all selected objects. As a result, all selected objects have the same attribute entries.

Rotate Point Symbols

Rotate Point Symbols allows you to change the rotation of point symbols in the map canvas. You must first define a rotation column from the attribute table of the point layer in the *Advanced* menu of the *Style* menu of the *Layer Properties*. Also, you will need to go into the 'SVG marker' and choose *Data defined properties ...*. Activate *Angle* and choose 'rotation' as field. Without these settings, the tool is inactive.

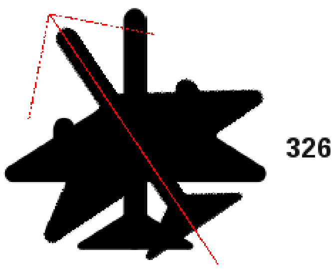

Figura 12.41: Rotate Point Symbols

To change the rotation, select a point feature in the map canvas and rotate it, holding the left mouse button pressed. A red arrow with the rotation value will be visualized (see Figure_edit_4). When you release the left mouse button again, the value will be updated in the attribute table.

Nota: If you hold the `Ctrl` key pressed, the rotation will be done in 15 degree steps.

12.5.6 Creating new Vector layers

QGIS allows you to create new shapefile layers, new SpatiaLite layers, and new GPX layers. Creation of a new GRASS layer is supported within the GRASS plugin. Please refer to section *Creating a new GRASS vector layer* for more information on creating GRASS vector layers.

Creating a new Shapefile layer

To create a new shape layer for editing, choose *New* → *New Shapefile Layer...* from the *Layer* menu. The *New Vector Layer* dialog will be displayed as shown in Figure_edit_5. Choose the type of layer (point, line or polygon) and the CRS (coordinate reference system).

Note that QGIS does not yet support creation of 2.5D features (i.e., features with X,Y,Z coordinates).

To complete the creation of the new shapefile layer, add the desired attributes by clicking on the **[Add to attributes list]** button and specifying a name and type for the attribute. A first 'id' column is added as default but can be removed, if not wanted. Only *Type: real* , *Type: integer* , *Type: string* and *Type:date* attributes are supported. Additionally and according to the attribute type, you can also define the width and precision of the new attribute column. Once you are happy with the attributes, click **[OK]** and provide a name for the shapefile. QGIS will automatically add a `.shp` extension to the name you specify. Once the layer has been created, it will be added to the map, and you can edit it in the same way as described in section *Digitizing an existing layer* above.

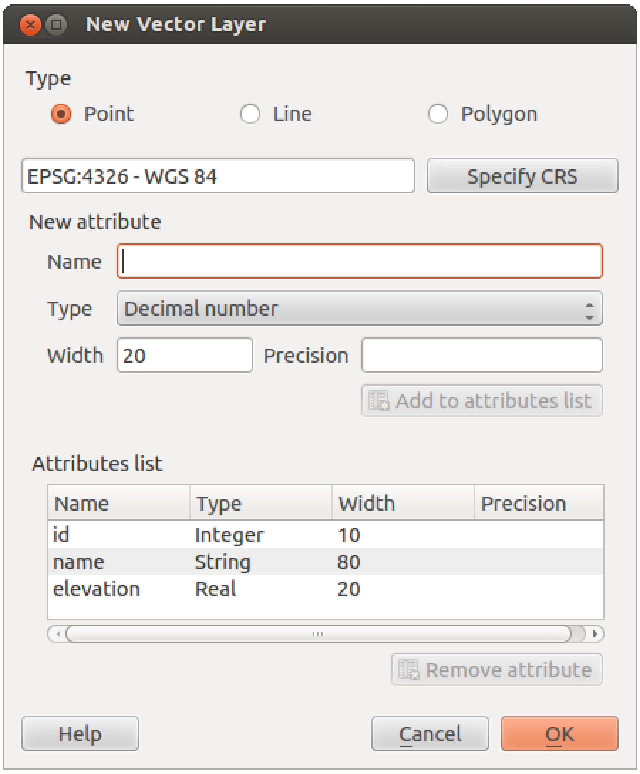

Figura 12.42: Creating a new Shapefile layer Dialog

Creating a new SpatiaLite layer

To create a new SpatiaLite layer for editing, choose *New* → *New SpatiaLite Layer...* from the *Layer* menu. The *New SpatiaLite Layer* dialog will be displayed as shown in Figure_edit_6.

The first step is to select an existing SpatiaLite database or to create a new SpatiaLite database. This can be done with the browse button ... to the right of the database field. Then, add a name for the new layer, define the layer type, and specify the coordinate reference system with **[Specify CRS]**. If desired, you can select *Create an autoincrementing primary key*.

To define an attribute table for the new SpatiaLite layer, add the names of the attribute columns you want to create with the corresponding column type, and click on the **[Add to attribute list]** button. Once you are happy with the attributes, click **[OK]**. QGIS will automatically add the new layer to the legend, and you can edit it in the same way as described in section *Digitizing an existing layer* above.

Further management of SpatiaLite layers can be done with the DB Manager. See *Complemento administrador de BBDD*.

Creating a new GPX layer

To create a new GPX file, you need to load the GPS plugin first. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox.

When this plugin is loaded, choose *New* → *Create new GPX Layer...* from the *Layer* menu. In the *Save new GPX file as* dialog, you can choose where to save the new GPX layer.

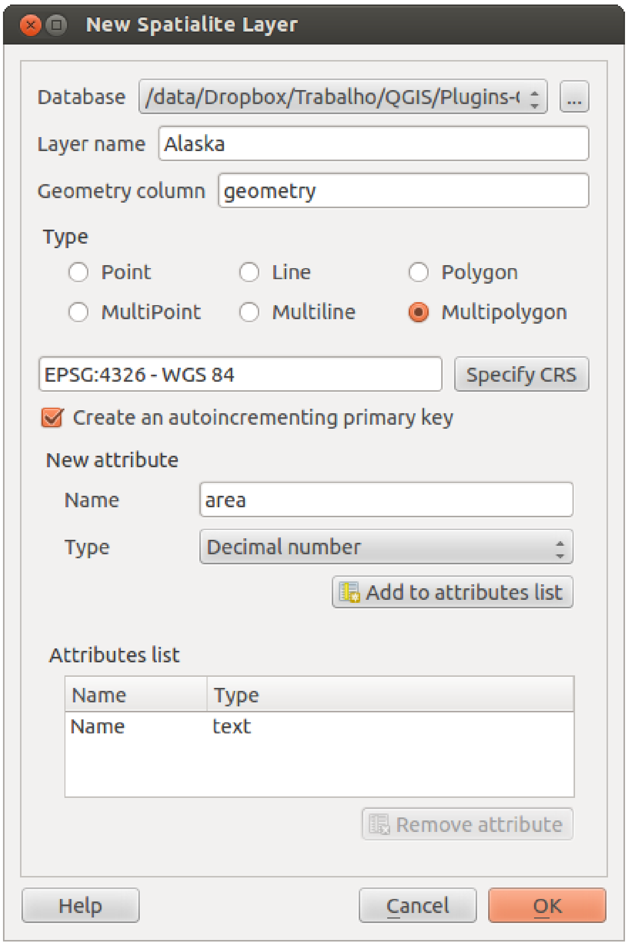

Figura 12.43: Creating a New SpatiaLite layer Dialog

12.5.7 Working with the Attribute Table

The attribute table displays features of a selected layer. Each row in the table represents one map feature, and each column contains a particular piece of information about the feature. Features in the table can be searched, selected, moved or even edited.

To open the attribute table for a vector layer, make the layer active by clicking on it in the map legend area. Then, from the main *Layer* menu, choose *Open Attribute Table*. It is also possible to right click on the layer and choose *Open Attribute Table* from the drop-down menu, and to click on the *Open Attribute Table* button in the Attributes toolbar.

This will open a new window that displays the feature attributes for the layer (figure_attributes_1). The number of features and the number of selected features are shown in the attribute table title.

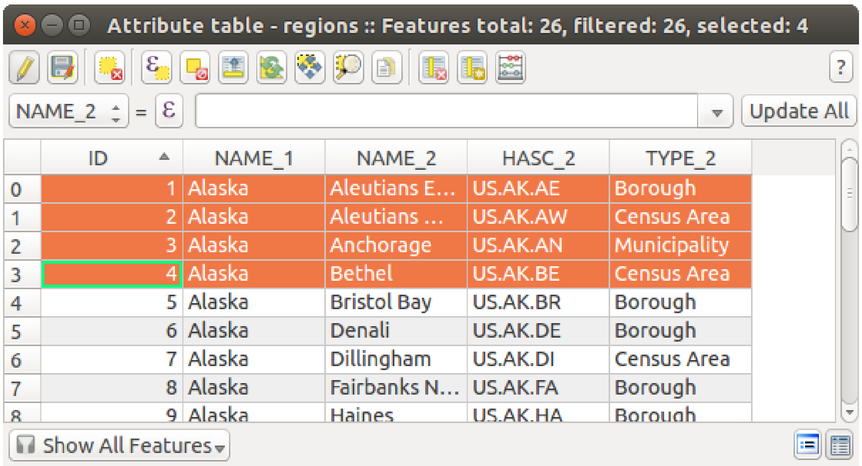

Figura 12.44: Attribute Table for regions layer

Selecting features in an attribute table

Each selected row in the attribute table displays the attributes of a selected feature in the layer. If the set of features selected in the main window is changed, the selection is also updated in the attribute table. Likewise, if the set of rows selected in the attribute table is changed, the set of features selected in the main window will be updated.

Rows can be selected by clicking on the row number on the left side of the row. **Multiple rows** can be marked by holding the `Ctrl` key. A **continuous selection** can be made by holding the `Shift` key and clicking on several row headers on the left side of the rows. All rows between the current cursor position and the clicked row are selected. Moving the cursor position in the attribute table, by clicking a cell in the table, does not change the row selection. Changing the selection in the main canvas does not move the cursor position in the attribute table.

The table can be sorted by any column, by clicking on the column header. A small arrow indicates the sort order (downward pointing means descending values from the top row down, upward pointing means ascending values from the top row down).

For a **simple search by attributes** on only one column, choose the *Column filter* → from the menu in the bottom left corner. Select the field (column) on which the search should be performed from the drop-down menu, and hit the **[Apply]** button. Then, only the matching features are shown in the attribute table.

To make a selection, you have to use the Select features using an Expression icon on top of the attribute table. Select features using an Expression allows you to define a subset of a table using a *Function List* like in the Field Calculator (see *Field Calculator*). The query result can then be saved as a new vector layer. For example, if you want to find regions that are boroughs from `regions.shp` of the QGIS sample data, you have to open the *Fields and Values* menu and choose the field that you want to query. Double-click the field 'TYPE_2' and also **[Load all unique values]** . From the list, choose and double-click 'Borough'. In the *Expression* field, the following query appears:

```
"TYPE_2" = 'Borough'
```

Here you can also use the *Function list* → *Recent (Selection)* to make a selection that you used before. The expression builder remembers the last 20 used expressions.

The matching rows will be selected, and the total number of matching rows will appear in the title bar of the attribute table, as well as in the status bar of the main window. For searches that display only selected features on the map, use the Query Builder described in section *Constructor de consultas*.

To show selected records only, use *Show Selected Features* from the menu at the bottom left.

The other buttons at the top of the attribute table window provide the following functionality:

- Toggle editing mode to edit single values and to enable functionalities described below (also with `Ctrl+E`)
- Save Edits (also with `Ctrl+S`)
- Unselect all (also with `Ctrl+U`)
- Move selected to top (also with `Ctrl+T`)
- Invert selection (also with `Ctrl+R`)
- Copy selected rows to clipboard (also with `Ctrl+C`)
- Zoom map to the selected rows (also with `Ctrl+J`)
- Pan map to the selected rows (also with `Ctrl+P`)
- Delete selected features (also with `Ctrl+D`)
- New Column for PostGIS layers and for OGR layers with GDAL version >= 1.6 (also with `Ctrl+W`)
- Delete Column for PostGIS layers and for OGR layers with GDAL version >= 1.9 (also with `Ctrl+L`)
- Open field calculator (also with `Ctrl+I`)

Below these buttons is the Field Calculator bar, which allows calculations to be quickly applied attributes visible in the table. This bar uses the same expressions as the Field Calculator (see *Field Calculator*).

Truco: Skip WKT geometry

If you want to use attribute data in external programs (such as Excel), use the Copy selected rows to clipboard button. You can copy the information without vector geometries if you deactivate *Settings* → *Options* → Data sources menu *Copy geometry in WKT representation from attribute table*.

Save selected features as new layer

The selected features can be saved as any OGR-supported vector format and also transformed into another coordinate reference system (CRS). Just open the right mouse menu of the layer and click on *Save as* to define the name of the output file, its format and CRS (see section *Leyenda del mapa*). To save the selection ensure that the *Save only selected features* is selected. It is also possible to specify OGR creation options within the dialog.

Paste into new layer

Features that are on the clipboard may be pasted into a new layer. To do this, first make a layer editable. Select some features, copy them to the clipboard, and then paste them into a new layer using *Edit* → *Paste Features as* and choosing *New vector layer* or *New memory layer*.

This applies to features selected and copied within QGIS and also to features from another source defined using well-known text (WKT).

Working with non spatial attribute tables

QGIS allows you also to load non-spatial tables. This currently includes tables supported by OGR and delimited text, as well as the PostgreSQL, MSSQL and Oracle provider. The tables can be used for field lookups or just generally browsed and edited using the table view. When you load the table, you will see it in the legend field. It can be opened with the Open Attribute Table tool and is then editable like any other layer attribute table.

As an example, you can use columns of the non-spatial table to define attribute values, or a range of values that are allowed, to be added to a specific vector layer during digitizing. Have a closer look at the edit widget in section *Fields Menu* to find out more.

12.5.8 Creating one to many relations

Relations are a technique often used in databases. The concept is, that features (rows) of different layers (tables) can belong to each other.

As an example you have a layer with all regions of alaska (polygon) which provides some attributes about its name and region type and a unique id (which acts as primary key).

Foreign keys

Then you get another point layer or table with information about airports that are located in the regions and you also want to keep track of these. If you want to add them to the region layer, you need to create a one to many relation using foreign keys, because there are several airports in most regions.

Figura 12.45: Alaska region with airports

In addition to the already existing attributes in the airports attribute table another field fk_region which acts as a foreign key (if you have a database, you will probably want to define a constraint on it).

This field fk_region will always contain an id of a region. It can be seen like a pointer to the region it belongs to. And you can design a custom edit form for the editing and QGIS takes care about the setup. It works with different providers (so you can also use it with shape and csv files) and all you have to do is to tell QGIS the relations between your tables.

Layers

QGIS makes no difference between a table and a vector layer. Basically, a vector layer is a table with a geometry. So can add your table as a vector layer. To demostrate you can load the 'region' shapefile (with geometries) and the 'airport' csv table (without geometries) and a foreign key (fk_region) to the layer region. This means, that each airport belongs to exactly one region while each region can have any number of airports (a typical one to many relation).

Definition (Relation Manager)

The first thing we are going to do is to let QGIS know about the relations between the layer. This is done in *Settings → Project Properties*. Open the *Relations* menu and click on *Add*.

- **name** is going to be used as a title. It should be a human readable string, describing, what the relation is used for. We will just call say "Airports" in this case.
- **referencing layer** is the one with the foreign key field on it. In our case this is the airports layer
- **referencing field** will say, which field points to the other layer so this is fk_region in this case
- **referenced layer** is the one with the primary key, pointed to, so here it is the regions layer
- **referenced field** is the primary key of the referenced layer so it is ID
- **id** will be used for internal purposes and has to be unique. You may need it to build custom forms once this is supported. If you leave it empty, one will be generated for you but you can assign one yourself to get one that is easier to handle.

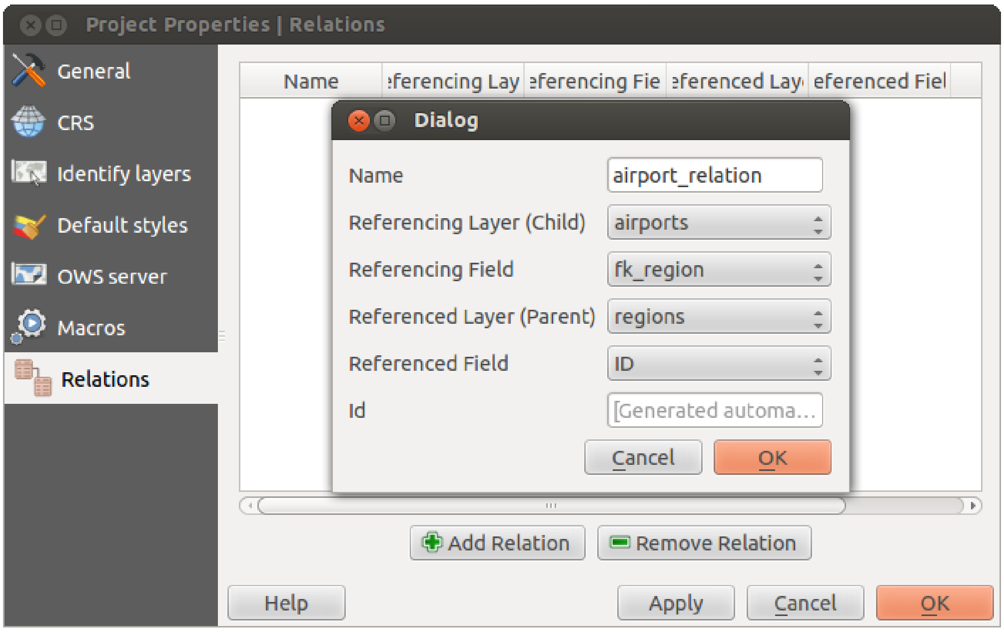

Figura 12.46: Relation Manager

Forms

Now that QGIS knows about the relation, it will be used to improve the forms it generates. As we did not change the default form method (autogenerated) it will just add a new widget in our form. So let's select the layer region in the legend and use the identify tool. Depending on your settings, the form might open directly or you will have to choose to open it in the identification dialog under actions.

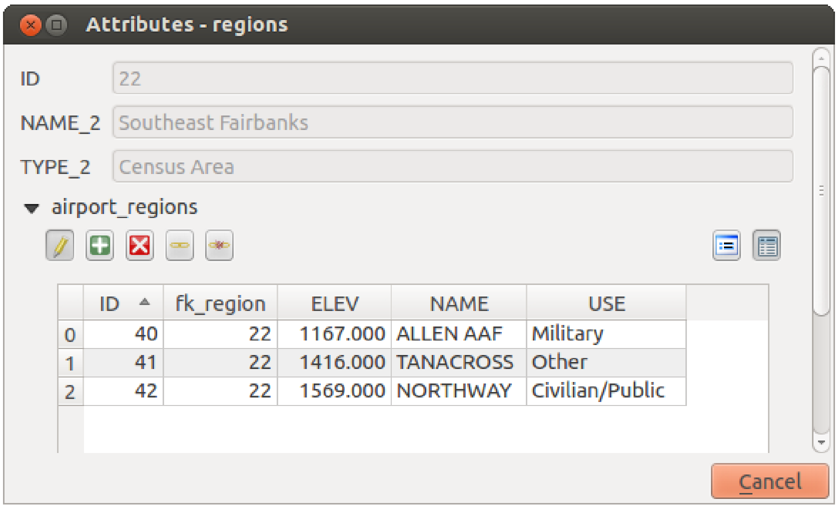

Figura 12.47: Identification dialog regions with relation to airports

As you can see, the airports assigned to this particular region are all shown in a table. And there are also some buttons available. Let's review them shortly

- The button is for toggling the edit mode. Be aware that it toggles the edit mode of the airport layer, although we are in the feature form of a feature from the region layer. But the table is representing features of the airport layer.
- The button will add a new feature to the airport layer. And it will assign the new airport to the current region by default.
- The button will delete the selected airport permanently.
- The symbol will open a new dialog where you can select any existing airport which will then be assigned to the current region. This may be handy if you created the airport on the wrong region by accident.
- The symbol will unlink the selected airport from the current region, leaving them unassigned (the foreign key is set to NULL) effectively.
- The two buttons to the right switch between table view and form view where the later let's you view all the airports in their respective form.

If you work on the airport table, a new widget type is available which lets you embed the feature form of the referenced region on the feature form of the airports. It can be used when you open the layer properties of the airports table, switch to the *Fields* menu and change the widget type of the foreign key field 'fk_region' to Relation Reference.

If you look at the feature dialog now, you will see, that the form of the region is embedded inside the airports form and will even have a combobox, which allows you to assign the current airport to another region.

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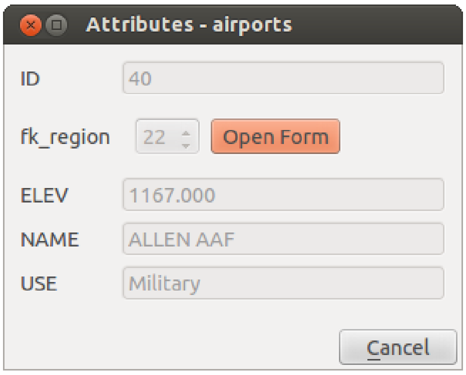

Figura 12.48: Identification dialog airport with relation to regions

12.6 Constructor de consultas

El Constructor de consultas permite definir un sub conjunto de una tabla utilizando SQL- como clausulas WHERE y visualizar los resultados en la ventana principal. El resultado de la consulta se puede guardar como una nueva capa vectorial.

12.6.1 Consulta

Abra el **Constructor de consultas** al abrir las Propiedades de la capa y vaya al menú *General*. Bajo *Subconjunto de datos espaciales*, haga clic en el botón **[Constructor de consultas]** para abrir el *Constructor de consultas*. Por ejemplo, si tiene una capa de `regiones` con un campo `TYPE_2`, podría seleccionar sólo regiones que estén en `municipio` y la caja *Expresión de filtrado específica por el proveedor* del Constructor de consultas. Figure_attributes_2 muestra un ejemplo de Constructor de consultas poblada con la capa `regions.shp` de los datos de ejemplo de QGIS. Las secciones de campos, valores y operadores ayudan a construir el SQL- como consulta.

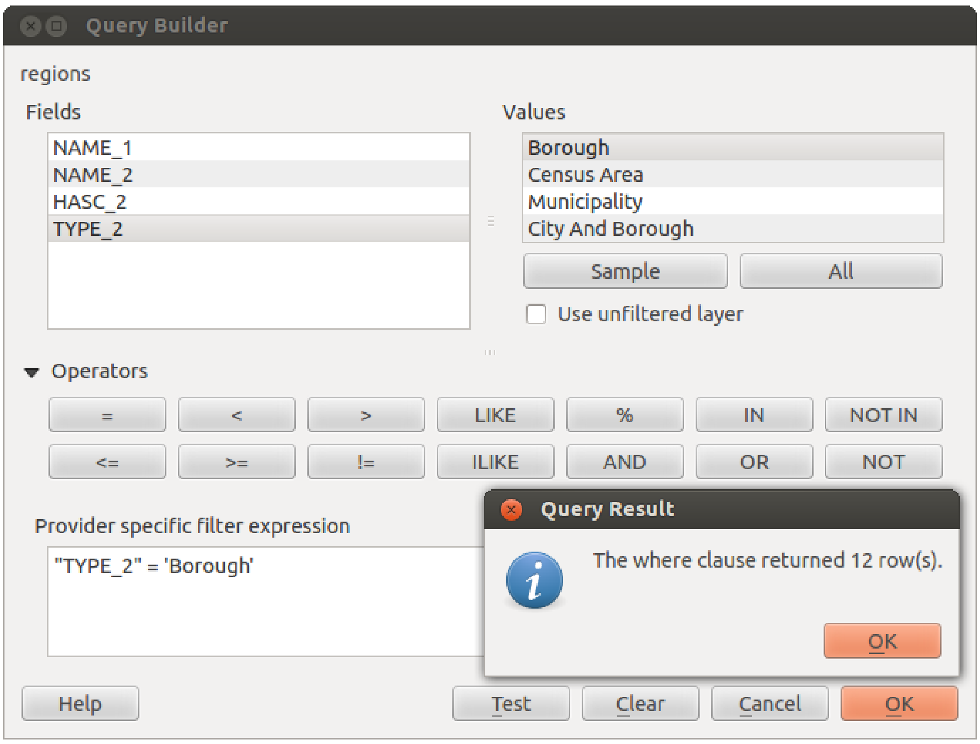

Figura 12.49: Constructor de consultas

La **Lista de campos** contiene todos las columnas de atributos de la tabla de atributos a ser buscados. Para agregar una columna de atributos al campo de la clausula SQL WHERE, haga doble clic en el nombre de la lista de campos. En general puede usar varios campos, valores y operadores para construir la consulta, o simplemente puede escribirlo en la caja SQL.

La **Lista de valores** lista los valores de una tabla de atributos. Para listar todos los valores posibles de un atributo, seleccione el atributo en la lista de campos y haga clic en el botón **[Todos]**. Para listar los primeros 25 valores únicos de una columna de atributos, seleccione la columna de atributos en la lista de campos y haga clic en el botón **[Muestra]**. Para añadir un valor al campo de la clausula WHERE de SQL, haga doble clic en el nombre en la lista de valores.

La **Sección de Operadores** contiene todos los operadores utilizables. Para añadir un operador al campo de la clausula WHERE, haga clic en el botón correspondiente. Los operadores relacionales (`=` , `>` , ...), operador de comparación de cadenas (`COMO`), y los operadores lógicos (`Y`, `O`, ...) están disponibles.

El botón **[Probar]** muestra un cuadro de mensaje con el numero de objetos espaciales que satisfacen la consulta actual, que es útil en el proceso de construcción de consultas. El botón **[Limpiar]** limpia el texto en el campo de texto de la clausula WHERE de SQL. El botón **[Aceptar]** cierra la ventana y selecciona los objetos espaciales que satisfacen la consulta. El botón **[Cancelar]** cierra la ventana sin cambiar la selección actual.

QGIS trata los actos de subconjuntos resultantes como si en toda la capa. Por ejemplo, si aplica el filtro por encima de 'Borough', no se puede mostrar, consultar, guardar o editar Ankorage , porque eso es una ' Manicpality ' y por lo tanto no forma parte del subconjunto .

La única excepción es que a menos que su capa sea parte de una base de datos, utilizar un subconjunto le impedirá la edición de la capa.

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12.7 Field Calculator

The Field Calculator button in the attribute table allows you to perform calculations on the basis of existing attribute values or defined functions, for instance, to calculate length or area of geometry features. The results can be written to a new attribute field, a virtual field, or they can be used to update values in an existing field.

Truco: Virtual Fields

- Virtual fields are not permanent and are not saved.
- To make a field virtual it must be done when the field is made.

The field calculator is now available on any layer that supports edit. When you click on the field calculator icon the dialog opens (see figure_attributes_3). If the layer is not in edit mode, a warning is displayed and using the field calculator will cause the layer to be put in edit mode before the calculation is made.

The quick field calculation bar in top of the attribute table is only visible if the layer is editable.

In quick field calculation bar, you first select the existing field name then open the expression dialog to create your expression or write it directly in the field then click on **Update All** button.

In the field calculator dialog, you first must select whether you want to only update selected features, create a new attribute field where the results of the calculation will be added or update an existing field.

If you choose to add a new field, you need to enter a field name, a field type (integer, real or string), the total field width, and the field precision (see figure_attributes_3). For example, if you choose a field width of 10 and a field precision of 3, it means you have 6 digits before the dot, then the dot and another 3 digits for the precision.

A short example illustrates how the field calculator works. We want to calculate the length in km of the `railroads` layer from the QGIS sample dataset:

1. Load the shapefile `railroads.shp` in QGIS and press Open Attribute Table.

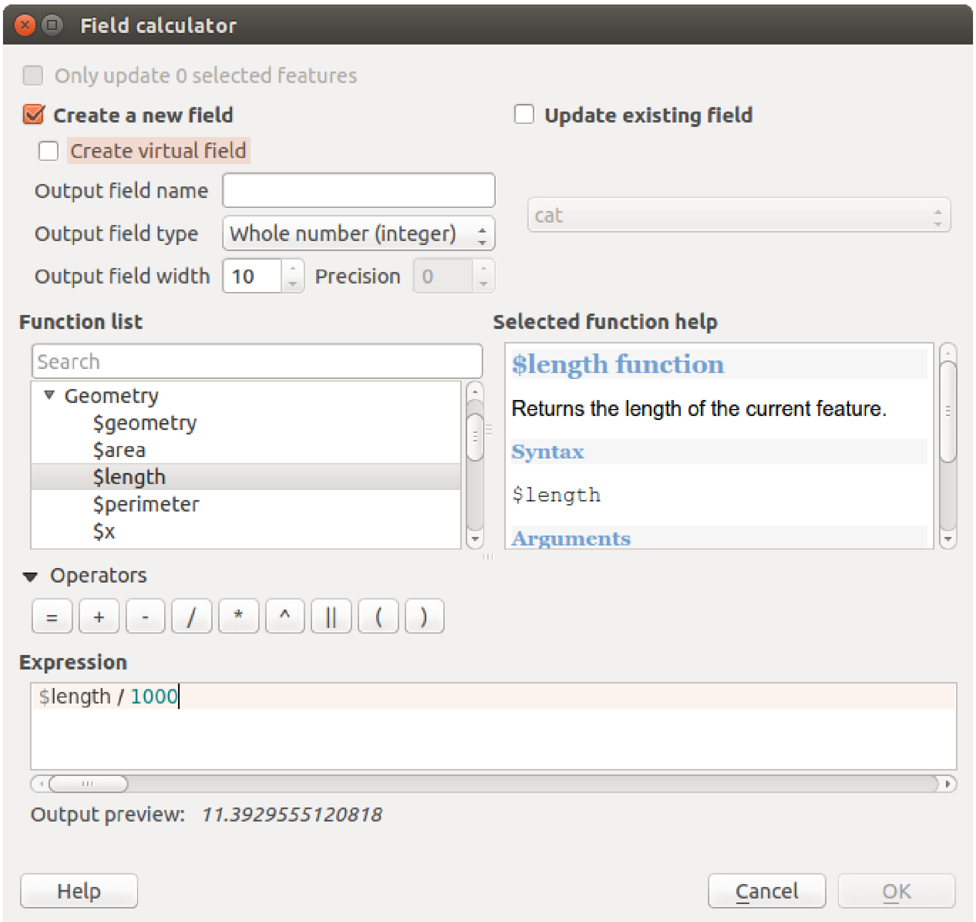

Figura 12.50: Field Calculator

2. Click on Toggle editing mode and open the Field Calculator dialog.
3. Select the *Create a new field* checkbox to save the calculations into a new field.
4. Add `length` as Output field name and `real` as Output field type, and define Output field width to be 10 and Precision, 3.
5. Now double click on function `$length` in the *Geometry* group to add it into the Field calculator expression box.
6. Complete the expression by typing ‘’/ 1000” in the Field calculator expression box and click **[Ok]**.
7. You can now find a new field `length` in the attribute table.

The available functions are listed in *Expressions* chapter.

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CAPÍTULO 13

Trabajar con catos raster

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13.1 Working with Raster Data

This section describes how to visualize and set raster layer properties. QGIS uses the GDAL library to read and write raster data formats, including ArcInfo Binary Grid, ArcInfo ASCII Grid, GeoTIFF, ERDAS IMAGINE, and many more. GRASS raster support is supplied by a native QGIS data provider plugin. The raster data can also be loaded in read mode from zip and gzip archives into QGIS.

As of the date of this document, more than 100 raster formats are supported by the GDAL library (see GDAL-SOFTWARE-SUITE in *Referencias bibliográficas y web*). A complete list is available at http://www.gdal.org/formats_list.html.

Nota: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a raster into QGIS. Other untested formats can be loaded by selecting the `[GDAL] All files (*)` filter.

Working with GRASS raster data is described in section *GRASS GIS Integration*.

13.1.1 What is raster data?

Raster data in GIS are matrices of discrete cells that represent features on, above or below the earth's surface. Each cell in the raster grid is the same size, and cells are usually rectangular (in QGIS they will always be rectangular). Typical raster datasets include remote sensing data, such as aerial photography, or satellite imagery and modelled data, such as an elevation matrix.

Unlike vector data, raster data typically do not have an associated database record for each cell. They are geocoded by pixel resolution and the x/y coordinate of a corner pixel of the raster layer. This allows QGIS to position the data correctly in the map canvas.

QGIS makes use of georeference information inside the raster layer (e.g., GeoTiff) or in an appropriate world file to properly display the data.

13.1.2 Loading raster data in QGIS

Raster layers are loaded either by clicking on the Add Raster Layer icon or by selecting the *Layer* → *Add Raster Layer* menu option. More than one layer can be loaded at the same time by holding down the `Ctrl` or `Shift` key and clicking on multiple items in the *Open a GDAL Supported Raster Data Source* dialog.

Once a raster layer is loaded in the map legend, you can click on the layer name with the right mouse button to select and activate layer-specific features or to open a dialog to set raster properties for the layer.

Right mouse button menu for raster layers

- *Zoom to Layer Extent*
- *Zoom to Best Scale (100 %)*
- *Stretch Using Current Extend*
- *Show in Overview*
- *Remove*
- *Duplicate*
- *Set Layer CRS*
- *Set Project CRS from Layer*
- *Save as ...*
- *Properties*
- *Rename*
- *Copy Style*
- *Add New Group*
- *Expand all*
- *Collapse all*
- *Update Drawing Order*

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13.2 Raster Properties Dialog

To view and set the properties for a raster layer, double click on the layer name in the map legend, or right click on the layer name and choose *Properties* from the context menu. This will open the *Raster Layer Properties* dialog (see figure_raster_1).

There are several menus in the dialog:

- *General*
- *Style*
- *Transparency*
- *Pyramids*
- *Histogram*
- *Metadata*

13.2.1 General Menu

Layer Info

The *General* menu displays basic information about the selected raster, including the layer source path, the display name in the legend (which can be modified), and the number of columns, rows and no-data values of the raster.

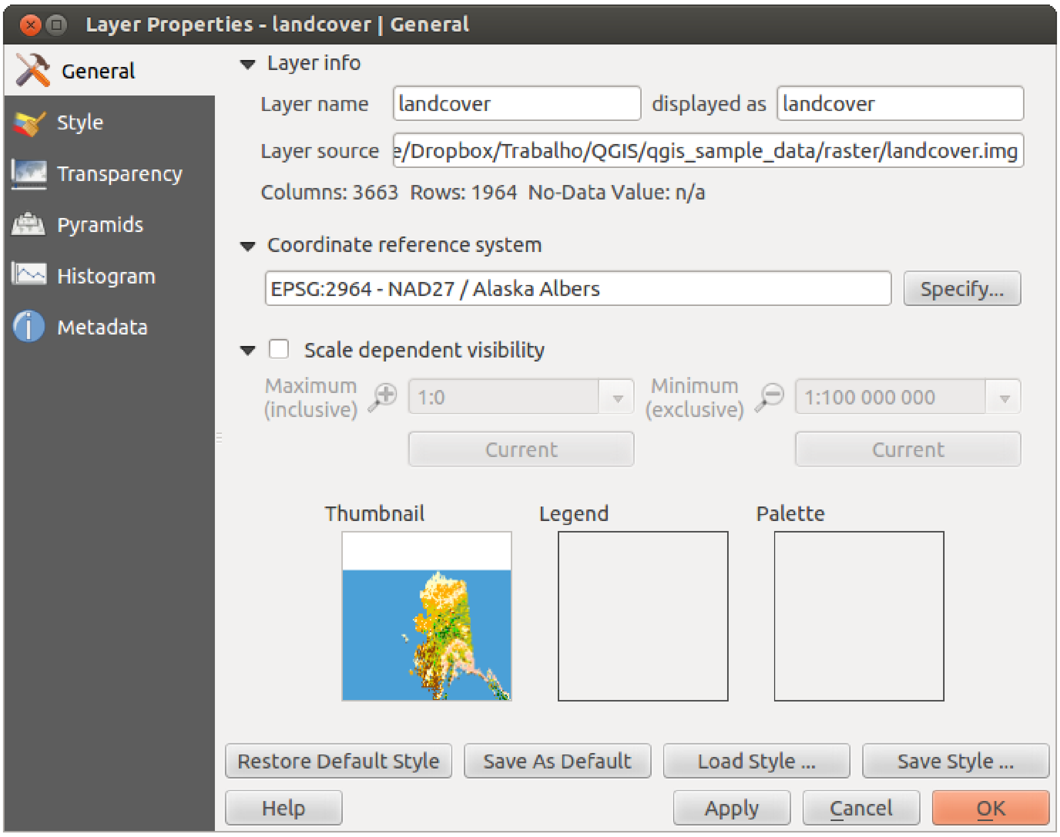

Figura 13.1: Raster Layers Properties Dialog

Coordinate reference system

Here, you find the coordinate reference system (CRS) information printed as a PROJ.4 string. If this setting is not correct, it can be modified by clicking the **[Specify]** button.

Scale Dependent visibility

Additionally scale-dependent visibility can be set in this tab. You will need to check the checkbox and set an appropriate scale where your data will be displayed in the map canvas.

At the bottom, you can see a thumbnail of the layer, its legend symbol, and the palette.

13.2.2 Style Menu

Band rendering

QGIS offers four different *Render types*. The renderer chosen is dependent on the data type.

1. Multiband color - if the file comes as a multiband with several bands (e.g., used with a satellite image with several bands)
2. Paletted - if a single band file comes with an indexed palette (e.g., used with a digital topographic map)
3. Singleband gray - (one band of) the image will be rendered as gray; QGIS will choose this renderer if the file has neither multibands nor an indexed palette nor a continous palette (e.g., used with a shaded relief map)
4. Singleband pseudocolor - this renderer is possible for files with a continuous palette, or color map (e.g., used with an elevation map)

Multiband color

With the multiband color renderer, three selected bands from the image will be rendered, each band representing the red, green or blue component that will be used to create a color image. You can choose several *Contrast enhancement* methods: 'No enhancement', 'Stretch to MinMax', 'Stretch and clip to MinMax' and 'Clip to min max'.

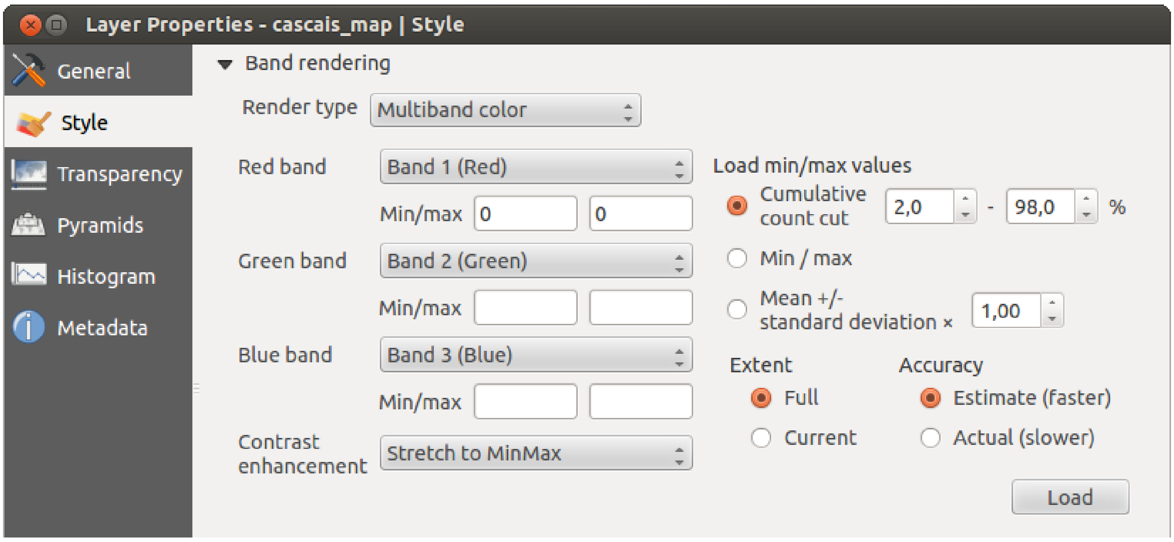

Figura 13.2: Raster Renderer - Multiband color

This selection offers you a wide range of options to modify the appearance of your raster layer. First of all, you have to get the data range from your image. This can be done by choosing the *Extent* and pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

Now you can scale the colors with the help of the *Load min/max values* section. A lot of images have a few very low and high data. These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2 % to 98 % of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

All calculations can also be made for the *Current* extent.

Truco: Viewing a Single Band of a Multiband Raster

If you want to view a single band of a multiband image (for example, Red), you might think you would set the Green and Blue bands to "Not Set". But this is not the correct way. To display the Red band, set the image type to 'Singleband gray', then select Red as the band to use for Gray.

Paletted

This is the standard render option for singleband files that already include a color table, where each pixel value is assigned to a certain color. In that case, the palette is rendered automatically. If you want to change colors assigned to certain values, just double-click on the color and the *Select color* dialog appears. Also, in QGIS 2.2. it's now possible to assign a label to the color values. The label appears in the legend of the raster layer then.

Contrast enhancement

Nota: When adding GRASS rasters, the option *Contrast enhancement* will always be set automatically to *stretch to min max*, regardless of if this is set to another value in the QGIS general options.

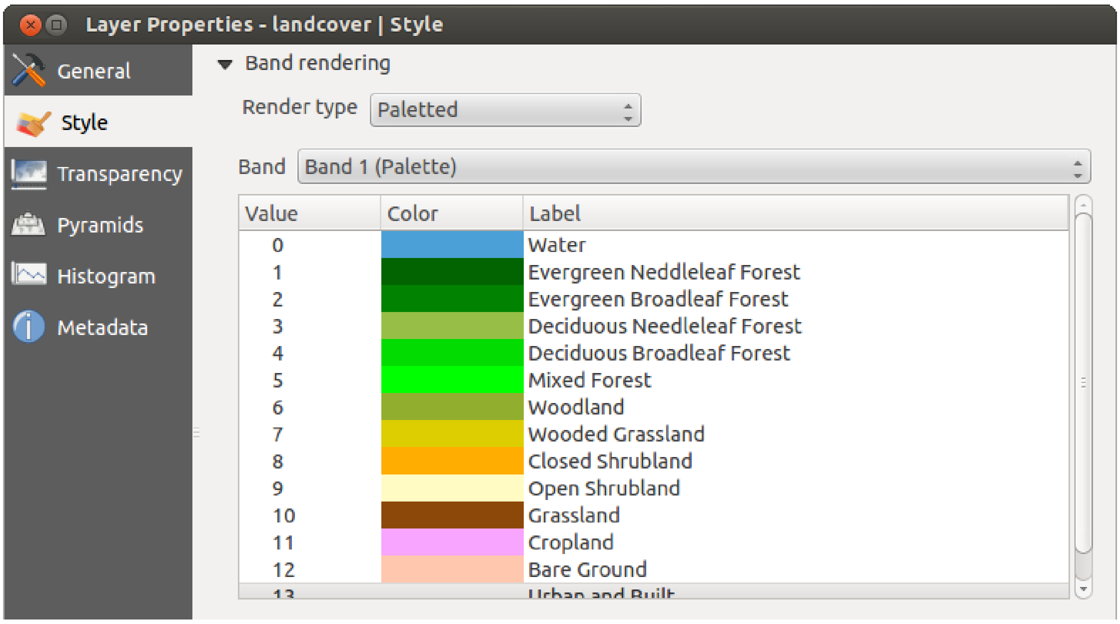

Figura 13.3: Raster Renderer - Paletted

Singleband gray

This renderer allows you to render a single band layer with a *Color gradient*: 'Black to white' or 'White to black'. You can define a *Min* and a *Max* value by choosing the *Extent* first and then pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

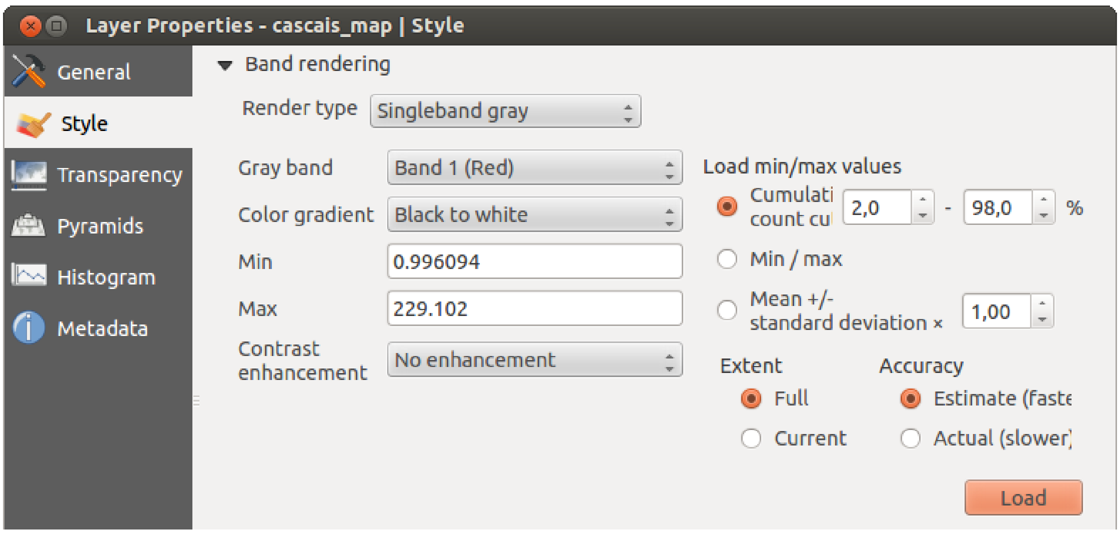

Figura 13.4: Raster Renderer - Singleband gray

With the *Load min/max values* section, scaling of the color table is possible. Outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2 % to 98 % of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. Further settings can be made with *Min/max* and *Mean +/- standard deviation x* 1,00. While the first one creates a color table with all of the data included in the original image, the second creates a color table that only considers values within the standard deviation or within multiple standard deviations. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

Singleband pseudocolor

This is a render option for single-band files, including a continous palette. You can also create individual color maps for the single bands here.   Three types of color interpolation are available:

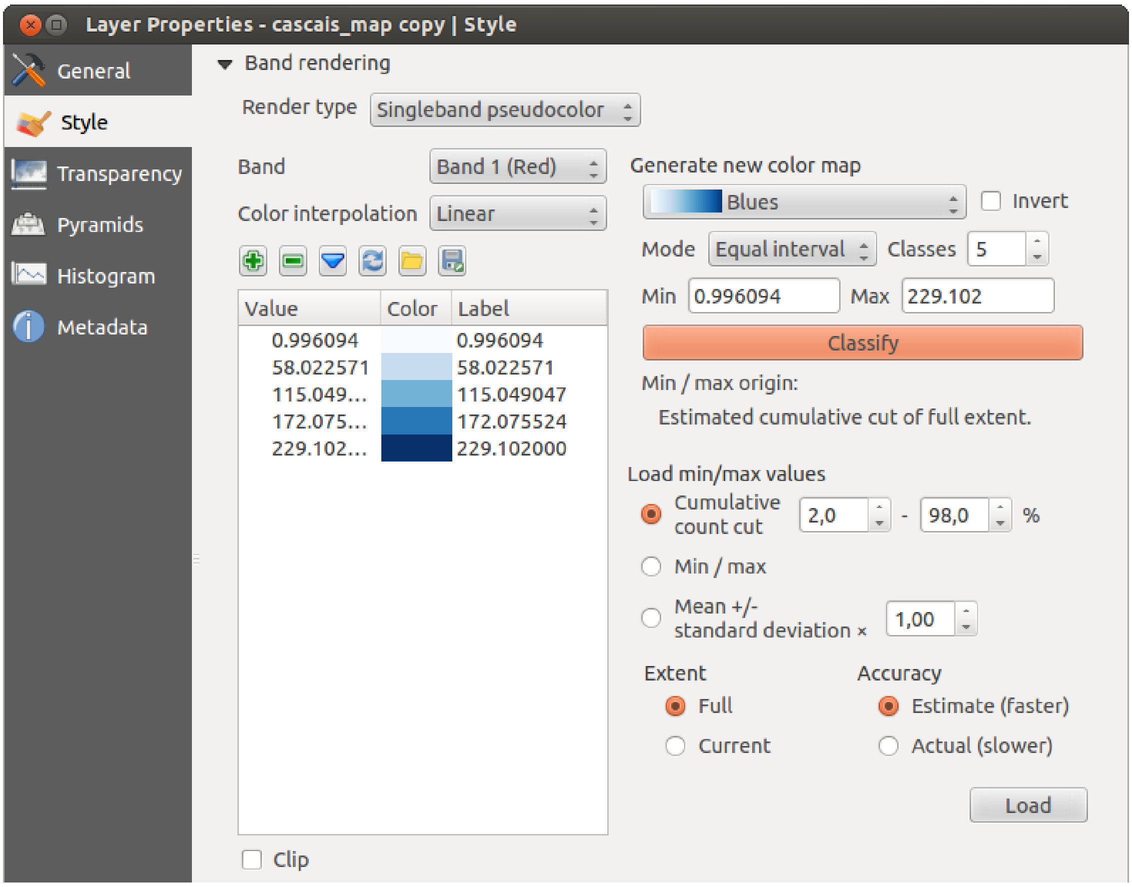

Figura 13.5: Raster Renderer - Singleband pseudocolor

1. Discrete
2. Linear
3. Exact

In the left block, the button Add values manually adds a value to the individual color table. The button Remove selected row deletes a value from the individual color table, and the Sort colormap items button sorts the color table according to the pixel values in the value column. Double clicking on the value column lets you insert a specific value. Double clicking on the color column opens the dialog *Change color*, where you can select a color to apply on that value. Further, you can also add labels for each color, but this value won't be displayed when you use the identify feature tool. You can also click on the button Load color map from band, which tries to load the table from the band (if it has any). And you can use the buttons Load color map from file or Export color map to file to load an existing color table or to save the defined color table for other sessions.

In the right block, *Generate new color map* allows you to create newly categorized color maps. For the *Classification mode* 'Equal interval', you only need to select the *number of classes* 1,00 and press the button *Classify*. You can invert the colors of the color map by clicking the *Invert* checkbox. In the case of the *Mode* 'Continous', QGIS creates classes automatically depending on the *Min* and *Max*. Defining *Min/Max* values can be done with the help of the *Load min/max values* section. A lot of images have a few very low and high data. These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2 % to 98 % of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table.

Color rendering

For every *Band rendering*, a *Color rendering* is possible.

You can also achieve special rendering effects for your raster file(s) using one of the blending modes (see *The Vector Properties Dialog*).

Further settings can be made in modifiying the *Brightness*, the *Saturation* and the *Contrast*. You can also use a *Grayscale* option, where you can choose between 'By lightness', 'By luminosity' and 'By average'. For one hue in the color table, you can modify the 'Strength'.

Resampling

The *Resampling* option makes its appearance when you zoom in and out of an image. Resampling modes can optimize the appearance of the map. They calculate a new gray value matrix through a geometric transformation.

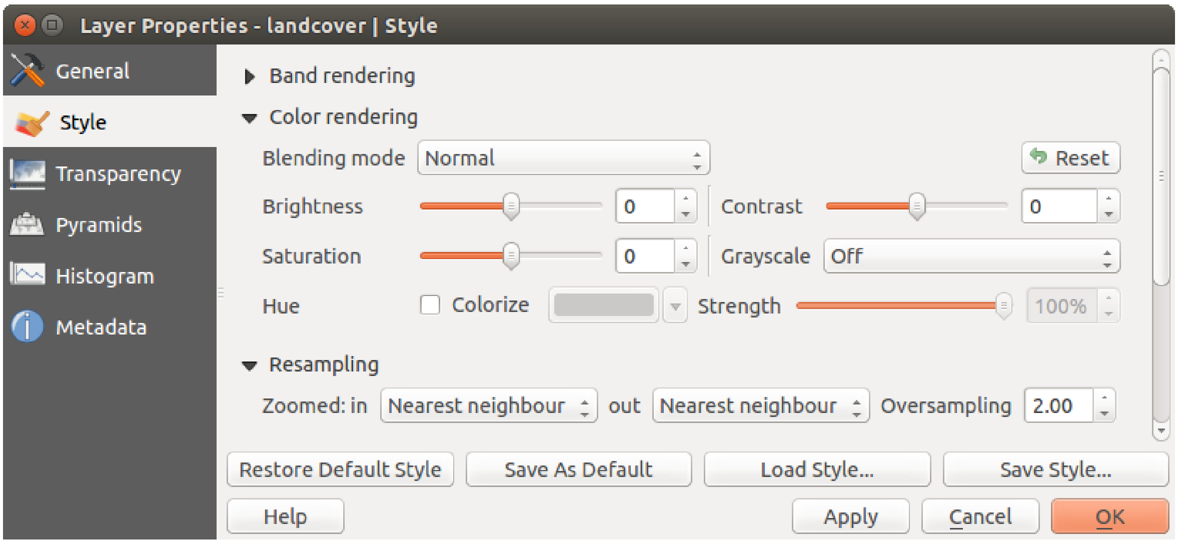

Figura 13.6: Raster Rendering - Resampling

When applying the 'Nearest neighbour' method, the map can have a pixelated structure when zooming in. This appearance can be improved by using the 'Bilinear' or 'Cubic' method, which cause sharp features to be blurred. The effect is a smoother image. This method can be applied, for instance, to digital topographic raster maps.

13.2.3 Transparency Menu

QGIS has the ability to display each raster layer at a different transparency level. Use the transparency slider to indicate to what extent the underlying layers (if any) should be visible though the current raster layer. This is very useful if you like to overlay more than one raster layer (e.g., a shaded relief map overlayed by a classified raster map). This will make the look of the map more three dimensional.

Additionally, you can enter a raster value that should be treated as *NODATA* in the *Additional no data value* menu.

An even more flexible way to customize the transparency can be done in the *Custom transparency options* section. The transparency of every pixel can be set here.

As an example, we want to set the water of our example raster file `landcover.tif` to a transparency of 20 %. The following steps are neccessary:

1. Load the raster file `landcover.tif`.
2. Open the *Properties* dialog by double-clicking on the raster name in the legend, or by right-clicking and choosing *Properties* from the pop-up menu.
3. Select the *Transparency* menu.
4. From the *Transparency band* menu, choose 'None'.
5. Click the Add values manually button. A new row will appear in the pixel list.
6. Enter the raster value in the 'From' and 'To' column (we use 0 here), and adjust the transparency to 20 %.
7. Press the **[Apply]** button and have a look at the map.

You can repeat steps 5 and 6 to adjust more values with custom transparency.

As you can see, it is quite easy to set custom transparency, but it can be quite a lot of work. Therefore, you can use the button Export to file to save your transparency list to a file. The button Import from file loads your transparency settings and applies them to the current raster layer.

13.2.4 Pyramids Menu

Large resolution raster layers can slow navigation in QGIS. By creating lower resolution copies of the data (pyramids), performance can be considerably improved, as QGIS selects the most suitable resolution to use depending on the level of zoom.

You must have write access in the directory where the original data is stored to build pyramids.

Several resampling methods can be used to calculate the pyramids:

- Nearest Neighbour
- Average
- Gauss
- Cubic
- Mode
- None

If you choose 'Internal (if possible)' from the *Overview format* menu, QGIS tries to build pyramids internally. You can also choose 'External' and 'External (Erdas Imagine)'.

Please note that building pyramids may alter the original data file, and once created they cannot be removed. If you wish to preserve a 'non-pyramided' version of your raster, make a backup copy prior to building pyramids.

13.2.5 Histogram Menu

The *Histogram* menu allows you to view the distribution of the bands or colors in your raster. The histogram is generated automatically when you open the *Histogram* menu. All existing bands will be displayed together. You can save the histogram as an image with the button. With the *Visibility* option in the *Prefs/Actions* menu, you can display histograms of the individual bands. You will need to select the option *Show selected band*. The *Min/max options* allow you to 'Always show min/max markers', to 'Zoom to min/max' and to 'Update style to min/max'. With the *Actions* option, you can 'Reset' and 'Recompute histogram' after you have chosen the *Min/max options*.

Figura 13.7: The Pyramids Menu

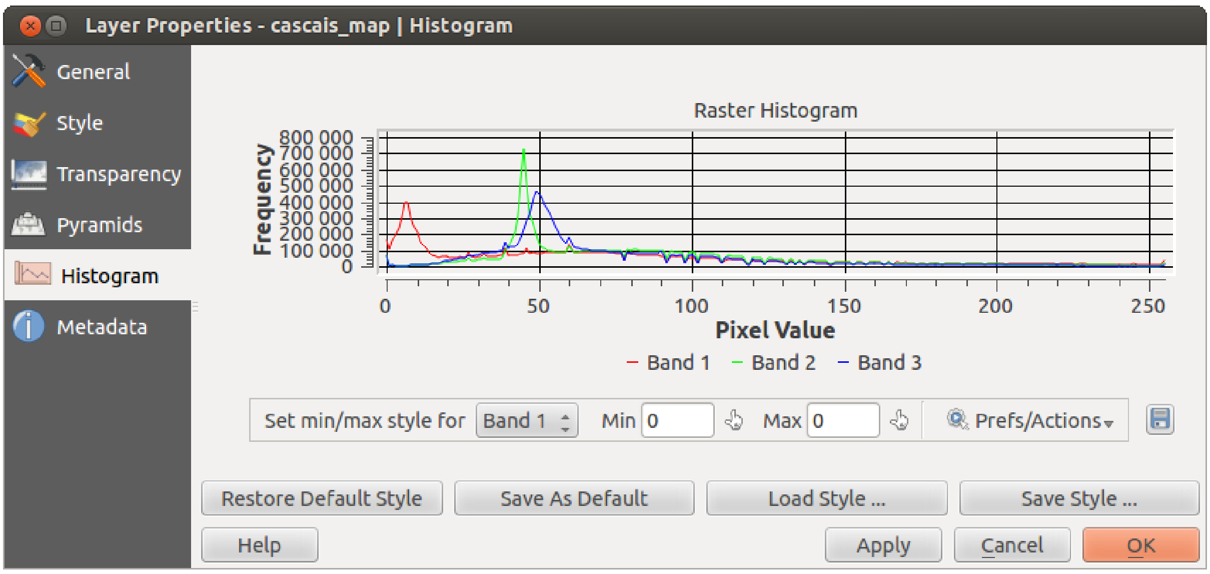

Figura 13.8: Raster Histogram

13.2.6 Metadata Menu

The *Metadata* menu displays a wealth of information about the raster layer, including statistics about each band in the current raster layer. From this menu, entries may be made for the *Description*, *Attribution*, *MetadataUrl* and *Properties*. In *Properties*, statistics are gathered on a 'need to know' basis, so it may well be that a given layer's statistics have not yet been collected.

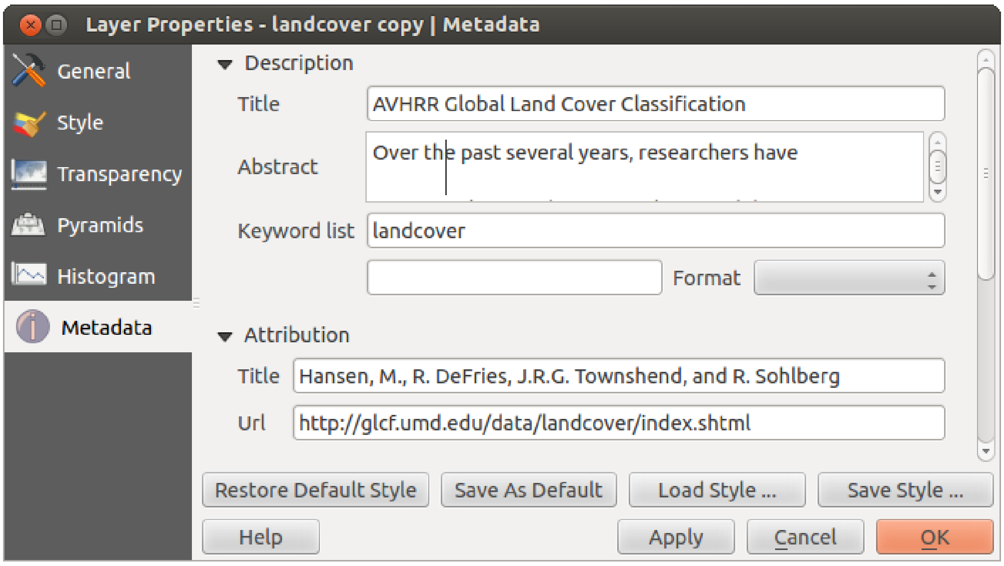

Figura 13.9: Raster Metadata

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13.3 Calculadora Ráster

La *Calculadora ráster* en el menú *Ráster* le permite realizar cálculos en base a los valores de píxel de un ráster existente (ver figure_raster_10). Los resultados se escriben en una nueva capa ráster con formato GDAL-compatible.

La lista **Bandas ráster** contiene todas las capas ráster cargadas que pueden ser utilizadas. Para añadir un ráster a la expresión de la calculadora de campos, haga doble clic en el nombre en la lista de campos. Puede después utilizar los operadores para construir expresiones de cálculo o simplemente puede escribirlas en el cuadro.

En la sección **Capa de resultado**, tendrá que definir una capa de salida. A continuación puede definir la extensión de la zona de cálculo basado en una capa ráster de entrada, o sobre la base de coordenadas X,Y y sobre columnas y filas, para establecer la resolución de la capa de salida. Si la capa de entrada tiene diferente resolución, los valores serán remuestreados con el algoritmo del vecino más cercano.

La sección de **Operadores** contiene todos los operadores disponibles. Para añadir un operador a la caja de expresiones de la calculadora ráster, haga clic en el botón apropiado. Cálculos matemáticos (`+`, `-`, `*`, ...) y funciones trigonométricas (`sin`, `cos`, `tan`, ...) están disponibles. ¡Estén atentos a más operadores por venir!

Con la casilla de verificación *Añadir resultado al proyecto*, La capa de resultado se añadirá automaticamente a la zona de la leyenda y puede ser visualizado.

13.3.1 Ejemplos

Convertir valores de elevación de metros a pies

Crear un ráster de elevación en pies de un ráster en metros, es necesario utilizar el factor de conversión de metros a pies: 3.28. La expresión es:

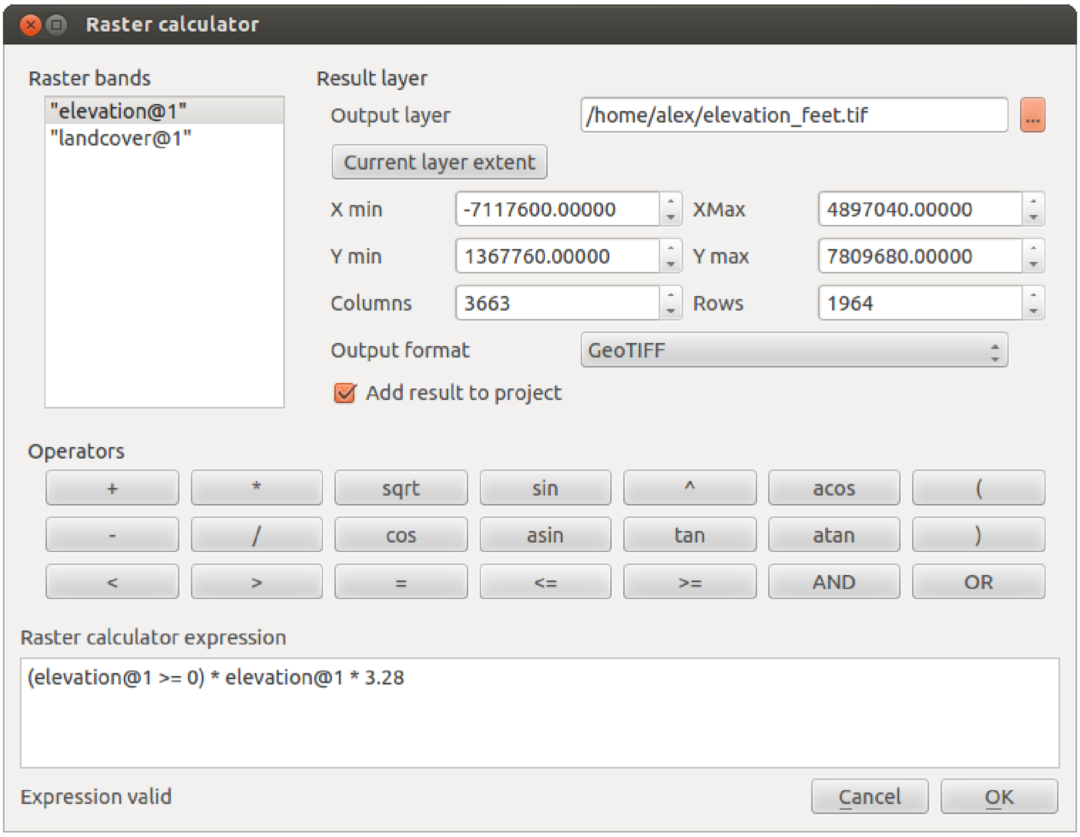

Figura 13.10: Calculadora Ráster

```
"elevation@1" * 3.28
```

El uso de una máscara

Si desea enmascarar partes de una ráster- digamos , por ejemplo , porque sólo está interesado en elevaciones por encima de 0 metros – se puede utilizar la siguiente expresión para crear una máscara y aplicar el resultado a un ráster en un solo paso.

```
("elevation@1" >= 0) * "elevation@1"
```

En otras palabras, por cada celda superior o igual a 0 , establezca su valor en 1. De lo contrario, establecer a 0. Esto crea la máscara al vuelo.

Si desea clasificar un ráster –digamos, por ejemplo en dos clases de elevación, puede utilizar la siguiente expresión para crear un ráster con dos valores 1 y 2 en un solo paso.

```
("elevation@1" < 50) * 1 + ("eleevation@1" >= 50) * 2
```

En otras palabras, para cada celda menor de 50 establecer el valor a 1. Para cada celda mayor o igual a 50 establecer el valor a 2.

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CAPÍTULO 14

Trabajar con datos OGC

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14.1 QGIS como cliente de datos OGC

El Open Geospatial Consortium (OGC) es una organización internacional con miembros de más de 300 organizaciones comerciales, gubernamentales, sin fines de lucro y de investigación de todo el mundo. Sus miembros desarrollan e implementan estándares para contenido geoespacial y servicios, procesamiento de datos SIG y el intercambio.

Al describir un modelo de datos básico para las características geográficas, un número cada vez mayor de las especificaciones son desarrollados por OGC para atender las necesidades específicas de ubicación interoperable y la tecnología geoespacial, incluyendo SIG. Más información se puede encontrar en http://www.opengeospatial.org/.

Importantes especificaciones OGC implementadas por QGIS son:

- **WMS** — Web Map Service (*Cliente WMS/WMTS*)
- **WMTS** — Web Map Tile Service (*Cliente WMS/WMTS*)
- **WFS** — Web Feature Service (*Cliente WFS y WFS-T*)
- **WFS-T** — Web Feature Service - Transactional (*Cliente WFS y WFS-T*)
- **WCS** — Web Coverage Service (*WCT Cliente*)
- **SFS** — Simple Features for SQL (*PostGIS Layers*)
- **GML** — Lenguaje de Marcado Generalizado

Los servicios OGC cada vez más se utilizan para intercambiar datos geoespaciales entre diferentes implementaciones de SIG y almacenes de datos. QGIS puede hacer frente a las especificaciones anteriores como un cliente, siendo **SFS** (a través del apoyo del proveedor de datos/PostGIS PostgreSQL, consulte la sección *PostGIS Layers*).

14.1.1 Cliente WMS/WMTS

Información general de la implementación WMS

Actualmente QGIS puede actuar como un cliente WMS que entiende servidores WMS 1.1, 1.1.1 y 1.3. En particular, se ha probado contra los servidores de acceso público como DEMIS.

Un servidor WMS actúa sobre las peticiones por parte del cliente (por ejemplo, QGIS) para un mapa ráster con una extensión dada, conjunto de capas, el estilo de simbolización, y la transparencia. El servidor WMS posteriormente, consulta a sus fuentes de datos locales, rásteriza el mapa, y lo envía de vuelta al cliente en un formato ráster. Para QGIS, este formato sería típicamente JPEG o PNG.

WMS es genéricamente un servicio REST (Representational State Transfer) en lugar de un servicio Web en toda regla. Como tal, puede tomar las URLs generadas por QGIS y utilizarlos en un navegador web para recuperar las mismas imágenes que QGIS utiliza internamente. Esto puede ser útil para la solución de problemas, ya que hay varias marcas de servidor WMS en el mercado y todos ellos tienen su propia interpretación de la norma WMS.

Las capas WMS se pueden añadir sencillamente, siempre que conozca la URL para acceder al servidor WMS, si tiene una conexión útil a ese servidor, y el servidor entiende HTTP como mecanismo de transporte de datos.

Información general de la implementación WMTS

QGIS también puede actuar como un cliente WMTS. WMTS es un estándar OGC para la distribución de conjunto de fichas de datos geoespaciales. Esta es una forma más rápida y eficiente de distribución de datos que WMS porque con WMTS, el conjunto de fichas es pre-generado, y el cliente sólo pide a la transmisión de los azulejos, no su producción. A petición WMS implica típicamente tanto la generación y transmisión de los datos. Un ejemplo bien conocido de un estándar de no OGC para la visualización de datos geoespaciales de azulejos es Google Maps.

Para mostrar los datos en una variedad de escalas cercanas a lo que el usuario podría querer, los conjuntos de teselas WMTS se producen en varios niveles de escala diferentes y están disponibles para el cliente SIG para pedirlos.

Este diagrama ejemplifica el concepto de conjunto de teselas:

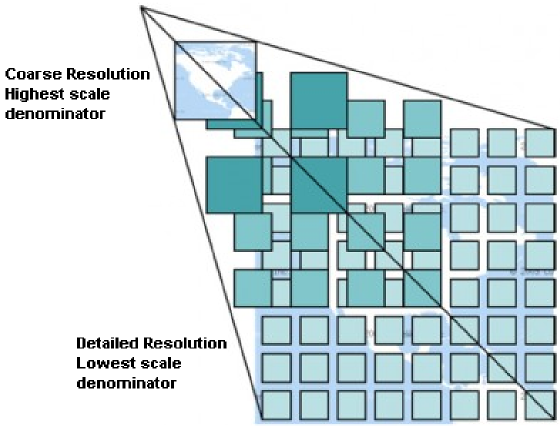

Figura 14.1: Concepto de conjunto de teselas WMTS

Los dos tipos de interfaces de WMTS, quelqgl reconoce son a través de Key-Value-Pairs(KVP) y RESTful. Estas dos interfaces son diferentes, y hay que especificar a diferente QGIS.

1) In order to access a **WMTS KVP** service, a QGIS user must open the WMS/WMTS interface and add the following string to the URL of the WMTS tile service:

```
"?SERVICE=WMTS&REQUEST=GetCapabilities"
```

Un ejemplo de este tipo de dirección es

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

Para probar la capa topo2 en este WMTS funciona muy bien. Añadir esta cadena indica que un servicio web WMTS se va a utilizar en lugar de un servicio WMS.

2. EL servicio **RESTful WMTS** toma una forma diferente, una URL sencilla. EL formato recomendado por OGC es:

```
{WMTSBaseURL}/1.0.0/WMTSCapabilities.xml
```

Este formato le ayuda a reconocer que es una dirección RESTful. Un WMTS RESTful se accede en QGIS simplemente añadiendo su dirección en la configuración del WMS en el campo de URL del formulario. Un ejemplo de este tipo de dirección para un caso de mapa base Austriaco es http://maps.wien.gv.at/basemap/1.0.0/WMTSCapabilities.xml.

Nota: Se pueden encontrar aun algunos servicios viejos llamados WMS-C. Estos servicios son bastante similares a WMTS (por ejemplo, mismo propósito pero trabaja un poco diferente). Se pueden administrar lo mismo que los servicios WMTS hechos. Sólo se añade ?titled=true al final de la url. Vea http://wiki.osgeo.org/wiki/Tile_Map_Service_Specification para mayor información acerca de esta especificación.

Cuando se lee WMTS, a menudo se puede pensar en WMS-C también.

Seleccionar servidor WMS/WMTS

La primera ves que utiliza el objeto WMS en QGIS, no hay servidores definidos.

Comience haciendo clic en el botón Añadir capa WMS en la barra de herramientas, o seleccionando *Capa* → *Añadir capa WMS...*.

El diálogo *Añadir capa(s) desde un servidor* para añadir capas que aparezcan en el servidor WMS. Se pueden agregar algunas capas para jugar haciendo clic en el botón **[Añadir servidores predeterminados]**. Este añadirá dos servidores demo WMS para usar: los servidores WMS de DM Solutions Group y Lizardtech. Para definir un nuevo servidor WMS en la pestaña *Capas*, seleccionar el botón **[Nuevo]**. A continuación introduzca los parámetros para conectarse a su servidor deseado, como se indica en table_OGC_1:

Nombre	Un nombre para esta conexión. Este nombre se utilizará en la lista desplegable de conexiones a servidor así que se puede distinguir de otros servidores WMS.
URL	La URL del servidor provee los datos. Este debe ser un nombre de host soluble – el mismo formato que usaría para abrir una conexión telnet o ping a un host.
Nombre de usuario	Nombre de usuario para acceder a un servidor asegurado de WMS. Este parámetro es opcional.
Contraseña	Contraseña para una autentificación básica al servidor WMS. Este parámetro es opcional
Ignorar URI GetMap	*Ignorar URI GetMap reportada en las capacidades*. Utilice un URI dado del campo URL anterior.
Ignorar la URI GetFeatureInfo	*Ignorar la URI GetFeatureInfo reportada en las capacidades*. Utilice un URI dado del campo URL anterior.

Tabla OGC 1: Parámetros de conexión WMS

Si necesita configurar un servidor proxy para poder recibir servicios WMS de internet, se puede añadir el servidor proxy en las opciones. Elegir *Configuración*→ *Opciones* y haga clic en la pestaña *Red & Proxy*. Ahí, podrá añadir su configuración de proxy y habilitarlos al ajustar el *Usar proxy para acceso web*. Comprobar que selecciono el tipo de proxy correcto del menú desplegable *Tipo de proxy* .

Una vez que la nueva conexión al servidor WMS ha sido creada, será preservado para futuras sesiones QGIS.

Truco: En las direcciones URL del servidor WMS

Asegúrese, al introducir la URL del servidor WMS, que tiene solo la base URL. Por ejemplo, no debe tener fragmentos como `request=GetCapabilities` o `version=1.0.0` en su URL.

Cargando capas WMS/WMTS

Una vez que haya llenado exitosamente en sus parámetros, puede utilizar el botón **[Conectar]** para recuperar las capacidades del servidor seleccionado. Esto incluye la codificación de la imagen, capas, estilos de capa y proyecciones. Como es una operación de la red, la velocidad de respuesta depende de la calidad de la conexión de red al servidor WMS. Mientras descarga los datos desde el servidor WMS, el proceso de descarga se visualizara en la parte inferior izquierda del dialogo WMS.

La pantalla ahora debe lucir un poco como figure_OGR_1, que muestra la respuesta proporcionada por el servidor WMS de DM Solutions Group.

Codificación de la Imagen

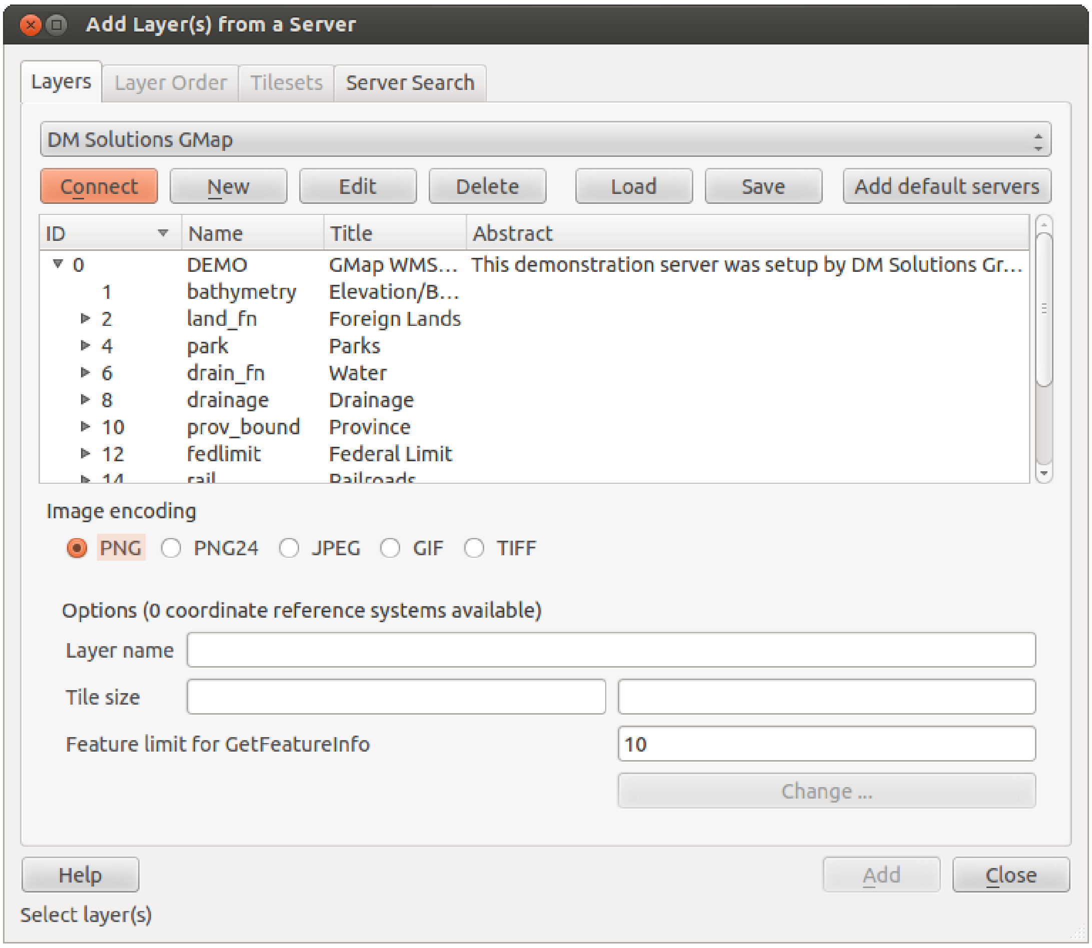

Figura 14.2: El diálogo para añadir un servidor WMs, mostrará las capas disponibles 

La sección *Codificación de la imagen* lista los formatos que reconoce por ambos el cliente y el servidor. Elija uno dependiendo de sus requerimientos de precisión de imagen.

Truco: Codificación de la Imagen

Normalmente, encontrará que un servidor WMS le ofrece la opción de codificación de la imagen en JPEG o PNG. JPEG es un formato de compresión con pérdida, mientras que PNG reproduce fielmente los datos crudos raster.

Utilizar JPEG si se espera que los datos WMS sean de naturaleza fotográfica y/o no le importa cierta perdida de calidad de la imagen. Esta disyuntiva típicamente reduce en cinco veces la necesidad de transferencia de datos en comparación con PNG.

Utilice PNG si desea representaciones precisas de los datos originales y no le importa el incremento de los requisitos de transferencia de datos.

Opciones

La zona Opciones del diálogo provee un campo de texto donde se puede añadir un *Nombre de capa* para la capa WMS. Este nombre aparecerá en la leyenda después de cargar la capa.

Debajo del nombre de la capa, se puede definir *Tamaño de la tesela*, si desea establecer tamaños de tesela (por ejemplo, 256x256) para dividir la petición WMS en múltiples peticiones.

El *Límite del objeto espacial para GetFeatureInfo* define los objetos espaciales del servidor a consultar.

Si se selecciona un WMS de la lista, aparece un campo con la proyección predeterminada proporcionada por el servidor de mapas. Si el botón **[Cambiar...]** está activo, puede hacer clic en él y cambiar la proyección por defecto de los WMS a otro SRC proporcionado por el servidor WMS.

Orden de la capa

La pestaña *Orden de Capas* lista las capas seleccionadas disponibles de la conexión actual al servidor WMS. Puede notar que algunas capas son ampliables; esto significa que la capa se puede visualizar en una selección de estilos de imagen.

Se puede seleccionar varias capas a la vez, pero solo una imagen de estilo por capa. Cuando varias capas son seleccionadas, estas se combinarán en el servidor WMS y se transmitirán a QGIS una sola vez.

Truco: Ordenar capas WMS

Las capas WMS representadas por un servidor son sobrepuestas en el orden listado en la sección de Capas, desde la parte superior a la parte inferior de la lista. Si se desea cambiar el orden de la superposición, se puede usar la pestaña *Orden de capas*.

Transparencia

En esta versión de QGIS, la configuración de la *Transparencia Global* de *Propiedades de la capa* esta codificado para estar siempre en donde esté disponible

Truco: Transparencia de capa WMS

La disponibilidad de imagen WMS transparente depende de la codificación de la imagen utilizada: PNG y GIF reconoce la transparencia, mientras JPEG deja sin reconocerlo.

Sistema de referencia de coordenadas

Un sistema de referencia de coordenadas (SRC) es la terminología para un proyección QGIS.

Cada capa WMS se puede representar en múltiples SRC's, dependiendo de la capacidad del servidor WMS.

Para elegir un SRC, seleccione **[Cambiar...]** y un cuadro de diálogo similar a Figure Projection 3 en *Working with Projections* aparecerá. La principal diferencia con la versión WMS del diálogo es que sólo aquellos SRCs son reconocidos por el servidor WMS se le mostrarán.

Busqueda del servidor

Dentro QGIS, se puede buscar servidores WMS. Figure_OGC_2 muestra la pestaña *Búsqueda de servidor* con el diálogo *Añadir capa(s) de un servidor*.

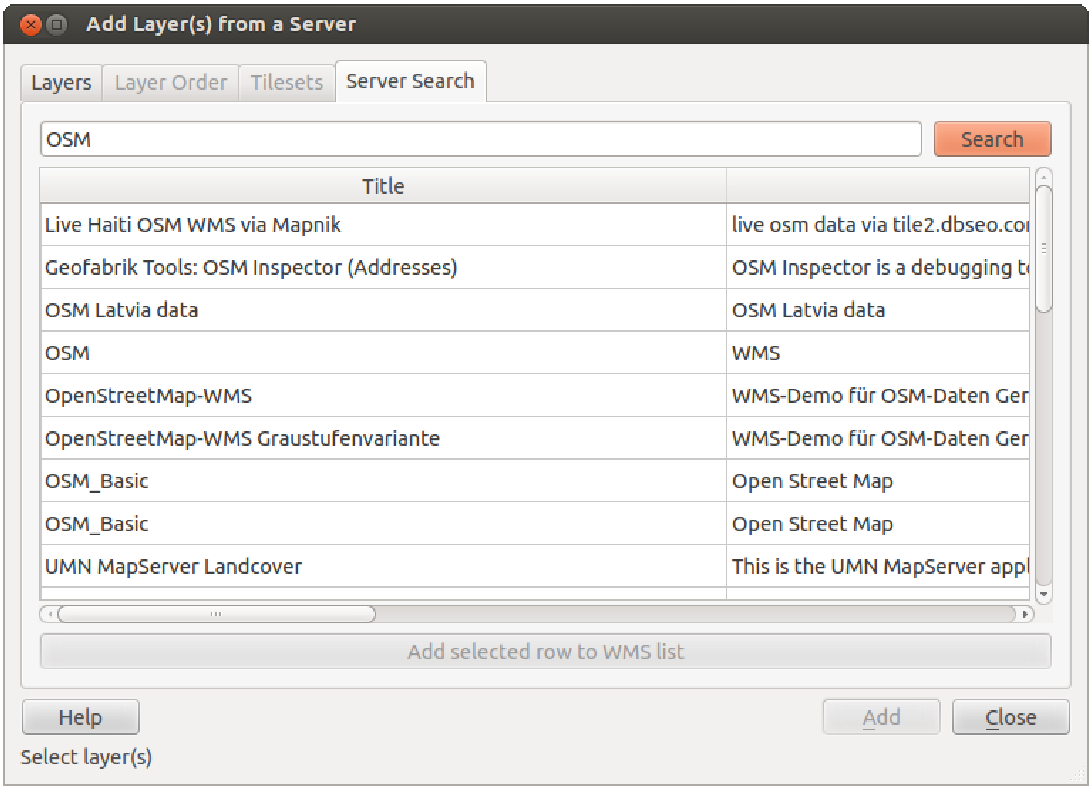

Figura 14.3: Diálogo para buscar servidores WMS después de algunas palabras clave

Como se puede ver, es posible ingresar una cadena de búsqueda en el campo de texto y golpear el botón **[Búsqueda]**. Después de un rato, el resultado de la búsqueda se completará automáticamente en la lista de abajo del campo de texto. Examine la lista de resultados e inspeccione los resultados de la búsqueda en la tabla. Para visualizar los resultados, seleccione una entrada de la tabla, pulse el botón **[Añadir la fila seleccionada a la lista WMS]** y cambiar de nuevo a la pestaña *Capas*. QGIS ha actualizado automáticamente la lista de su servidor, y el resultado de búsqueda seleccionado ya está habilitado en la lista de servidores WMS guardados en la pestaña *Capas*. Sólo tiene que solicitar la lista de capas al hacer clic en el botón **[Conectar]**. Esta opción es muy útil cuando se desea buscar mapas por palabras clave específicas.

Básicamente, esta opción es una interfaz del API de http://geopole.org.

Conjunto de teselas

Al utilizar servicios WMTS (Cached WMS) como

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

Son capaces de navegar a través de la pestaña :guilabel: *Conjunto de teselas* propuesta por el servidor. La información adicional como el tamaño de la tesela, formatos y SRC compatibles se enumeran en esta tabla. En combinación con esta característica, puede usar el control deslizante de escala de tesela seleccionando *Configuración* -> *Paneles* (KDE y Windows) o *Ver* -> *Paneles* (Gnome y MacOSX), a continuación, elegir *Escala de tesela*. Esto le da las escalas disponibles desde el servidor de tesela con un buen slider atracado.

Utilizar la herramienta de Identificar objetos espaciales

Una vez que haya añadido un servidor WMS, y si alguna capa de un servidor WMS es consultable, puede entonces utilizar la herramienta Identificar objetos espaciales para seleccionar un píxel del lienzo del mapa. Una consulta se hace al servidor WMS por cada selección realizada. El resultado de la consulta se regresara en texto plano. El formato de este texto es dependiente del servidor WMS particular utilizado. **Selección de Formato**

Si múltiples formatos de salida son reconocidos por el servidor, una lista desplegable con formatos admitidos se añade automáticamente al diálogo de resultados identificados y el formato seleccionada puede ser almacenado en el proyecto para la capa. **Usar formato GML**

La herramienta Identificar reconoce la respuesta del servidor WMS (GetFeatureInfo) en formato GML (se llama Objeto espacial en la GUI QGIS en este contexto). Si el formato "Objeto espacial" es admitido por el servidor y seleccionado, los resultados de la herramienta de identificados son objetos vectoriales, como de una capa vectorial regular. Cuando un objeto espacial es seleccionado en el árbol, este resalta en el mapa y se puede copiar a la papelera y pegar a otra capa vectorial. Vea el ejemplo de configuración de UMN Mapserver abajo que admite GetFeatureInfo en formato GML.

```
# in layer METADATA add which fields should be included and define geometry (example):

"gml_include_items"   "all"
"ows_geometries"      "mygeom"
"ows_mygeom_type"     "polygon"

# Then there are two possibilities/formats available, see a) and b):

# a) basic (output is generated by Mapserver and does not contain XSD)
# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "application/vnd.ogc.gml,text/html"

# b) using OGR (output is generated by OGR, it is send as multipart and contains XSD)
# in MAP define OUTPUTFORMAT (example):
OUTPUTFORMAT
    NAME "OGRGML"
    MIMETYPE "ogr/gml"
    DRIVER "OGR/GML"
    FORMATOPTION "FORM=multipart"
END

# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "OGRGML,text/html"
```

Ver propiedades

Una vez que haya añadido un servidor WMS, puede ver sus propiedades haciendo clic derecho sobre el mismo en la leyenda y la seleccionar *Propiedades*. **Pestaña de Metadatos**

La pestaña *Metadatos* muestra una gran cantidad de información acerca del servidor WMS, generalmente obtenida de la declaración de capacidades de ese servidor. Muchas definiciones pueden ser extraídas mediante la lectura del estándar WMS (vea OPEN-GEOSPATIAL-CONSORTIUM en *Referencias bibliográficas y web*), pero aquí hay algunas definiciones útiles:

- **Propiedades del servidor**
  - **Versión WMS** — La versión WMS implementada por el servidor.
  - **Formatos de Imagen** — La lista de MIME-types que el servidor puede responder con la hora de elaboración del mapa. QGIS reconoce cualquier formato las bibliotecas Qt subyacentes con que fueron construidas, que es típicamente al menos `image/png` y `image/jpeg`.
  - **Formato de Identificación** — La lista de tipos MIME, el servidor puede responder, cuando utilice la herramienta de Identificación. Actualmente, QGIS reconoce el tipo `texto plano`.
- **Propiedades de la capa**

- **Seleccionar** — Sea o no esta capa seleccionada cuando su servidor fue añadido a este proyecto.
- **Visible** — Si la capa seleccionada es o no visible en la leyenda (aun no utilizada en esta versión de QGIS).
- **Poder Identificar** — Sea o no esta capa regresará algunos resultados cuando la herramienta de identificar se utilice en él.
- **Puede ser transparente** — Si esta capa puede ser representada o no con transparencia. Esta versión de QGIS siempre usará transparencia si este es `Si` y la codificación de la imagen admite la transparencia.
- ** Puede Acercar zum ** — Si o no esta capa se puede hacer zoom en el servidor. Esta versión de QGIS asume que todas las capas WMS tienen este conjunto de `Yes`. Capas deficientes pueden ser presentadas de manera extraña.
- **Conteo en Cascada** — Los servidores WMS pueden actuar como proxy para otros servidores WMS para obtener datos ráster de una capa. Esta entrada muestra el número de veces que se remitió la solicitud de esta capa para ver a los servidores WMS para obtener un resultado.
- ** Ancho fijo, altura fija ** — Si o no esta capa tiene fijos la dimensiones en píxeles de origen. Esta versión de QGIS asume que todas las capas WMS tienen este conjunto a la nada. Capas deficientes pueden ser presentadas de manera extraña.
- **Recuadro delimitador WGS 84** — El recuadro delimitador de la capa, en coordenadas WGS 84. Algunos servidores WMS no utilizan este valor correctamente (por ejemplo, utilizan coordenadas UTM en su lugar). Si éste es el caso, la vista inicial de la capa puede aparecer muy 'lejana' en QGIS. El webmaster de WMS debería ser informado de este error, que probablemente conocerá como los elementos XML de WMS `LatLonBoundingBox`, `EX_GeographicBoundingBox` o el *BoundingBox'* de CRS:84.
- **Disponible en SRC** — Las proyecciones que esta capa puede representar por el servidor WMS. Éstos se enumeran en el formato nativo de WMS.
- **Disponible en estilo** — Los estilos de imagen que esta capa puede representar por el servidor WMS.

Mostrar leyenda gráfica WMS en la tabla de contenido y diseñador de impresión

El proveedor de datos WMS de QGIS es capaz de mostrar una leyenda gráfica en la tabla de contendos de la lista de capas y en el diseñador de mapas. La leyenda WMS se muestra sólo si el servidor WMS tiene capacidad GetLegendGraphic y la capa especifica una url para getCapability, por lo que, además, es necesario seleccionar un estilo para la capa.

Si hay definida una legendGraphic, ésta se mostrará debajo de la capa. Es pequeña y hay que hacer clic sobre ella para abrirla en tamaño real (debido a una limitación de la arquitectura de QgsLegendInterface). Al hacer clic en la leyenda de la capa se abrirá un cuadro con la leyenda a la máxima resolución.

En el diseñador de impresión, la leyenda se integrará en la dimensión original (descargada). La resolución de la leyenda se puede configurar en las propiedades del elemento bajo Leyenda->WMS LegendGraphic para que coincida con los requisitos de impresión

La leyenda mostrará información contextual basada en su escala actual. La leyenda WMS se muestra sólo si el servidor WMS tiene capacidad GetLegendGraphic y la capa tiene definida una url getCapability, para lo que se debe seleccionar un estilo.

Limitaciones del cliente WMS

No es posible la funcionalidad de cliente WMS que se había incluido en esta versión de QGIS. Algunas de las excepciones más notables siguen.

Editar la configuración de la capa WMS

Una vez que hayas completado el procedimiento de :sup: *Añadir capa WMS*, no se podrá cambiar la configuración. Una solución alternativa es eliminar la capa por completo y empezar de nuevo.

**Autentificación necesaria en servidores WMS **

Actualmente, se admiten servicios WMS públicamente accesibles y garantizados. Los servidores WMS garantizados se puede acceder mediante autenticación pública. El usuario puede agregar las credenciales (opcional) cuando agregue un servidor WMS. Vea la sección :ref: *ogc-wms-servers* para más detalles.

Truco: Acceso garantizado a capas OGC

Si necesita acceder a capas protegidas mediante métodos seguros que no sean la autenticación básica, puede utilizar InteProxy como un proxy transparente, lo que lo hace compatible con varios métodos de autenticación. Puede encontrar más información en el manual InteProxy en http://inteproxy.wald.intevation.org.

Truco: QGIS WMS Mapserver

Desde la versión 1.7.0, QGIS tiene su propia implementación de un servidor de mapas WMS 1.3.0. Lea más sobre esto en el capítulo *QGIS como Servidor de Datos OGC*.

14.1.2 WCT Cliente

Un Web Coverage Service (WCS) proporciona acceso a los datos ráster en formas que son útiles para la representación del lado cliente, como datos de entrada en los modelos científicos, y para otros clientes. El WCS se puede comparar con la WFS y el WMS. Como WMS y WFS instancias de servicios, un WCS permite a los clientes elegir partes de las explotaciones de información de un servidor basado en restricciones espaciales y otros criterios de consulta.

QGIS tiene un proveedor WCS nativo y reconocida en ambas versiones 1.0 y 1,1 (que son significativamente diferentes), pero actualmente se prefiere 1.0, porque 1.1 tiene muchas problemas (por ejemplo, cada servidor implementa de diferente forma con varias particularidades).

El proveedor de WCS nativo se encarga de todas las solicitudes de red y utiliza las configuraciones de red estándar de |qgl (especialmente de proxy). También es posible seleccionar el modo de caché ('siempre caché', 'preferentemente caché', 'preferentemente red', 'siempre red'). El proveedor también es compatible con la selección de tiempo de la posición, si el servidor ofrece dicha información temporal.

14.1.3 Cliente WFS y WFS-T

En QGIS, una capa WFS se comporta prácticamente como cualquier otra capa vectorial. Puede identificar y seleccionar objetos espaciales, y ver la tabla de atributos. Desde QGIS 1.6, la edición WFS-T está también de apoyó.

En general, añadir una capa WFS es muy similar al procedimiento utilizado con WMS. La diferencia es que no hay servidores por defecto definidos, así que tenemos que añadir la nuestra.

Cargar una capa WFS

Como un ejemplo, utilizamos el servidor WFS de DM Solutions y mostramos una capa. La URL es http://www2.dmsolutions.ca/cgi-bin/mswfs_gmap

1. Haga clic en la herramienta Añadir capa WFS en la barra de herramientas Capas. El diálogo *Añadir capa WFS de un servidor* aparecera.
2. Haga clic en **[Nuevo]**.
3. Ingrese 'DS Solutions' como nombre.
4. Introducir la URL (véase más arriba).
5. Haga clic en **[Aceptar]**.
6. Seleccione 'DM Solutions' de la lista desplegable *Conexiones de servidor* .

7. Haga clic en **[Conectar]**
8. Espere a que la capa de capas este poblada.
9. Seleccione la capa *Parks* en la lista.
10. Haga clic en **[Aplicar]** para añadir la capa al mapa.

Tenga en cuenta que cualquier configuración de proxy que pueda haber establecido en sus preferencias también son reconocidos.

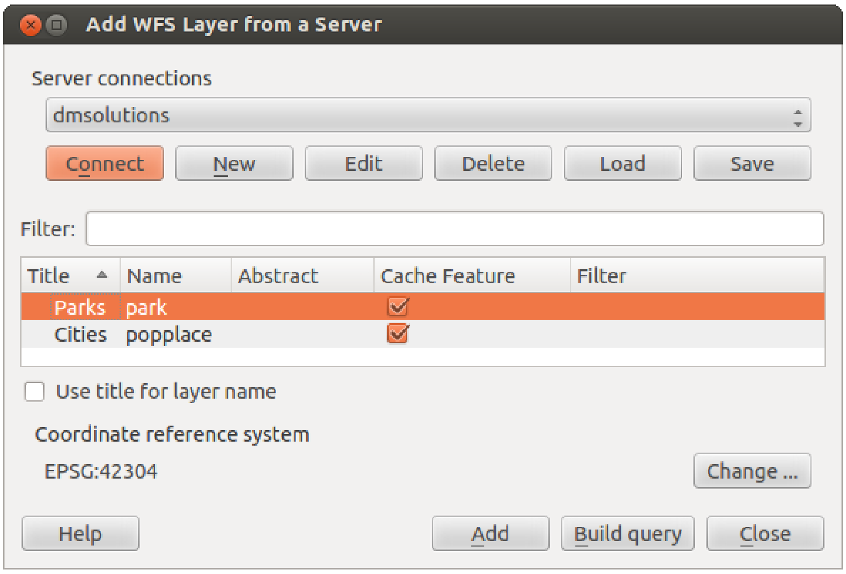

Figura 14.4: Añadir una capa WFS

Se dará cuenta el progreso de la descarga se visualiza en la parte inferior izquierda de la ventana principal de QGIS. Una vez cargada la capa, puede identificar y seleccionar una provincia o dos y ver la tabla de atributos.

Sólo la versión 1.0.0 de WFS es compatible. Por ahora, no ha habido muchas pruebas contra versiones WFS implementados en otros servidores de la CMA. Si tiene problemas con cualquier otro servidor WFS, por favor no dude en ponerse en contacto con el equipo de desarrollo. Por favor, consulte la sección :ref: *label_helpsupport* para más información sobre las listas de correo.

Truco: Encontrar servidores WFS

Puede encontrar servidores WFS adicionales al utilizar Google o su buscador favorito. Hay un número de listas con URLs publicas, algunos de ellos son mantenidos y otro no.

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14.2 QGIS como Servidor de Datos OGC

El servidor QGIS es una aplicación de código abierto WMS 1.3, WFS 1.0.0 y WCS 1 1.1.1 que además implementa características cartográficas avanzadas para la cartografía temática. El servidor QGIS es una aplicación FastCGI/CGI (Common Gateway Interface) escrita en C++ que trabaja en conjunto con el servidor web (por ejemplo, Apache, Lighttpd). Es financiado por los proyectos de EU Orchestra, Sany y la ciudad de Uster en Suiza.

El servidor QGIS utiliza QGIS como back-end para la lógica de los SIG y de mapa de representación. Además, la biblioteca Qt se utiliza para gráficos y para la plataforma independiente la programación en C++. En contraste con otro software de WMS, el servidor de QGIS utiliza reglas cartográficos como un lenguaje de configuración, tanto para la configuración del servidor y de las reglas cartográficas definidas por el usuario.

Como QGIS de escritorio y QGIS servidor utilizan las mismas librerías de visualización, los mapas que se publican en la web tienen el mismo aspecto que el SIG de escritorio.

En uno de los siguientes manuales, proporcionaremos un ejemplo de configuración para configurar un servidor QGIS. Por ahora, recomendamos leer una de las siguientes direcciones URLs para obtener más información:

- http://karlinapp.ethz.ch/qgis_wms/
- http://hub.qgis.org/projects/quantum-gis/wiki/QGIS_Server_Tutorial
- http://linfiniti.com/2010/08/qgis-mapserver-a-wms-server-for-the-masses/

14.2.1 Ejemplo de instalación en Debian Squeeze

En este punto, daremos un ejemplo de instalación corto y simple cómo hacerlo para Debian Squeeze. Muchos otros sistemas operativos proporcionan paquetes para servidor QGIS, también. Si tienen que construir todo desde las fuentes, consulte las URLs anteriores.

Aparte de QGIS y Servidor QGIS, necesita un servidor web, en nuestro caso apache2. Puede instalar todos los paquetes con `aptitude` o `apt-get install` junto con otros paquetes de dependencias necesarias. Después de la instalación, debe probar para confirmar que el servidor web y el servidor QGIS funcionan como esperaban. Asegúrese de que el servidor Apache se está ejecutando con `/etc/init.d/apache2 start`. Abra un navegador web y escriba la URL‘‘http://localhost‘‘. Si Apache está arriba, debería ver el mensaje ‘It works!’.

Ahora probamos la instalación del servidor QGIS. El `qgis_mapserv.fcgi` esta disponible en `/usr/lib/cgi-bin/qgis_mapserv.fcgi` y proporciona un WMS estándar que muestra los limites estatales de Alaska. Añadir el WMS con la URL `http://localhost/cgi-bin/qgis_mapserv.fcgi` como se describe en *Seleccionar servidor WMS/WMTS*.

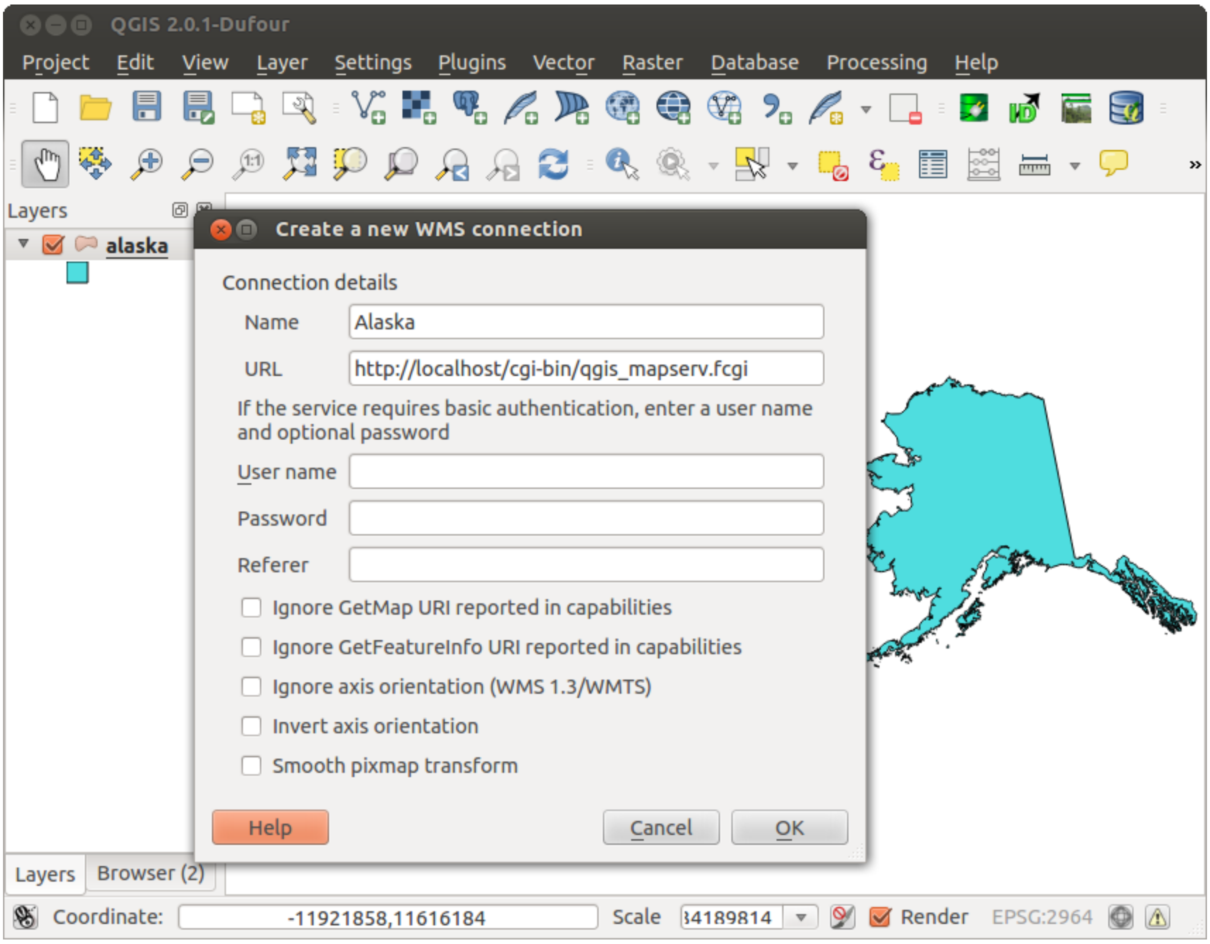

Figura 14.5: El estándar WMS con límites de EUA incluidas en el Servidor QGIS (KDE)

14.2.2 Crear un WMS/WFS/WCS desde un proyecto QGIS

Para proveer un nuevo servidor QGIS WMS, WFS o WCS, tenemos que crear un archivo de proyecto QGIS con algunos datos. Aquí, utilizamos el archivo shape 'Alaska' del conjunto de datos de ejemplo de QGIS. Definir los colores y estilos de las capas en QGIS y el SRC del proyecto, si aun no se ha definido.

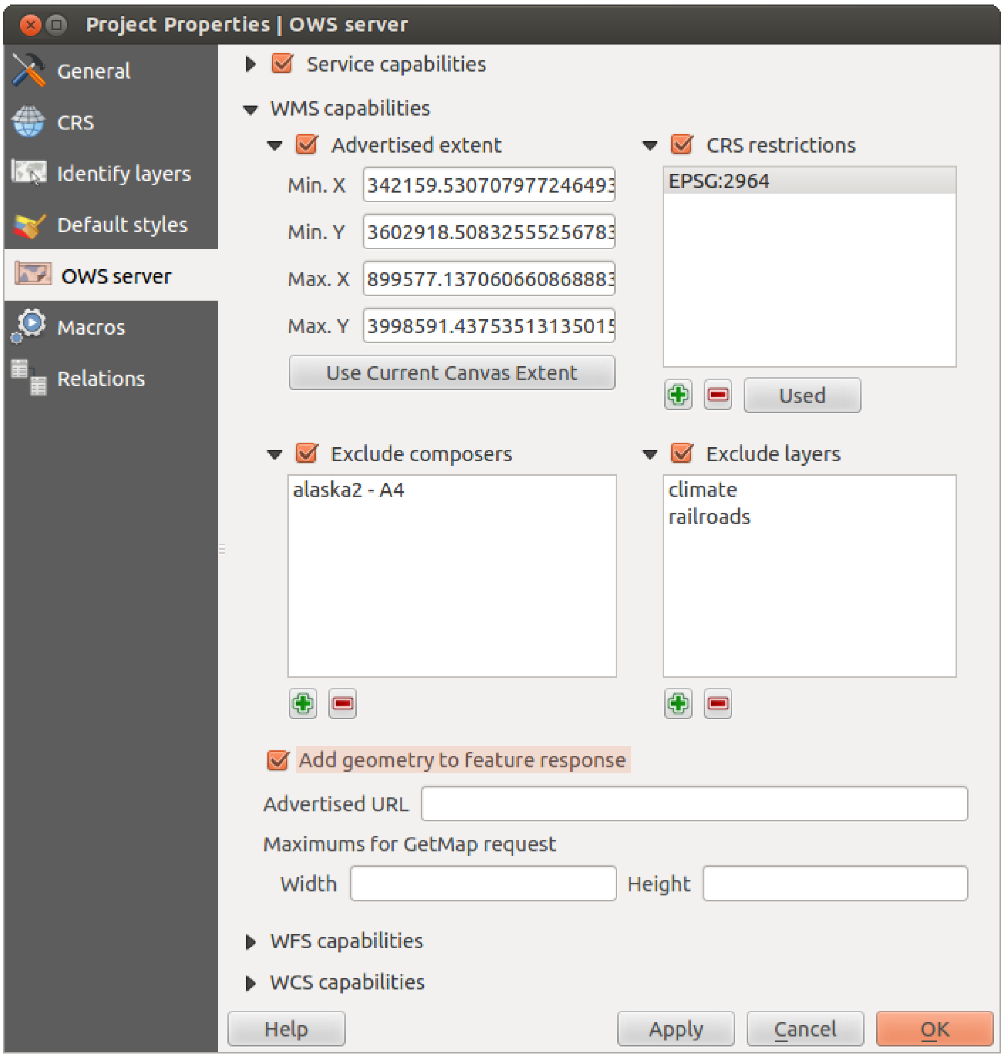

Figura 14.6: Definiciones para un proyecto QGIS de Servidor WMS/WFS/WCS (KDE)

Luego, vaya al menú *OWS Server* del diálogo *Proyecto* → *Propiedades del Proyecto* y proporciona información acerca del OWS en los campos de abajo *Capacidades del Servicio*. Esto aparecera en la respuesta de GetCapabilities del WMS, WFS o WCS. Si no marca *Capacidades del servicio*, el servidor QGIS utilizará la información dada en el archivo `wms_metadata.xml` ubicado en la carpeta `cgi-bin`.

WMS capacidades

En la sección *Capacidades WMS*, puede definir la extensión anunciada en la respuesta del GetCapabilities del WMS mediante el ingreso de los valores mínimo y máximo de X y Y en los campos en *extensión anunciada*. Al hacer clic en *Usar la extensión de la vista del mapa actual* establece estos valores de la extensión actual mostrada en la vista del mapa de QGIS. Al marcar *Restricciones SRC*, puede restringir en que los sistemas de coordenadas de referencia (SRC) del servidor QGIS ofrecerá representar mapas. Utilice el botón de abajo para seleccionar aquellos SRC del selector de Sistemas de Referencia de Coordenadas, o haga clic en *Usado* y añada los SRC utilizados en el proyecto QGIS a la lista.

Si usted tiene un diseños de impresión definidas en el proyecto, se enumerarán en la respuesta GetCapabilities, y pueden ser utilizados por la solicitud GetPrint para crear impresiones, utilizando uno de los diseños de impresión como una plantilla. Esta es una extensión especifica de QGIS de la especificación WMS 1.3.0. Si desea excluir cualquier diseñador de impresión de ser publicado por el WMS, marque *Excluir diseñadores* y haga clic en el botón de abajo. A continuación, seleccione un diseñador de impresión desde el diálogo *Seleccionar diseñador de impresión* para añadirlo a la lista de diseñadores excluidos.

Si desea excluir alguna capa o grupo de capas de ser publicadas por el WMS, marque *Excluir capas* y haga clic en el botón de abajo. Esto abre el diálogo *Seleccionar capas y grupos restringidos*, que le permite elegir las capas y grupos que no desea que sean publicados. Utilice la tecla `Shift` o la tecla `Ctrl` si desea seleccionar múltiples entradas a la vez.

Puede recibir la solicitud de GetFeatureInfo como texto plano, XML y GML. Por omisión el formato es XML, texto o GML depende del formato de salida seleccionado para la petición GetFeatureInfo.

Si desea, puede marcar *Añadir geometría a la repuesta del objeto*. Este incluirá en la respuesta GetFeatureInfo las geometrías de las características en un formato de texto. Si quiere el servidor QGIS para anunciar URLs de peticiones especificas en la respuesta WMS GetCapabilities, introduzca la URL correspondiente en el campo *URL anunciada*. Por otra parte, puede restringir el tamaño máximo de los mapas devueltos en la solicitud GetMap al introducir el ancho y altura máxima en los campos correspondientes en *Máximos para la solicitud GetMap*.

Si una de sus capas utiliza Avisos del mapa (por ejemplo, mostrar texto usando expresiones) este será incluido dentro de la salida GetFeatureInfo. Si la capa utiliza un valor del mapa para uno de sus atributos, también esta información será mostrada en la salida GetFeatureInfo.

WFS capacidades

En el área *Capacidades WFS*, puede seleccionar las capas que desee publicar como WFS, y especificar si permitirá la actualización, inserción y eliminación de operaciones. Si introduce una URL en el campo *URL anunciada* de la sección *Capacidades WFS*, el Servidor QGIS anunciará esta URL especifica en la respuesta de WFS GetCapabilities.

WCS capacidades

En el área *Capacidades WCS*, puede seleccionar las capas que desee publicar como WCS. Si introduce una URL en el campo *URL anunciada* de la sección *Capacidades WCS*, el Servidor QGIS anunciará la URL especifica en la respuesta de WCS GetCapabilities.

Ahora, guardarmos la sesión en un archivo de proyecto `alaska.qgs`. Para proveer el proyecto como WMS/WFS, creamos una nueva carpeta `/usr/lib/cgi-bin/project` con privilegios de administrados y añadimos el archivo del proyecto `alaska.qgs` y copiamos del archivo `qgis_mapserv.fcgi` - eso es todo.

Ahora probaremos nuestro proyecto WMS, WFS y WCS. Añadir el WMS, WFS y WCS como se describe en *Cargando capas WMS/WMTS*, *Cliente WFS y WFS-T* y *WCT Cliente* a QGIS y cargar los datos. La URL es:

```
http://localhost/cgi-bin/project/qgis_mapserv.fcgi
```

Ajuste fino de OWS

Para capas vectoriales, el menú *Campos* del diálogo *Capa→ Propiedades* permitirá definir cada atributo si será publicado o no. Por omisión, todos los atributos están publicados por WMS y WFS. Si desea especificar que un atributo no sea publicado, demarque la casilla de verificación correspondiente en la columna *WMS* o *WFS*.

Puede superponer una marca de agua sobre el mapa producido por WMS al añadir anotaciones de texto o anotaciones SVG para el archivo del proyecto. Vea la sección Herramientas de Anotación en *Herramientas generales* para obtener instrucciones en la creación de anotaciones. Para que las anotaciones sean desplegadas como marca de agua en el WMS de salida, al marcar la caja *Fijar posición del mapa* en el diálogo *Anotaciones de texto* debe ser desmarcada. Esto se puede acceder al hacer doble clic en la anotación mientras una de las herramientas de anotación esta activa. Para anotaciones SVG, necesitará configurar el proyecto para guardar rutas absolutas (en el menú *General* del diálogo *Proyecto→ Propiedades del proyecto*) o para modificar manualmente la ruta de la imagen SVG de una manera que representa una ruta relativa válida.

Parámetros extra soportados por la petición GetMap del WMS

En la petición GetMap del WMS, el servidor QGIS acepta un par de parámetros adicionales ademas de los parámetros estándar de acuerdo a la especificación OGC WMS 1.3.0:

- Parámetro **MAP**: Similar a MapServer, el parámetro `MAP` se puede utilizar para especificar la ruta al archivo del proyecto QGIS. Puede especificar una ruta absoluta o una ruta relativa a la ubicación del ejecutable del servidor (`qgis_mapserv.fcgi`). Si no especifica, el Servidor QGIS busca archivos .qgs en el directorio donde se encuentra el ejecutable del servidor.

  Ejemplo:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&MAP=/home/qgis/mymap.qgs&...
  ```

- Parámetro **DPI**: El parámetro `DPI` se puede utilizar para especificar la resolución de la solicitud de salida.

  Ejemplo:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?REQUEST=GetMap&DPI=300&...
  ```

- Parámetro **OPACITIES**: La opacidad se puede establecer en una capa o nivel de grupo. Los valores permitidos van de 0 (completamente transparente) a 255 (totalmente opaco).

  Ejemplo:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&LAYERS=mylayer1,mylayer2&OPACITIES=125,200&...
  ```

Registro del servidor QGIS

Para registrar solicitudes enviadas al servidor, establecer las siguientes variables de entorno:

- **QGIS_SERVER_LOG_FILE**: Especifica la ruta y el nombre de archivo. Comprobar que el servidor tiene los permisos apropiados para escritura de archivo. El archivo debe ser creado automáticamente, sólo envié algunas solicitudes al servidor. Si no está allá, verifique los permisos.
- **QGIS_SERVER_LOG_LEVEL**: Especifica el nivel de registro deseado. los valores disponibles son:
  - 0 INFO (registrar todas las solicitudes),
  - 1 ADVERTENCIA,
  - 2 CRÍTICA (Registrar sólo errores críticos, adecuado para fines de producción)

  Ejemplo:

  ```
  SetEnv QGIS_SERVER_LOG_FILE /var/tmp/qgislog.txt
  SetEnv QGIS_SERVER_LOG_LEVEL 0
  ```

Nota

- ¡Al usar el módulo Fcgid utilice FcgidInitialEnv en lugar de SetEnv!
- El registro del servidor también está habilitado si el ejecutable está compilado en modo de lanzamiento.

Variables de entorno

- **QGIS_OPTIONS_PATH**: La variable especifica la ruta al directorio con los ajustes. Funciona de la misma forma como aplicación QGIS –optionspath. Esta buscando el archivo de configuración en <QGIS_OPTIONS_PATH>/QGIS/QGIS2.ini. Por ejemplo, para establecer el servidor QGIS en Apache utilizar el archivo de configuración en /path/to/config/QGIS/QGIS2.ini, añadir a configuración de Apache:

  ```
  SetEnv QGIS_OPTIONS_PATH "/path/to/config/"
  ```

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Trabajar con datos GPS

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15.1 GPS Plugin

15.1.1 What is GPS?

GPS, the Global Positioning System, is a satellite-based system that allows anyone with a GPS receiver to find their exact position anywhere in the world. GPS is used as an aid in navigation, for example in airplanes, in boats and by hikers. The GPS receiver uses the signals from the satellites to calculate its latitude, longitude and (sometimes) elevation. Most receivers also have the capability to store locations (known as **waypoints**), sequences of locations that make up a planned **route** and a tracklog or **track** of the receiver's movement over time. Waypoints, routes and tracks are the three basic feature types in GPS data. QGIS displays waypoints in point layers, while routes and tracks are displayed in linestring layers.

15.1.2 Loading GPS data from a file

There are dozens of different file formats for storing GPS data. The format that QGIS uses is called GPX (GPS eXchange format), which is a standard interchange format that can contain any number of waypoints, routes and tracks in the same file.

To load a GPX file, you first need to load the plugin. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox. When this plugin is loaded, two buttons with a small handheld GPS device will show up in the toolbar:

- Create new GPX Layer
- GPS Tools

For working with GPS data, we provide an example GPX file available in the QGIS sample dataset: `qgis_sample_data/gps/national_monuments.gpx`. See section *Datos de ejemplo* for more information about the sample data.

1. Select *Vector* → *GPS* → *GPS Tools* or click the GPS Tools icon in the toolbar and open the *Load GPX file* tab (see figure_GPS_1).
2. Browse to the folder `qgis_sample_data/gps/`, select the GPX file `national_monuments.gpx` and click **[Open]**.

Use the **[Browse...]** button to select the GPX file, then use the checkboxes to select the feature types you want to load from that GPX file. Each feature type will be loaded in a separate layer when you click **[OK]**. The file `national_monuments.gpx` only includes waypoints.

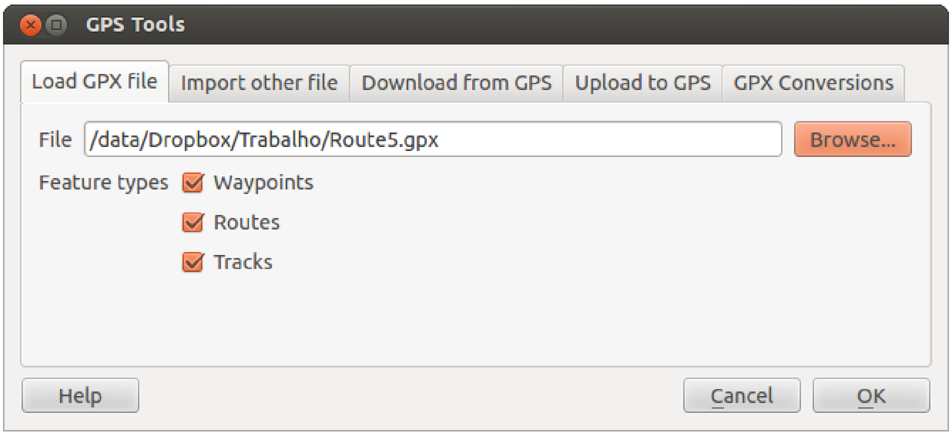

Figura 15.1: The *GPS Tools* dialog window

Nota: GPS units allow you to store data in different coordinate systems. When downloading a GPX file (from your GPS unit or a web site) and then loading it in QGIS, be sure that the data stored in the GPX file uses WGS 84 (latitude/longitude). QGIS expects this, and it is the official GPX specification. See http://www.topografix.com/GPX/1/1/.

15.1.3 GPSBabel

Since QGIS uses GPX files, you need a way to convert other GPS file formats to GPX. This can be done for many formats using the free program GPSBabel, which is available at http://www.gpsbabel.org. This program can also transfer GPS data between your computer and a GPS device. QGIS uses GPSBabel to do these things, so it is recommended that you install it. However, if you just want to load GPS data from GPX files you will not need it. Version 1.2.3 of GPSBabel is known to work with QGIS, but you should be able to use later versions without any problems.

15.1.4 Importing GPS data

To import GPS data from a file that is not a GPX file, you use the tool *Import other file* in the GPS Tools dialog. Here, you select the file that you want to import (and the file type), which feature type you want to import from it, where you want to store the converted GPX file and what the name of the new layer should be. Note that not all GPS data formats will support all three feature types, so for many formats you will only be able to choose between one or two types.

15.1.5 Downloading GPS data from a device

QGIS can use GPSBabel to download data from a GPS device directly as new vector layers. For this we use the *Download from GPS* tab of the GPS Tools dialog (see Figure_GPS_2). Here, we select the type of GPS device, the port that it is connected to (or USB if your GPS supports this), the feature type that you want to download, the GPX file where the data should be stored, and the name of the new layer.

The device type you select in the GPS device menu determines how GPSBabel tries to communicate with your GPS device. If none of the available types work with your GPS device, you can create a new type (see section *Defining new device types*).

The port may be a file name or some other name that your operating system uses as a reference to the physical port in your computer that the GPS device is connected to. It may also be simply USB, for USB-enabled GPS units.

- On Linux, this is something like `/dev/ttyS0` or `/dev/ttyS1`.
- On Windows, it is `COM1` or `COM2`.

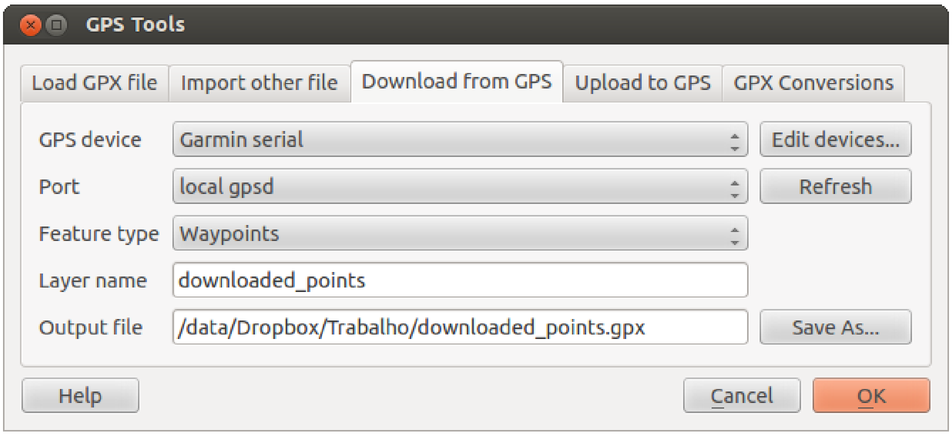

Figura 15.2: The download tool

When you click **[OK]**, the data will be downloaded from the device and appear as a layer in QGIS.

15.1.6 Uploading GPS data to a device

You can also upload data directly from a vector layer in QGIS to a GPS device using the *Upload to GPS* tab of the GPS Tools dialog. To do this, you simply select the layer that you want to upload (which must be a GPX layer), your GPS device type, and the port (or USB) that it is connected to. Just as with the download tool, you can specify new device types if your device isn't in the list.

This tool is very useful in combination with the vector-editing capabilities of QGIS. It allows you to load a map, create waypoints and routes, and then upload them and use them on your GPS device.

15.1.7 Defining new device types

There are lots of different types of GPS devices. The QGIS developers can't test all of them, so if you have one that does not work with any of the device types listed in the *Download from GPS* and *Upload to GPS* tools, you can define your own device type for it. You do this by using the GPS device editor, which you start by clicking the **[Edit devices]** button in the download or the upload tab.

To define a new device, you simply click the **[New device]** button, enter a name, enter download and upload commands for your device, and click the **[Update device]** button. The name will be listed in the device menus in the upload and download windows – it can be any string. The download command is the command that is used to download data from the device to a GPX file. This will probably be a GPSBabel command, but you can use any other command line program that can create a GPX file. QGIS will replace the keywords `%type`, `%in`, and `%out` when it runs the command.

`%type` will be replaced by `-w` if you are downloading waypoints, `-r` if you are downloading routes and `-t` if you are downloading tracks. These are command-line options that tell GPSBabel which feature type to download.

`%in` will be replaced by the port name that you choose in the download window and `%out` will be replaced by the name you choose for the GPX file that the downloaded data should be stored in. So, if you create a device type with the download command `gpsbabel %type -i garmin -o gpx %in %out` (this is actually the download command for the predefined device type 'Garmin serial') and then use it to download waypoints from port `/dev/ttyS0` to the file `output.gpx`, QGIS will replace the keywords and run the command `gpsbabel -w -i garmin -o gpx /dev/ttyS0 output.gpx`.

The upload command is the command that is used to upload data to the device. The same keywords are used, but `%in` is now replaced by the name of the GPX file for the layer that is being uploaded, and `%out` is replaced by the port name.

You can learn more about GPSBabel and its available command line options at http://www.gpsbabel.org.

Once you have created a new device type, it will appear in the device lists for the download and upload tools.

15.1.8 Download of points/tracks from GPS units

As described in previous sections QGIS uses GPSBabel to download points/tracks directly in the project. QGIS comes out of the box with a pre-defined profile to download from Garmin devices. Unfortunately there is a bug #6318 that does not allow create other profiles, so downloading directly in QGIS using the GPS Tools is at the moment limited to Garmin USB units.

Garmin GPSMAP 60cs

MS Windows

Install the Garmin USB drivers from http://www8.garmin.com/support/download_details.jsp?id=591

Connect the unit. Open GPS Tools and use `type=garmin serial` and `port=usb`: Fill the fields *Layer name* and *Output file*. Sometimes it seems to have problems saving in a certain folder, using something like `c:\temp` usually works.

Ubuntu/Mint GNU/Linux

It is first needed an issue about the permissions of the device, as described at https://wiki.openstreetmap.org/wiki/USB_Garmin_on_GNU/Linux. You can try to create a file `/etc/udev/rules.d/51-garmin.rules` containing this rule

```
ATTRS{idVendor}=="091e", ATTRS{idProduct}=="0003", MODE="666"
```

After that is necessary to be sure that the `garmin_gps` kernel module is not loaded

```
rmmod garmin_gps
```

and then you can use the GPS Tools. Unfortunately there seems to be a bug #7182 and usually QGIS freezes several times before the operation work fine.

BTGP-38KM datalogger (only Bluetooth)

MS Windows

The already referred bug does not allow to download the data from within QGIS, so it is needed to use GPSBabel from the command line or using its interface. The working command is

```
gpsbabel -t -i skytraq,baud=9600,initbaud=9600 -f COM9 -o gpx -F C:/GPX/aaa.gpx
```

Ubuntu/Mint GNU/Linux

Use same command (or settings if you use GPSBabel GUI) as in Windows. On Linux it maybe somehow common to get a message like

```
skytraq: Too many read errors on serial port
```

it is just a matter to turn off and on the datalogger and try again.

BlueMax GPS-4044 datalogger (both BT and USB)

MS Windows

Nota: It needs to install its drivers before using it on Windows 7. See in the manufacturer site for the proper download.

Downloading with GPSBabel, both with USB and BT returns always an error like

```
gpsbabel -t -i mtk -f COM12 -o gpx -F C:/temp/test.gpx
mtk_logger: Can't create temporary file data.bin
Error running gpsbabel: Process exited unsucessfully with code 1
```

Ubuntu/Mint GNU/Linux

With USB

After having connected the cable use the `dmesg` command to understand what port is being used, for example `/dev/ttyACM3`. Then as usual use GPSBabel from the CLI or GUI

```
gpsbabel -t -i mtk -f /dev/ttyACM3 -o gpx -F /home/user/bluemax.gpx
```

With Bluetooth

Use Blueman Device Manager to pair the device and make it available through a system port, then run GPSBabel

```
gpsbabel -t -i mtk -f /dev/rfcomm0 -o gpx -F /home/user/bluemax_bt.gpx
```

.

15.2 Live GPS tracking

To activate live GPS tracking in QGIS, you need to select *Settings* → *Panels* *GPS information*. You will get a new docked window on the left side of the canvas.

There are four possible screens in this GPS tracking window:

- GPS position coordinates and an interface for manually entering vertices and features
- GPS signal strength of satellite connections
- GPS polar screen showing number and polar position of satellites
- GPS options screen (see figure_gps_options)

With a plugged-in GPS receiver (has to be supported by your operating system), a simple click on **[Connect]** connects the GPS to QGIS. A second click (now on **[Disconnect]**) disconnects the GPS receiver from your computer. For GNU/Linux, gpsd support is integrated to support connection to most GPS receivers. Therefore, you first have to configure gpsd properly to connect QGIS to it.

> **Advertencia:** If you want to record your position to the canvas, you have to create a new vector layer first and switch it to editable status to be able to record your track.

15.2.1 Position and additional attributes

If the GPS is receiving signals from satellites, you will see your position in latitude, longitude and altitude together with additional attributes.

15.2.2 GPS signal strength

Here, you can see the signal strength of the satellites you are receiving signals from.

15.2.3 GPS polar window

If you want to know where in the sky all the connected satellites are, you have to switch to the polar screen. You can also see the ID numbers of the satellites you are receiving signals from.

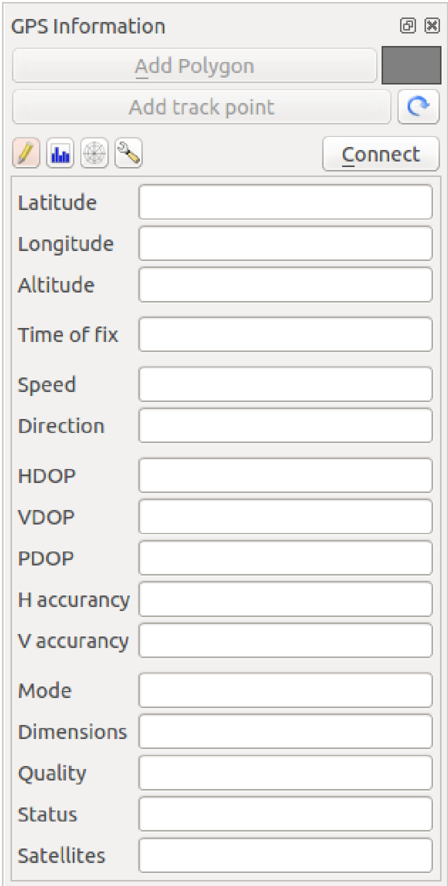

Figura 15.3: GPS tracking position and additional attributes

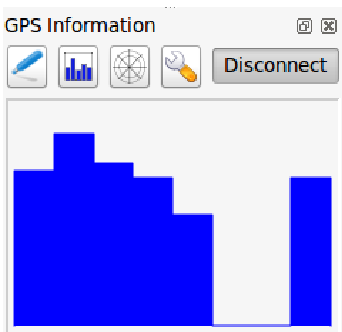

Figura 15.4: GPS tracking signal strength

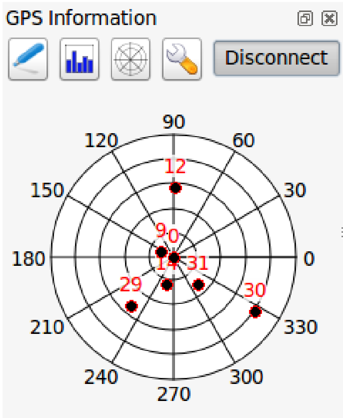

Figura 15.5: GPS tracking polar window

15.2.4 GPS options

In case of connection problems, you can switch between:

- *Autodetect*
- *Internal*
- *Serial device*
- *gpsd* (selecting the Host, Port and Device your GPS is connected to)

A click on **[Connect]** again initiates the connection to the GPS receiver.

You can activate *Automatically save added features* when you are in editing mode. Or you can activate *Automatically add points* to the map canvas with a certain width and color.

Activating *Cursor*, you can use a slider to shrink and grow the position cursor on the canvas.

Activating *Map centering* allows you to decide in which way the canvas will be updated. This includes 'always', 'when leaving', if your recorded coordinates start to move out of the canvas, or 'never', to keep map extent.

Finally, you can activate *Log file* and define a path and a file where log messages about the GPS tracking are logged.

If you want to set a feature manually, you have to go back to Position and click on **[Add Point]** or **[Add track point]**.

15.2.5 Connect to a Bluetooth GPS for live tracking

With QGIS you can connect a Bluetooth GPS for field data collection. To perform this task you need a GPS Bluetooth device and a Bluetooth receiver on your computer.

At first you must let your GPS device be recognized and paired to the computer. Turn on the GPS, go to the Bluetooth icon on your notification area and search for a New Device.

On the right side of the Device selection mask make sure that all devices are selected so your GPS unit will probably appear among those available. In the next step a serial connection service should be available, select it and click on **[Configure]** button.

Remember the number of the COM port assigned to the GPS connection as resulting by the Bluetooth properties.

After the GPS has been recognized, make the pairing for the connection. Usually the autorization code is `0000`.

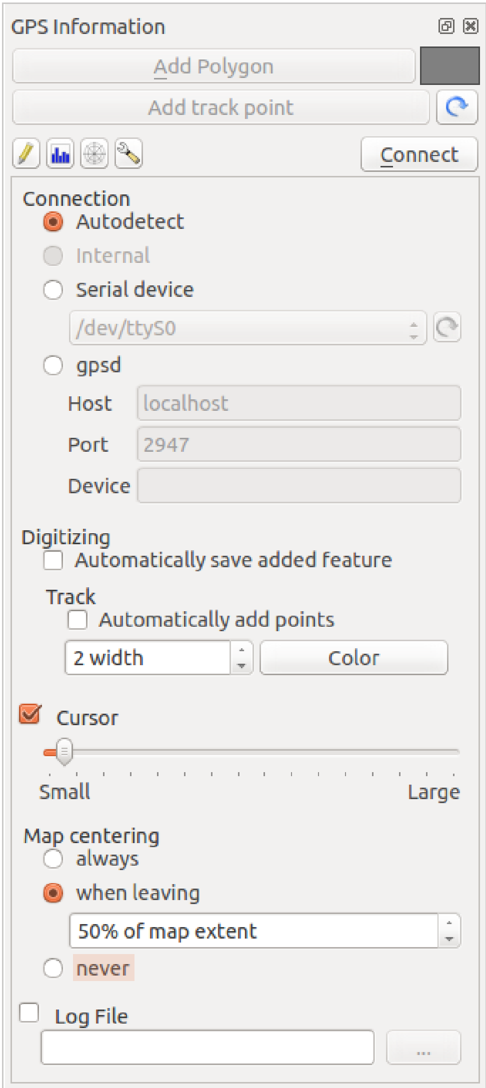

Figura 15.6: GPS tracking options window

Now open *GPS information* panel and switch to GPS options screen. Select the COM port assigned to the GPS connection and click the **[Connect]**. After a while a cursor indicating your position should appear.

If QGIS can't receive GPS data, then you should restart your GPS device, wait 5-10 seconds then try to connect again. Usually this solution work. If you receive again a connection error make sure you don't have another Bluetooth receiver near you, paired with the same GPS unit.

15.2.6 Using GPSMAP 60cs

MS Windows

Easiest way to make it work is to use a middleware (freeware, not open) called GPSGate.

Launch the program, make it scan for GPS devices (works for both USB and BT ones) and then in QGIS just click **[Connect]** in the Live tracking panel using the *Autodetect* mode.

Ubuntu/Mint GNU/Linux

As for Windows the easiest way is to use a server in the middle, in this case GPSD, so

```
sudo apt-get install gpsd
```

Then load the `garmin_gps` kernel module

```
sudo modprobe garmin_gps
```

And then connect the unit. Then check with `dmesg` the actual device being used bu the unit, for example `/dev/ttyUSB0`. Now you can launch gpsd

```
gpsd /dev/ttyUSB0
```

And finally connect with the QGIS live tracking tool.

15.2.7 Using BTGP-38KM datalogger (only Bluetooth)

Using GPSD (under Linux) or GPSGate (under Windows) is effortless.

15.2.8 Using BlueMax GPS-4044 datalogger (both BT and USB)

MS Windows

The live tracking works for both USB and BT modes, by using GPSGate or even without it, just use the *Autodetect* mode, or point the tool the right port.

Ubuntu/Mint GNU/Linux

For USB

The live tracking works both with GPSD

```
gpsd /dev/ttyACM3
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/ttyACM3`).

For Bluetooth

The live tracking works both with GPSD

```
gpsd /dev/rfcomm0
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/rfcomm0`).

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GRASS GIS Integration

The GRASS plugin provides access to GRASS GIS databases and functionalities (see GRASS-PROJECT in *Referencias bibliográficas y web*). This includes visualizing GRASS raster and vector layers, digitizing vector layers, editing vector attributes, creating new vector layers and analysing GRASS 2-D and 3-D data with more than 400 GRASS modules.

In this section, we'll introduce the plugin functionalities and give some examples of managing and working with GRASS data. The following main features are provided with the toolbar menu when you start the GRASS plugin, as described in section sec_starting_grass:

- Open mapset
- New mapset
- Close mapset
- Add GRASS vector layer
- Add GRASS raster layer
- Create new GRASS vector
- Edit GRASS vector layer
- Open GRASS tools
- Display current GRASS region
- Edit current GRASS region

16.1 Starting the GRASS plugin

To use GRASS functionalities and/or visualize GRASS vector and raster layers in QGIS, you must select and load the GRASS plugin with the Plugin Manager. Therefore, go to the menu *Plugins* → *Manage Plugins*, select *GRASS* and click **[OK]**.

You can now start loading raster and vector layers from an existing GRASS `LOCATION` (see section sec_load_grassdata). Or, you can create a new GRASS `LOCATION` with QGIS (see section *Creating a new GRASS LOCATION*) and import some raster and vector data (see section *Importing data into a GRASS LOCATION*) for further analysis with the GRASS Toolbox (see section *The GRASS Toolbox*).

16.2 Loading GRASS raster and vector layers

With the GRASS plugin, you can load vector or raster layers using the appropriate button on the toolbar menu. As an example, we will use the QGIS Alaska dataset (see section *Datos de ejemplo*). It includes a small sample GRASS `LOCATION` with three vector layers and one raster elevation map.

1. Create a new folder called `grassdata`, download the QGIS 'Alaska' dataset `qgis_sample_data.zip` from http://download.osgeo.org/qgis/data/ and unzip the file into `grassdata`.
2. Start QGIS.
3. If not already done in a previous QGIS session, load the GRASS plugin clicking on *Plugins* → *Manage Plugins* and activate *GRASS*. The GRASS toolbar appears in the QGIS main window.
4. In the GRASS toolbar, click the Open mapset icon to bring up the *MAPSET* wizard.
5. For `Gisdbase`, browse and select or enter the path to the newly created folder `grassdata`.
6. You should now be able to select the *LOCATION* `alaska` and the *MAPSET* `demo`.
7. Click **[OK]**. Notice that some previously disabled tools in the GRASS toolbar are now enabled.
8. Click on Add GRASS raster layer, choose the map name `gtopo30` and click **[OK]**. The elevation layer will be visualized.
9. Click on Add GRASS vector layer, choose the map name `alaska` and click **[OK]**. The Alaska boundary vector layer will be overlayed on top of the `gtopo30` map. You can now adapt the layer properties as described in chapter *The Vector Properties Dialog* (e.g., change opacity, fill and outline color).
10. Also load the other two vector layers, `rivers` and `airports`, and adapt their properties.

As you see, it is very simple to load GRASS raster and vector layers in QGIS. See the following sections for editing GRASS data and creating a new `LOCATION`. More sample GRASS `LOCATIONs` are available at the GRASS website at http://grass.osgeo.org/download/sample-data/.

Truco: GRASS Data Loading

If you have problems loading data or QGIS terminates abnormally, check to make sure you have loaded the GRASS plugin properly as described in section *Starting the GRASS plugin*.

16.3 GRASS LOCATION and MAPSET

GRASS data are stored in a directory referred to as GISDBASE. This directory, often called `grassdata`, must be created before you start working with the GRASS plugin in QGIS. Within this directory, the GRASS GIS data are organized by projects stored in subdirectories called `LOCATIONs`. Each `LOCATION` is defined by its coordinate system, map projection and geographical boundaries. Each `LOCATION` can have several `MAPSETs` (subdirectories of the `LOCATION`) that are used to subdivide the project into different topics or subregions, or as workspaces for individual team members (see Neteler & Mitasova 2008 in *Referencias bibliográficas y web*). In order to analyze vector and raster layers with GRASS modules, you must import them into a GRASS `LOCATION`. (This is not strictly true – with the GRASS modules `r.external` and `v.external` you can create read-only links to external GDAL/OGR-supported datasets without importing them. But because this is not the usual way for beginners to work with GRASS, this functionality will not be described here.)

16.3.1 Creating a new GRASS LOCATION

As an example, here is how the sample GRASS `LOCATION alaska`, which is projected in Albers Equal Area projection with unit feet was created for the QGIS sample dataset. This sample GRASS `LOCATION alaska`

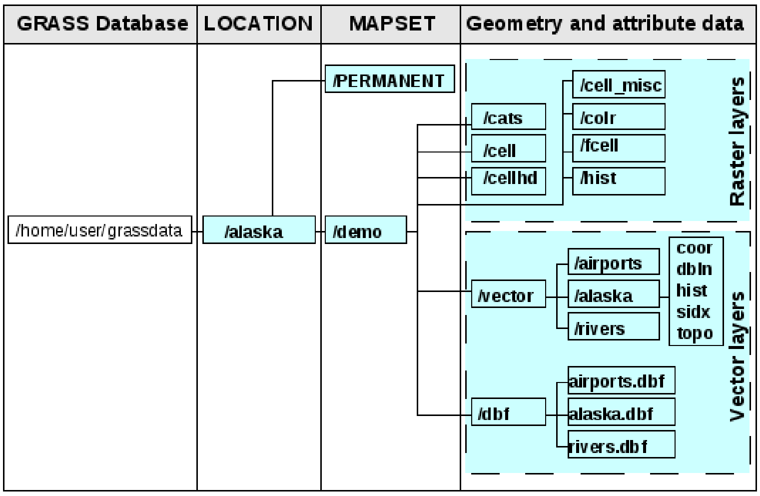

Figura 16.1: GRASS data in the alaska LOCATION

will be used for all examples and exercises in the following GRASS-related sections. It is useful to download and install the dataset on your computer (see *Datos de ejemplo*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. Visualize the `alaska.shp` shapefile (see section *Loading a Shapefile*) from the QGIS Alaska dataset (see *Datos de ejemplo*).
3. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
4. Select an existing GRASS database (GISDBASE) folder `grassdata`, or create one for the new `LOCATION` using a file manager on your computer. Then click **[Next]**.
5. We can use this wizard to create a new `MAPSET` within an existing `LOCATION` (see section *Adding a new MAPSET*) or to create a new `LOCATION` altogether. Select *Create new location* (see figure_grass_location_2).
6. Enter a name for the `LOCATION` – we used 'alaska' – and click **[Next]**.
7. Define the projection by clicking on the radio button *Projection* to enable the projection list.
8. We are using Albers Equal Area Alaska (feet) projection. Since we happen to know that it is represented by the EPSG ID 2964, we enter it in the search box. (Note: If you want to repeat this process for another `LOCATION` and projection and haven't memorized the EPSG ID, click on the CRS Status icon in the lower right-hand corner of the status bar (see section *Working with Projections*)).
9. In *Filter*, insert 2964 to select the projection.
10. Click **[Next]**.
11. To define the default region, we have to enter the `LOCATION` bounds in the north, south, east, and west directions. Here, we simply click on the button **[Set current |qg| extent]**, to apply the extent of the loaded layer `alaska.shp` as the GRASS default region extent.
12. Click **[Next]**.
13. We also need to define a `MAPSET` within our new `LOCATION` (this is necessary when creating a new `LOCATION`). You can name it whatever you like - we used 'demo'. GRASS automatically creates a special `MAPSET` called `PERMANENT`, designed to store the core data for the project, its default spatial extent and coordinate system definitions (see Neteler & Mitasova 2008 in *Referencias bibliográficas y web*).
14. Check out the summary to make sure it's correct and click **[Finish]**.
15. The new `LOCATION`, 'alaska', and two `MAPSETs`, 'demo' and 'PERMANENT', are created. The currently opened working set is 'demo', as you defined.

16. Notice that some of the tools in the GRASS toolbar that were disabled are now enabled.

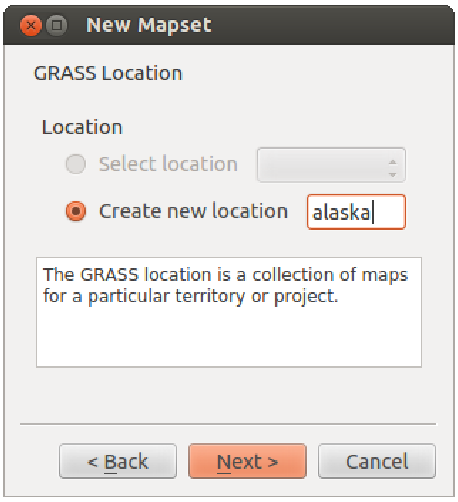

Figura 16.2: Creating a new GRASS LOCATION or a new MAPSET in QGIS

If that seemed like a lot of steps, it's really not all that bad and a very quick way to create a `LOCATION`. The `LOCATION` 'alaska' is now ready for data import (see section *Importing data into a GRASS LOCATION*). You can also use the already-existing vector and raster data in the sample GRASS `LOCATION` 'alaska', included in the QGIS 'Alaska' dataset *Datos de ejemplo*, and move on to section *The GRASS vector data model*.

16.3.2 Adding a new MAPSET

A user has write access only to a GRASS `MAPSET` he or she created. This means that besides access to your own `MAPSET`, you can read maps in other users' `MAPSETs` (and they can read yours), but you can modify or remove only the maps in your own `MAPSET`.

All `MAPSETs` include a `WIND` file that stores the current boundary coordinate values and the currently selected raster resolution (see Neteler & Mitasova 2008 in *Referencias bibliográficas y web*, and section *The GRASS region tool*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
3. Select the GRASS database (GISDBASE) folder `grassdata` with the `LOCATION` 'alaska', where we want to add a further `MAPSET` called 'test'.
4. Click **[Next]**.
5. We can use this wizard to create a new `MAPSET` within an existing `LOCATION` or to create a new `LOCATION` altogether. Click on the radio button *Select location* (see figure_grass_location_2) and click **[Next]**.
6. Enter the name `text` for the new `MAPSET`. Below in the wizard, you see a list of existing `MAPSETs` and corresponding owners.
7. Click **[Next]**, check out the summary to make sure it's all correct and click **[Finish]**.

16.4 Importing data into a GRASS LOCATION

This section gives an example of how to import raster and vector data into the 'alaska' GRASS `LOCATION` provided by the QGIS 'Alaska' dataset. Therefore, we use the landcover raster map `landcover.img` and the vector GML file `lakes.gml` from the QGIS 'Alaska' dataset (see *Datos de ejemplo*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click the Open MAPSET icon to bring up the *MAPSET* wizard.
3. Select as GRASS database the folder `grassdata` in the QGIS Alaska dataset, as `LOCATION` 'alaska', as `MAPSET` 'demo' and click **[OK]**.
4. Now click the Open GRASS tools icon. The GRASS Toolbox (see section *The GRASS Toolbox*) dialog appears.
5. To import the raster map `landcover.img`, click the module `r.in.gdal` in the *Modules Tree* tab. This GRASS module allows you to import GDAL-supported raster files into a GRASS `LOCATION`. The module dialog for `r.in.gdal` appears.
6. Browse to the folder `raster` in the QGIS 'Alaska' dataset and select the file `landcover.img`.
7. As raster output name, define `landcover_grass` and click **[Run]**. In the *Output* tab, you see the currently running GRASS command `r.in.gdal -o input=/path/to/landcover.img output=landcover_grass`.
8. When it says **Succesfully finished**, click **[View output]**. The `landcover_grass` raster layer is now imported into GRASS and will be visualized in the QGIS canvas.
9. To import the vector GML file `lakes.gml`, click the module `v.in.ogr` in the *Modules Tree* tab. This GRASS module allows you to import OGR-supported vector files into a GRASS `LOCATION`. The module dialog for `v.in.ogr` appears.
10. Browse to the folder `gml` in the QGIS 'Alaska' dataset and select the file `lakes.gml` as OGR file.
11. As vector output name, define `lakes_grass` and click **[Run]**. You don't have to care about the other options in this example. In the *Output* tab you see the currently running GRASS command `v.in.ogr -o dsn=/path/to/lakes.gml output=lakes\_grass`.
12. When it says **Succesfully finished**, click **[View output]**. The `lakes_grass` vector layer is now imported into GRASS and will be visualized in the QGIS canvas.

16.5 The GRASS vector data model

It is important to understand the GRASS vector data model prior to digitizing.

In general, GRASS uses a topological vector model.

This means that areas are not represented as closed polygons, but by one or more boundaries. A boundary between two adjacent areas is digitized only once, and it is shared by both areas. Boundaries must be connected and closed without gaps. An area is identified (and labeled) by the **centroid** of the area.

Besides boundaries and centroids, a vector map can also contain points and lines. All these geometry elements can be mixed in one vector and will be represented in different so-called 'layers' inside one GRASS vector map. So in GRASS, a layer is not a vector or raster map but a level inside a vector layer. This is important to distinguish carefully. (Although it is possible to mix geometry elements, it is unusual and, even in GRASS, only used in special cases such as vector network analysis. Normally, you should prefer to store different geometry elements in different layers.)

It is possible to store several 'layers' in one vector dataset. For example, fields, forests and lakes can be stored in one vector. An adjacent forest and lake can share the same boundary, but they have separate attribute tables. It is also possible to attach attributes to boundaries. An example might be the case where the boundary between a lake and a forest is a road, so it can have a different attribute table.

The 'layer' of the feature is defined by the 'layer' inside GRASS. 'Layer' is the number which defines if there is more than one layer inside the dataset (e.g., if the geometry is forest or lake). For now, it can be only a number. In the future, GRASS will also support names as fields in the user interface.

Attributes can be stored inside the GRASS `LOCATION` as dBase or SQLite3 or in external database tables, for example, PostgreSQL, MySQL, Oracle, etc.

Attributes in database tables are linked to geometry elements using a ‘category’ value.

‘Category’ (key, ID) is an integer attached to geometry primitives, and it is used as the link to one key column in the database table.

Truco: Learning the GRASS Vector Model

The best way to learn the GRASS vector model and its capabilities is to download one of the many GRASS tutorials where the vector model is described more deeply. See http://grass.osgeo.org/documentation/manuals/ for more information, books and tutorials in several languages.

16.6 Creating a new GRASS vector layer

To create a new GRASS vector layer with the GRASS plugin, click the Create new GRASS vector toolbar icon. Enter a name in the text box, and you can start digitizing point, line or polygon geometries following the procedure described in section *Digitizing and editing a GRASS vector layer*.

In GRASS, it is possible to organize all sorts of geometry types (point, line and area) in one layer, because GRASS uses a topological vector model, so you don’t need to select the geometry type when creating a new GRASS vector. This is different from shapefile creation with QGIS, because shapefiles use the Simple Feature vector model (see section *Creating new Vector layers*).

Truco: Creating an attribute table for a new GRASS vector layer

If you want to assign attributes to your digitized geometry features, make sure to create an attribute table with columns before you start digitizing (see figure_grass_digitizing_5).

16.7 Digitizing and editing a GRASS vector layer

The digitizing tools for GRASS vector layers are accessed using the Edit GRASS vector layer icon on the toolbar. Make sure you have loaded a GRASS vector and it is the selected layer in the legend before clicking on the edit tool. Figure figure_grass_digitizing_2 shows the GRASS edit dialog that is displayed when you click on the edit tool. The tools and settings are discussed in the following sections.

Truco: Digitizing polygons in GRASS

If you want to create a polygon in GRASS, you first digitize the boundary of the polygon, setting the mode to ‘No category’. Then you add a centroid (label point) into the closed boundary, setting the mode to ‘Next not used’. The reason for this is that a topological vector model links the attribute information of a polygon always to the centroid and not to the boundary.

Toolbar

In figure_grass_digitizing_1, you see the GRASS digitizing toolbar icons provided by the GRASS plugin. Table table_grass_digitizing_1 explains the available functionalities.

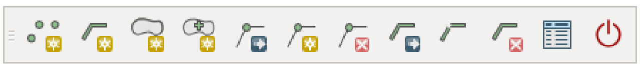

Figura 16.3: GRASS Digitizing Toolbar

Icon	Tool	Purpose
	New Point	Digitize new point
	New Line	Digitize new line
	New Boundary	Digitize new boundary (finish by selecting new tool)
	New Centroid	Digitize new centroid (label existing area)
	Move vertex	Move one vertex of existing line or boundary and identify new position
	Add vertex	Add a new vertex to existing line
	Delete vertex	Delete vertex from existing line (confirm selected vertex by another click)
	Move element	Move selected boundary, line, point or centroid and click on new position
	Split line	Split an existing line into two parts
	Delete element	Delete existing boundary, line, point or centroid (confirm selected element by another click)
	Edit attributes	Edit attributes of selected element (note that one element can represent more features, see above)
	Close	Close session and save current status (rebuilds topology afterwards)

Table GRASS Digitizing 1: GRASS Digitizing Tools

Category Tab

The *Category* tab allows you to define the way in which the category values will be assigned to a new geometry element.

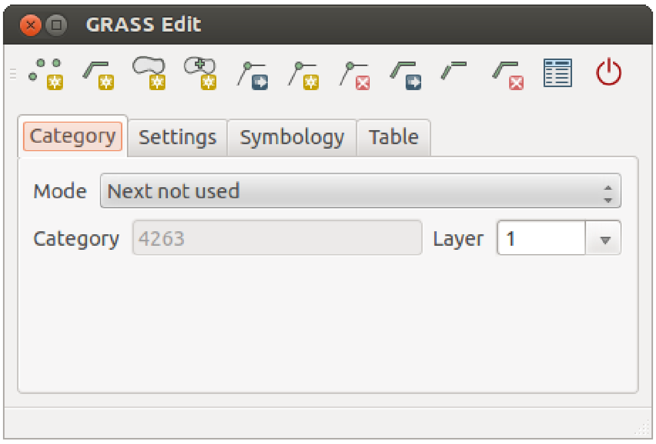

Figura 16.4: GRASS Digitizing Category Tab

- **Mode**: The category value that will be applied to new geometry elements.
  - Next not used - Apply next not yet used category value to geometry element.
  - Manual entry - Manually define the category value for the geometry element in the 'Category' entry field.
  - No category - Do not apply a category value to the geometry element. This is used, for instance, for area boundaries, because the category values are connected via the centroid.
- **Category** - The number (ID) that is attached to each digitized geometry element. It is used to connect each geometry element with its attributes.

- **Field (layer)** - Each geometry element can be connected with several attribute tables using different GRASS geometry layers. The default layer number is 1.

Truco: Creating an additional GRASS 'layer' with |qg|

If you would like to add more layers to your dataset, just add a new number in the 'Field (layer)' entry box and press return. In the Table tab, you can create your new table connected to your new layer.

Settings Tab

The *Settings* tab allows you to set the snapping in screen pixels. The threshold defines at what distance new points or line ends are snapped to existing nodes. This helps to prevent gaps or dangles between boundaries. The default is set to 10 pixels.

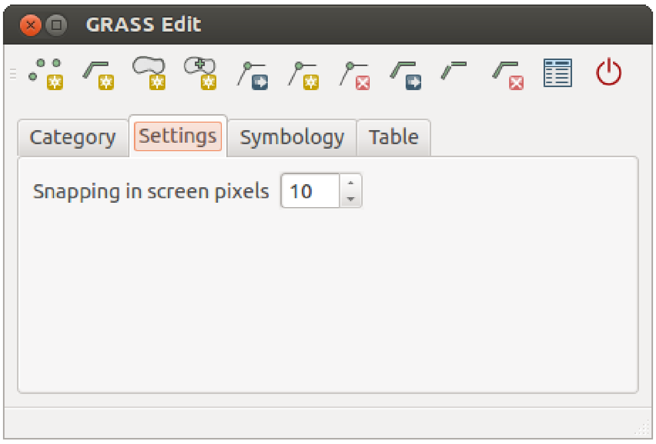

Figura 16.5: GRASS Digitizing Settings Tab

Symbology Tab

The *Symbology* tab allows you to view and set symbology and color settings for various geometry types and their topological status (e.g., closed / opened boundary).

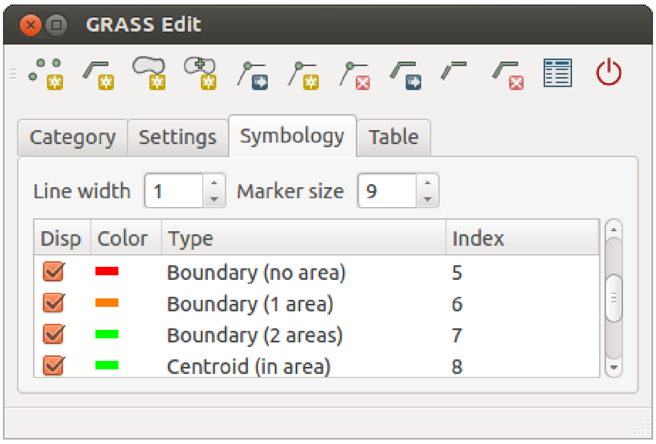

Figura 16.6: GRASS Digitizing Symbology Tab

Table Tab

The *Table* tab provides information about the database table for a given 'layer'. Here, you can add new columns to an existing attribute table, or create a new database table for a new GRASS vector layer (see section *Creating a new GRASS vector layer*).

Truco: GRASS Edit Permissions

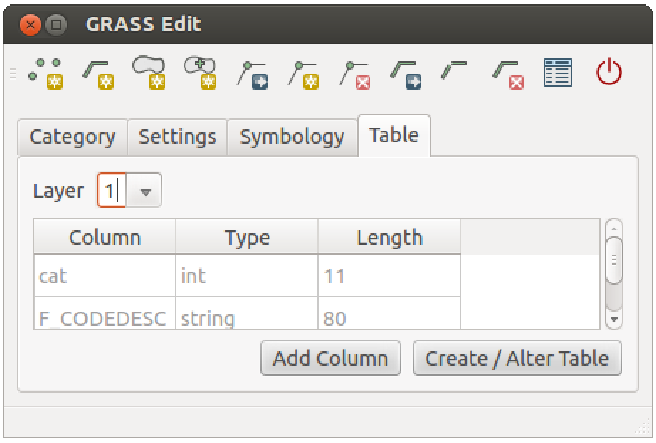

Figura 16.7: GRASS Digitizing Table Tab

You must be the owner of the GRASS MAPSET you want to edit. It is impossible to edit data layers in a MAPSET that is not yours, even if you have write permission.

16.8 The GRASS region tool

The region definition (setting a spatial working window) in GRASS is important for working with raster layers. Vector analysis is by default not limited to any defined region definitions. But all newly created rasters will have the spatial extension and resolution of the currently defined GRASS region, regardless of their original extension and resolution. The current GRASS region is stored in the `$LOCATION/$MAPSET/WIND` file, and it defines north, south, east and west bounds, number of columns and rows, horizontal and vertical spatial resolution.

It is possible to switch on and off the visualization of the GRASS region in the QGIS canvas using the Display current GRASS region button.

With the Edit current GRASS region icon, you can open a dialog to change the current region and the symbology of the GRASS region rectangle in the QGIS canvas. Type in the new region bounds and resolution, and click **[OK]**. The dialog also allows you to select a new region interactively with your mouse on the QGIS canvas. Therefore, click with the left mouse button in the QGIS canvas, open a rectangle, close it using the left mouse button again and click **[OK]**.

The GRASS module `g.region` provides a lot more parameters to define an appropriate region extent and resolution for your raster analysis. You can use these parameters with the GRASS Toolbox, described in section *The GRASS Toolbox*.

16.9 The GRASS Toolbox

The Open GRASS Tools box provides GRASS module functionalities to work with data inside a selected GRASS LOCATION and MAPSET. To use the GRASS Toolbox you need to open a LOCATION and MAPSET that you have write permission for (usually granted, if you created the MAPSET). This is necessary, because new raster or vector layers created during analysis need to be written to the currently selected LOCATION and MAPSET.

16.9.1 Working with GRASS modules

The GRASS shell inside the GRASS Toolbox provides access to almost all (more than 300) GRASS modules in a command line interface. To offer a more user-friendly working environment, about 200 of the available GRASS modules and functionalities are also provided by graphical dialogs within the GRASS plugin Toolbox.

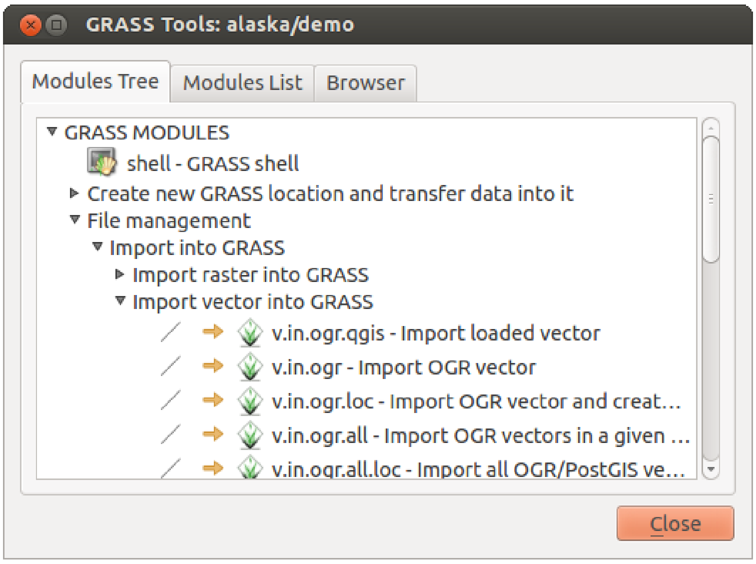

Figura 16.8: GRASS Toolbox and Module Tree

A complete list of GRASS modules available in the graphical Toolbox in QGIS version 2.6 is available in the GRASS wiki at http://grass.osgeo.org/wiki/GRASS-QGIS_relevant_module_list.

It is also possible to customize the GRASS Toolbox content. This procedure is described in section *Customizing the GRASS Toolbox*.

As shown in figure_grass_toolbox_1, you can look for the appropriate GRASS module using the thematically grouped *Modules Tree* or the searchable *Modules List* tab.

By clicking on a graphical module icon, a new tab will be added to the Toolbox dialog, providing three new sub-tabs: *Options*, *Output* and *Manual*.

Options

The *Options* tab provides a simplified module dialog where you can usually select a raster or vector layer visualized in the QGIS canvas and enter further module-specific parameters to run the module.

The provided module parameters are often not complete to keep the dialog clear. If you want to use further module parameters and flags, you need to start the GRASS shell and run the module in the command line.

A new feature since QGIS 1.8 is the support for a *Show Advanced Options* button below the simplified module dialog in the *Options* tab. At the moment, it is only added to the module `v.in.ascii` as an example of use, but it will probably be part of more or all modules in the GRASS Toolbox in future versions of QGIS. This allows you to use the complete GRASS module options without the need to switch to the GRASS shell.

Output

The *Output* tab provides information about the output status of the module. When you click the **[Run]** button, the module switches to the *Output* tab and you see information about the analysis process. If all works well, you will finally see a `Successfully finished` message.

Manual

The *Manual* tab shows the HTML help page of the GRASS module. You can use it to check further module parameters and flags or to get a deeper knowledge about the purpose of the module. At the end of each module manual page, you see further links to the `Main Help index`, the `Thematic index` and the `Full index`. These links provide the same information as the module `g.manual`.

Truco: Display results immediately

If you want to display your calculation results immediately in your map canvas, you can use the 'View Output' button at the bottom of the module tab.

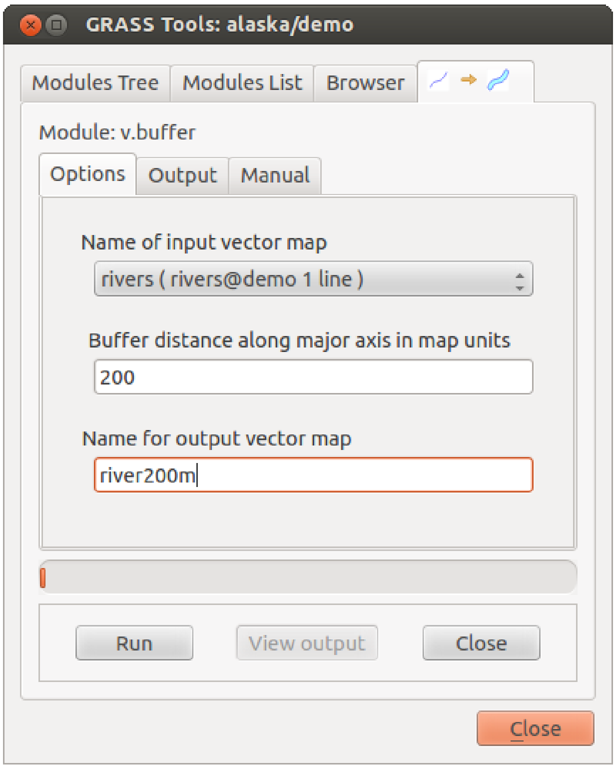

Figura 16.9: GRASS Toolbox Module Options

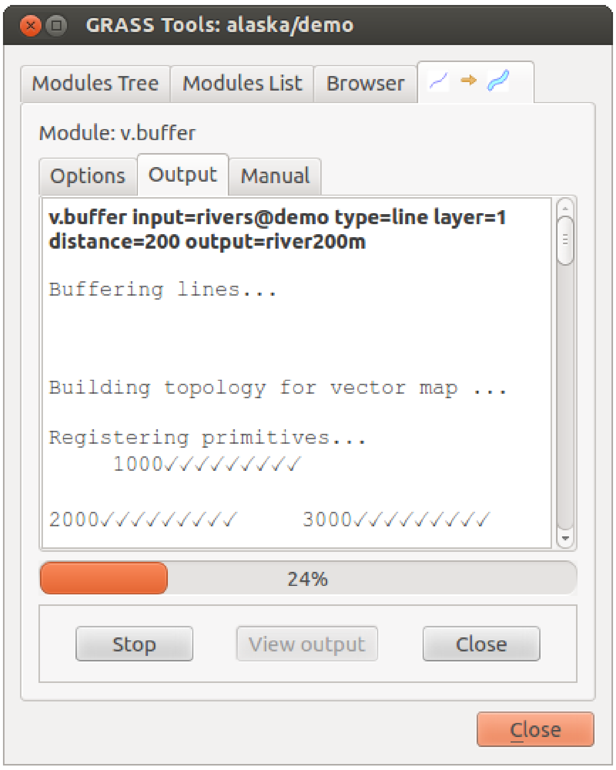

Figura 16.10: GRASS Toolbox Module Output

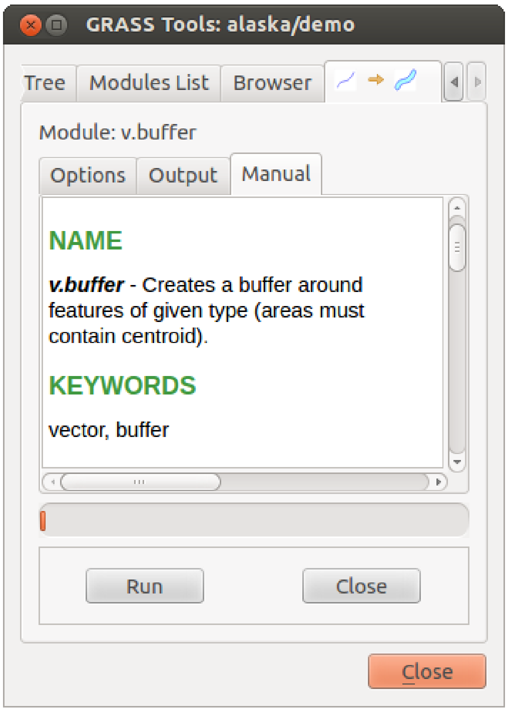

Figura 16.11: GRASS Toolbox Module Manual

16.9.2 GRASS module examples

The following examples will demonstrate the power of some of the GRASS modules.

Creating contour lines

The first example creates a vector contour map from an elevation raster (DEM). Here, it is assumed that you have the Alaska LOCATION set up as explained in section *Importing data into a GRASS LOCATION*.

- First, open the location by clicking the Open mapset button and choosing the Alaska location.
- Now load the gtopo30 elevation raster by clicking Add GRASS raster layer and selecting the gtopo30 raster from the demo location.
- Now open the Toolbox with the Open GRASS tools button.
- In the list of tool categories, double-click *Raster* → *Surface Management* → *Generate vector contour lines*.
- Now a single click on the tool **r.contour** will open the tool dialog as explained above (see *Working with GRASS modules*). The gtopo30 raster should appear as the *Name of input raster*.
- Type into the *Increment between Contour levels* 1,00 the value 100. (This will create contour lines at intervals of 100 meters.)
- Type into the *Name for output vector map* the name ctour_100.
- Click **[Run]** to start the process. Wait for several moments until the message Successfully finished appears in the output window. Then click **[View Output]** and **[Close]**.

Since this is a large region, it will take a while to display. After it finishes rendering, you can open the layer properties window to change the line color so that the contours appear clearly over the elevation raster, as in *The Vector Properties Dialog*.

Next, zoom in to a small, mountainous area in the center of Alaska. Zooming in close, you will notice that the contours have sharp corners. GRASS offers the **v.generalize** tool to slightly alter vector maps while keeping their overall shape. The tool uses several different algorithms with different purposes. Some of the algorithms (i.e., Douglas Peuker and Vertex Reduction) simplify the line by removing some of the vertices. The resulting vector will load faster. This process is useful when you have a highly detailed vector, but you are creating a very small-scale map, so the detail is unnecessary.

Truco: The simplify tool

Note that the QGIS fTools plugin has a *Simplify geometries* → tool that works just like the GRASS **v.generalize** Douglas-Peuker algorithm.

However, the purpose of this example is different. The contour lines created by `r.contour` have sharp angles that should be smoothed. Among the **v.generalize** algorithms, there is Chaiken's, which does just that (also Hermite splines). Be aware that these algorithms can **add** additional vertices to the vector, causing it to load even more slowly.

- Open the GRASS Toolbox and double-click the categories *Vector* → *Develop map* → *Generalization*, then click on the **v.generalize** module to open its options window.
- Check that the 'ctour_100' vector appears as the *Name of input vector*.
- From the list of algorithms, choose Chaiken's. Leave all other options at their default, and scroll down to the last row to enter in the field *Name for output vector map* 'ctour_100_smooth', and click **[Run]**.
- The process takes several moments. Once `Successfully finished` appears in the output windows, click **[View output]** and then **[Close]**.
- You may change the color of the vector to display it clearly on the raster background and to contrast with the original contour lines. You will notice that the new contour lines have smoother corners than the original while staying faithful to the original overall shape.

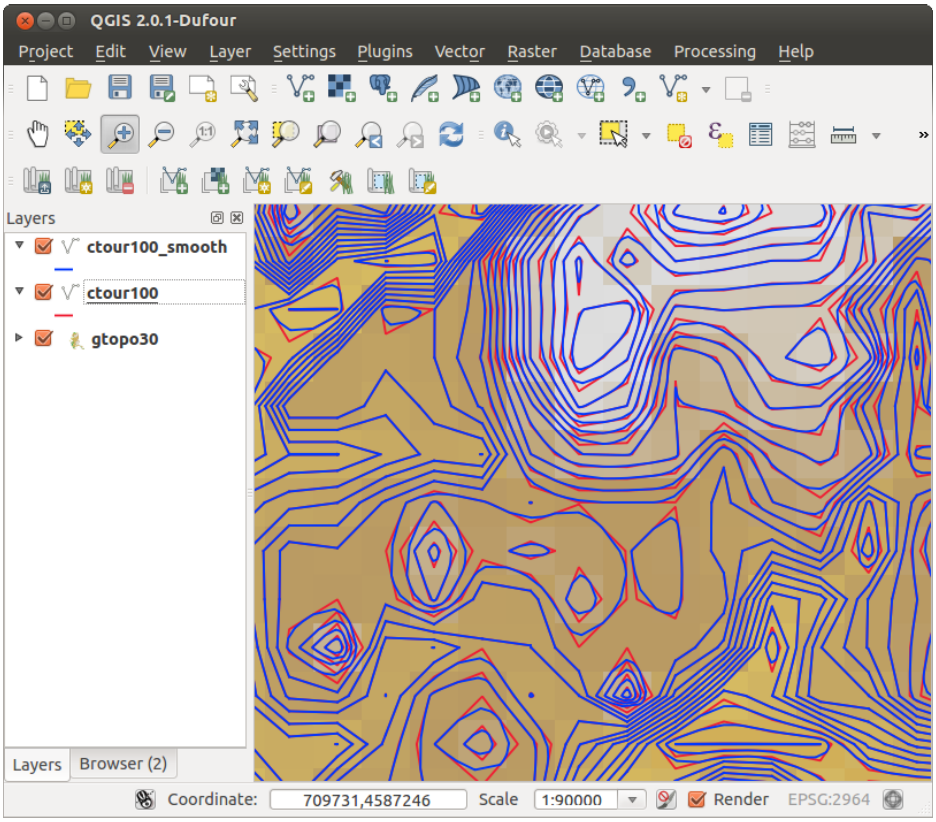

Figura 16.12: GRASS module v.generalize to smooth a vector map

Truco: Other uses for r.contour

The procedure described above can be used in other equivalent situations. If you have a raster map of precipitation data, for example, then the same method will be used to create a vector map of isohyetal (constant rainfall) lines.

Creating a Hillshade 3-D effect

Several methods are used to display elevation layers and give a 3-D effect to maps. The use of contour lines, as shown above, is one popular method often chosen to produce topographic maps. Another way to display a 3-D effect is by hillshading. The hillshade effect is created from a DEM (elevation) raster by first calculating the slope and aspect of each cell, then simulating the sun's position in the sky and giving a reflectance value to each cell. Thus, you get sun-facing slopes lighted; the slopes facing away from the sun (in shadow) are darkened.

- Begin this example by loading the `gtopo30` elevation raster. Start the GRASS Toolbox, and under the Raster category, double-click to open *Spatial analysis* → *Terrain analysis*.
- Then click **r.shaded.relief** to open the module.
- Change the *azimuth angle* 1,00 270 to 315.
- Enter `gtopo30_shade` for the new hillshade raster, and click **[Run]**.
- When the process completes, add the hillshade raster to the map. You should see it displayed in grayscale.
- To view both the hillshading and the colors of the `gtopo30` together, move the hillshade map below the `gtopo30` map in the table of contents, then open the *Properties* window of `gtopo30`, switch to the *Transparency* tab and set its transparency level to about 25 %.

You should now have the `gtopo30` elevation with its colormap and transparency setting displayed **above** the grayscale hillshade map. In order to see the visual effects of the hillshading, turn off the `gtopo30_shade` map, then turn it back on.

Using the GRASS shell

The GRASS plugin in QGIS is designed for users who are new to GRASS and not familiar with all the modules and options. As such, some modules in the Toolbox do not show all the options available, and some modules do not appear at all. The GRASS shell (or console) gives the user access to those additional GRASS modules that do not appear in the Toolbox tree, and also to some additional options to the modules that are in the Toolbox with the simplest default parameters. This example demonstrates the use of an additional option in the **r.shaded.relief** module that was shown above.

The module **r.shaded.relief** can take a parameter `zmult`, which multiplies the elevation values relative to the X-Y coordinate units so that the hillshade effect is even more pronounced.

- Load the `gtopo30` elevation raster as above, then start the GRASS Toolbox and click on the GRASS shell. In the shell window, type the command `r.shaded.relief map=gtopo30 shade=gtopo30_shade2 azimuth=315 zmult=3` and press **[Enter]**.
- After the process finishes, shift to the *Browse* tab and double-click on the new `gtopo30_shade2` raster to display it in QGIS.
- As explained above, move the shaded relief raster below the `gtopo30` raster in the table of contents, then check the transparency of the colored `gtopo30` layer. You should see that the 3-D effect stands out more strongly compared with the first shaded relief map.

Raster statistics in a vector map

The next example shows how a GRASS module can aggregate raster data and add columns of statistics for each polygon in a vector map.

- Again using the Alaska data, refer to *Importing data into a GRASS LOCATION* to import the trees shapefile from the `shapefiles` directory into GRASS.
- Now an intermediate step is required: centroids must be added to the imported trees map to make it a complete GRASS area vector (including both boundaries and centroids).

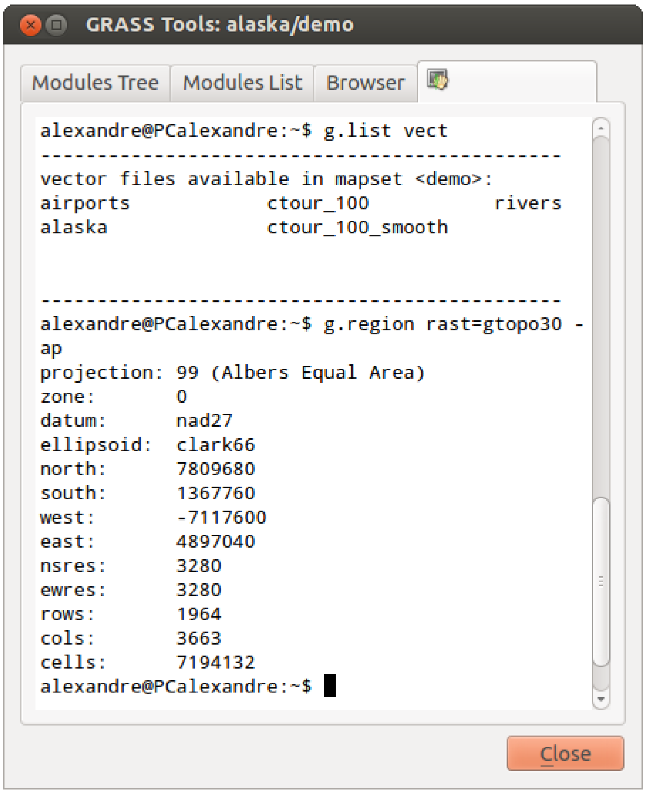

Figura 16.13: The GRASS shell, r.shaded.relief module

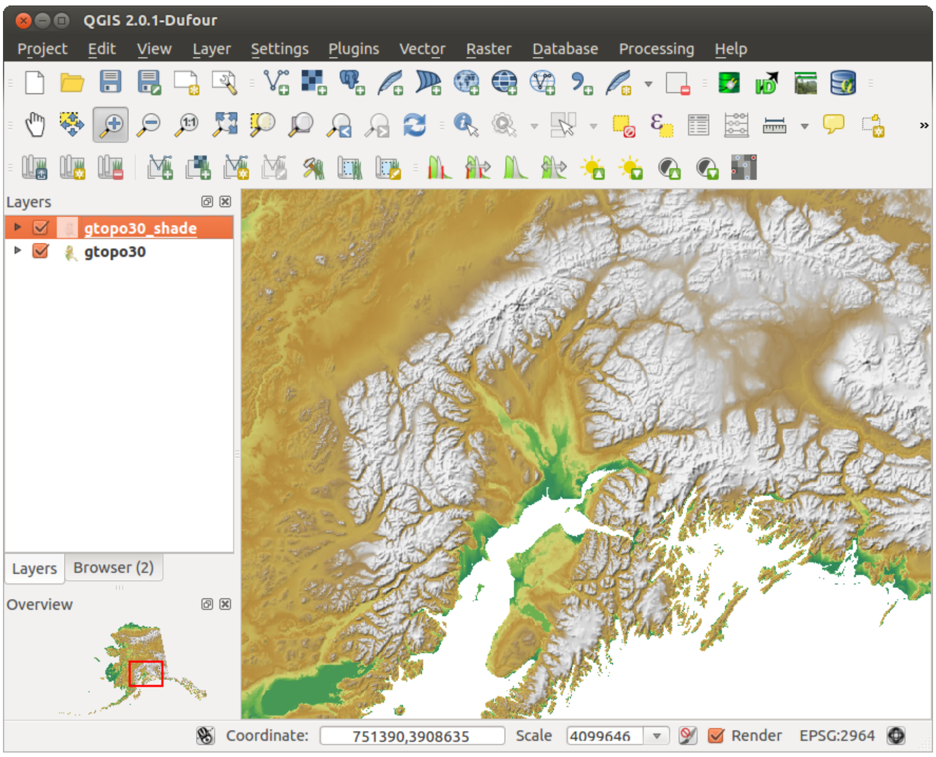

Figura 16.14: Displaying shaded relief created with the GRASS module r.shaded.relief

- From the Toolbox, choose *Vector* → *Manage features*, and open the module **v.centroids**.
- Enter as the *output vector map* 'forest_areas' and run the module.
- Now load the `forest_areas` vector and display the types of forests - deciduous, evergreen, mixed - in different colors: In the layer *Properties* window, *Symbology* tab, choose from *Legend type* 'Unique value' and set the *Classification field* to 'VEGDESC'. (Refer to the explanation of the symbology tab in *Style Menu* of the vector section.)
- Next, reopen the GRASS Toolbox and open *Vector* → *Vector update* by other maps.
- Click on the **v.rast.stats** module. Enter `gtopo30` and `forest_areas`.
- Only one additional parameter is needed: Enter *column prefix* `elev`, and click **[Run]**. This is a computationally heavy operation, which will run for a long time (probably up to two hours).
- Finally, open the `forest_areas` attribute table, and verify that several new columns have been added, including `elev_min`, `elev_max`, `elev_mean`, etc., for each forest polygon.

16.9.3 Working with the GRASS LOCATION browser

Another useful feature inside the GRASS Toolbox is the GRASS `LOCATION` browser. In figure_grass_module_7, you can see the current working `LOCATION` with its `MAPSETs`.

In the left browser windows, you can browse through all `MAPSETs` inside the current `LOCATION`. The right browser window shows some meta-information for selected raster or vector layers (e.g., resolution, bounding box, data source, connected attribute table for vector data, and a command history).

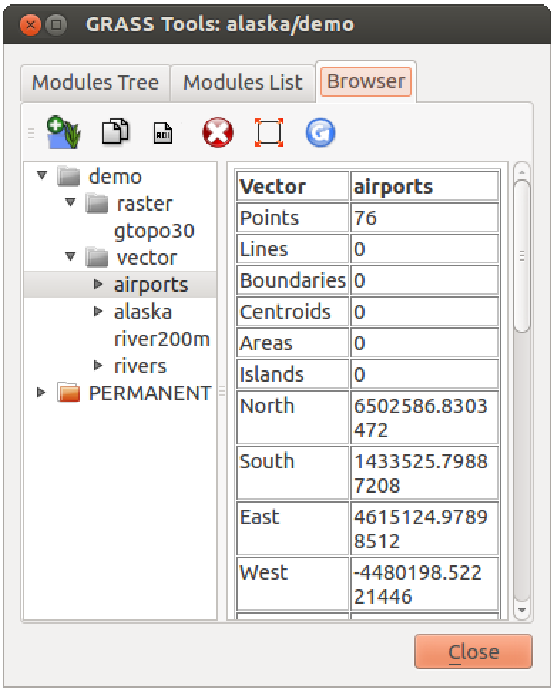

Figura 16.15: GRASS LOCATION browser

The toolbar inside the *Browser* tab offers the following tools to manage the selected `LOCATION`:

- *Add selected map to canvas*
- *Copy selected map*
- *Rename selected map*

- *Delete selected map*
- *Set current region to selected map*
- *Refresh browser window*

The *Rename selected map* and *Delete selected map* only work with maps inside your currently selected `MAPSET`. All other tools also work with raster and vector layers in another `MAPSET`.

16.9.4 Customizing the GRASS Toolbox

Nearly all GRASS modules can be added to the GRASS Toolbox. An XML interface is provided to parse the pretty simple XML files that configure the modules' appearance and parameters inside the Toolbox.

A sample XML file for generating the module `v.buffer` (v.buffer.qgm) looks like this:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE qgisgrassmodule SYSTEM "http://mrcc.com/qgisgrassmodule.dtd">

<qgisgrassmodule label="Vector buffer" module="v.buffer">
        <option key="input" typeoption="type" layeroption="layer" />
        <option key="buffer"/>
        <option key="output" />
</qgisgrassmodule>
```

The parser reads this definition and creates a new tab inside the Toolbox when you select the module. A more detailed description for adding new modules, changing a module's group, etc., can be found on the QGIS wiki at http://hub.qgis.org/projects/quantum-gis/wiki/Adding_New_Tools_to_the_GRASS_Toolbox.

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CAPÍTULO 17

Entorno de trabajo de procesamiento de QGIS

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17.1 Introducción

Este capítulo introduce al marco de procesamiento de QGIS, un entorno de geoprosesamiento que se puede utilizar para llamar algoritmos nativos o de terceros de QGIS, haciendo su tarea de análisis espacial más productivo y fácil de lograr.

En las siguientes secciones, revisaremos cómo usar los elementos gráficos de este sistema y sacar el máximo provecho de cada uno de ellos.

Hay cuatro elementos básicos en el marco IUG, que se usa para ejecutar algoritmos para diferentes propósitos. Elegir una u otra herramienta dependerá del tipo de análisis que se va a realizar y de las características particulares que cada usuario y proyecto. Todos ellos (a excepción de la interfaz de procesamiento por lotes, lo que se llama desde la caja de herramientas, como veremos más delante) se puede acceder desde el menú *Procesado*. (Verpa más de cuatro entradas. Los restantes no se utilizan para ejecutar los algoritmos y se explicarán más adelante en este capítulo.)

- La caja de herramientas. El elemento principal de la IUG, se usa para ejecutar un solo algoritmo o grupo de procesos sobre la base de ese algoritmo.

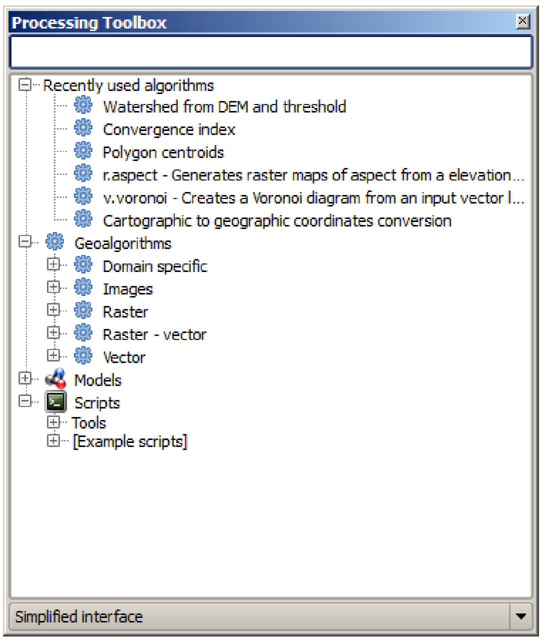

Figura 17.1: Caja de herramientas de procesado

- El modelador gráfico. Varios algoritmos se pueden combinar graficamente usando el modelador para definir un flujo de trabajo, creando un proceso individual que involucre varios subprocesos.

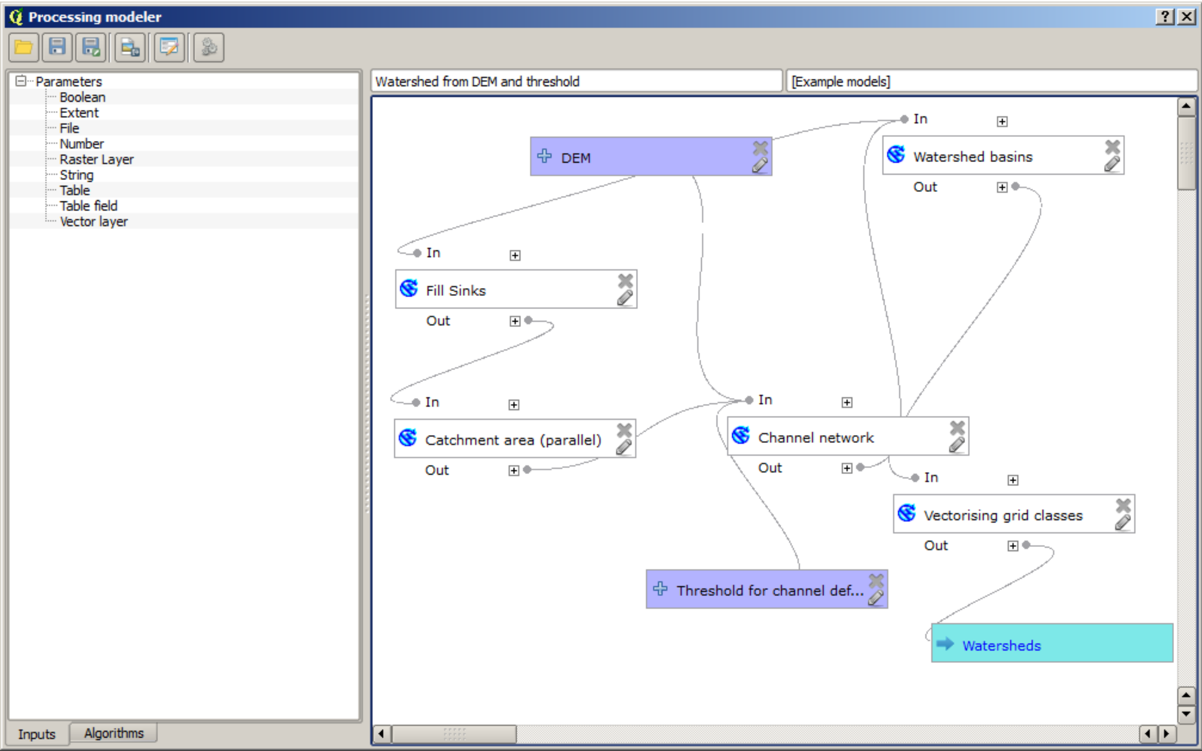

Figura 17.2: Procesamiento del modelador

- El administrador del historial. Todas las acciones que se llevan acabo mediante cualquiera de los elementos mencionados se almacenan en un archivo de la historia y puede ser posteriormente producido usando el administrador del historial.
- La interfaz de procesamiento por lote. Esta interfaz permite que ejecute procesos por lote y automatizar la ejecución de un solo algoritmo a múltiples conjuntos de datos.

En las siguientes secciones, revisaremos cada uno de los elementos a detalle.

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17.2 The toolbox

La *Caja de herramientas* es el principal elemento de procesamiento de la interfaz gráfica de usuario, y el que más se suele usar en el trabajo diario. Muestra un listado de todos los algoritmos disponibles agrupados en diferentes bloques, y es el punto de acceso para ejecutarlos, bien haciéndolo como un proceso único o bien como un proceso por lotes que realice varias ejecuciones del mismo algoritmo con diferentes conjuntos de entradas.

The toolbox contains all the available algorithms, divided into predefined groups. All these groups are found under a single tree entry named *Geoalgorithms*.

Además, hay dos entradas más llamadas *Modelos* y *Scripts*. Éstas permiten crear algorimtos y definir flujos de trabajo y tareas de procesamiento personalizados. Más adelante hay uan sección completa dedicada a esto.

En la parte superior de la caja de herramientas, hay una caja de texto. Para reducir el número de algoritmos que se muestran en la caja de herramientas y que resulte más fácil encontrar el que se necesita, se puede introducir cualquier palabra o frase en esa caja de texto. Según se va escribiendo, el número de algorimos que se muestra se va reduciendo a sólo aquellos que contienen el texto introducido en su nombre.

En la parte inferior, hay una caja desplegable en la que se puede elegir entre la lista simplificada (la ya explicada) y la lista avanzada. Si se cambia a la opción avanzada, la caja de herramientas tendrá este aspecto:

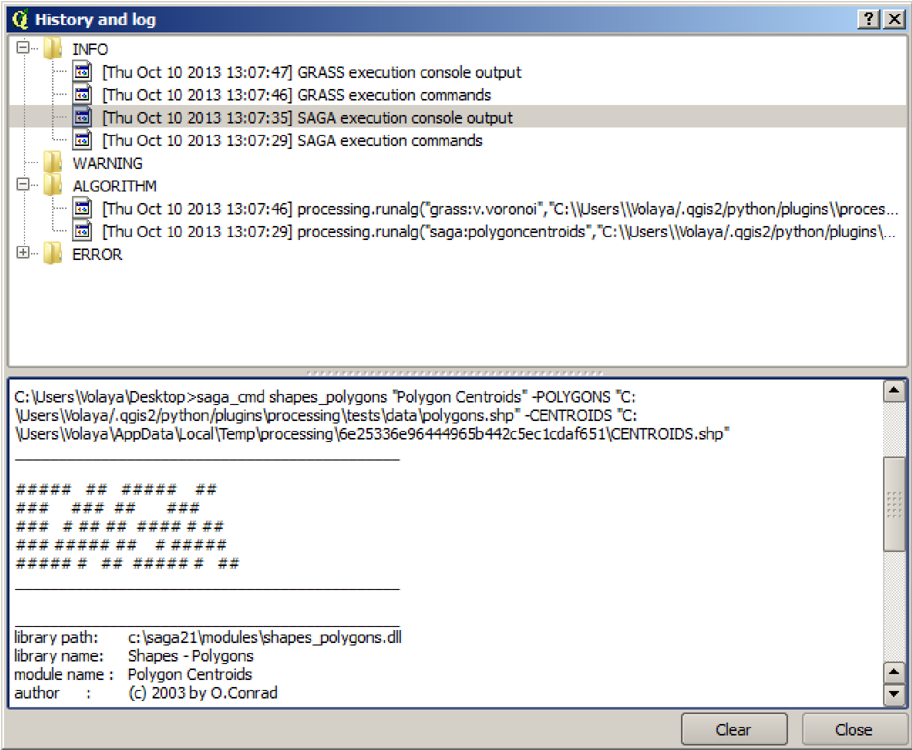

Figura 17.3: Procesamiento de Historial

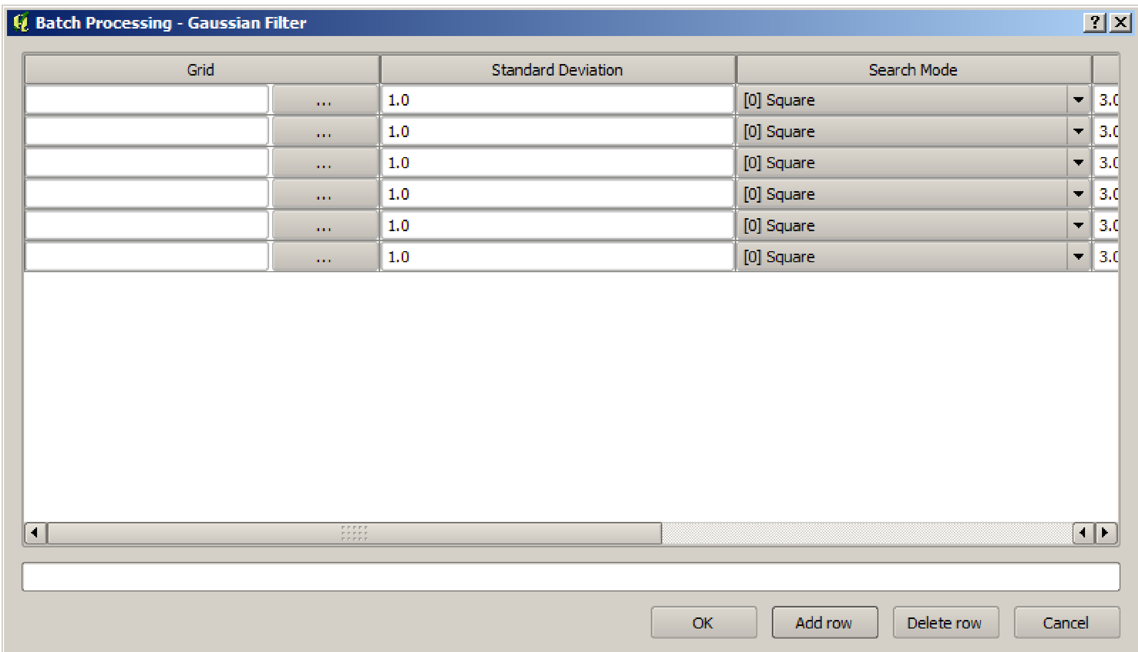

Figura 17.4: Interfaz de procesamiento por lote

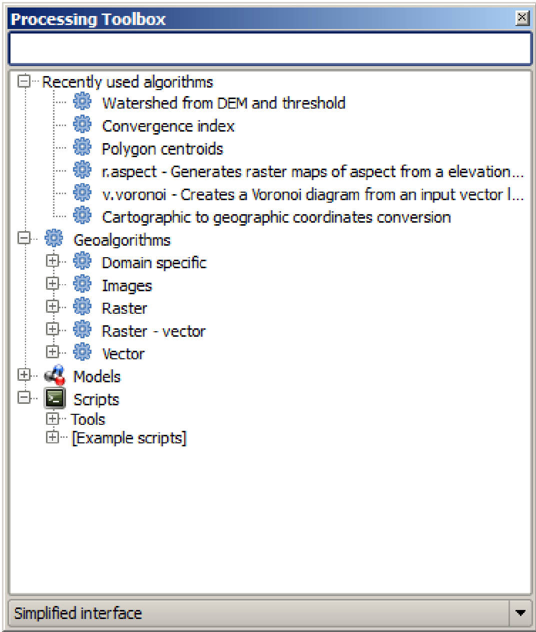

Figura 17.5: Processing Toolbox

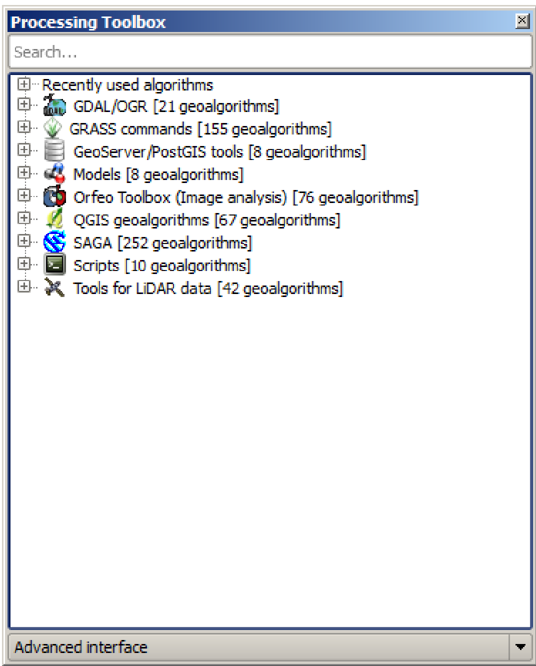

Figura 17.6: Processing Toolbox (advanced mode)

En la vista avanzada, cada grupo representa a un 'proveedor de algoritmos', que es un conjunto de algorimos que tiene el mismo origen, por ejemplo de una aplicación externa con capacidades de geoprocesamiento. Algunos de estos grupos representan algoritmos de aplicaciones como SAGA, GRASS o R, mientras que otros contienen algorimos directamente programados usando el complemeto de procesamiento y no pertenecen a ningún otro programa.

Esta vista se recomienda para los usuarios/as que tienen cierto conocimiento de las aplicaciones de las que provienen los algoritmos, ya que estos se muestran con sus nombres y grupos originales.

Además, hay algunos algoritmos que sólo están disponibles en la vista avanzada, como las herramientas de LIDAR y los scripts basados en el software de cálculo estadístico R entre otras. Los plugins de QGIS independientes que añaden nuevos algoritmos a la caja de herramientas, se muestran también sólo en la vista avanzada.

En concreto, la vista simplificada contiene algoritmos de los siguientes productos:

- GRASS
- SAGA
- OTB
- Native QGIS algorithms

Si se usa QGIS en Windows, estos algorimos están plenamente funcionales desde el principio y pueden ejecutarse sin necesidad de instalaciones adicionales. Además, ejecutarlos no requiere un conocimiento previo de las aplicaciones externas que usan, haciéndolos más accesibles para usuarios/as sin experiencia.

If you want to use an algorithm not provided by any of the above providers, switch to the advanced mode by selecting the corresponding option at the bottom of the toolbox.

Para ejecutar un algoritmo, basta con hacer doble click sobre su nombre en la caja de herramientas.

17.2.1 El cuadro de diálogo de algoritmo

Once you double-click on the name of the algorithm that you want to execute, a dialog similar to that in the figure below is shown (in this case, the dialog corresponds to the SAGA 'Convergence index' algorithm).

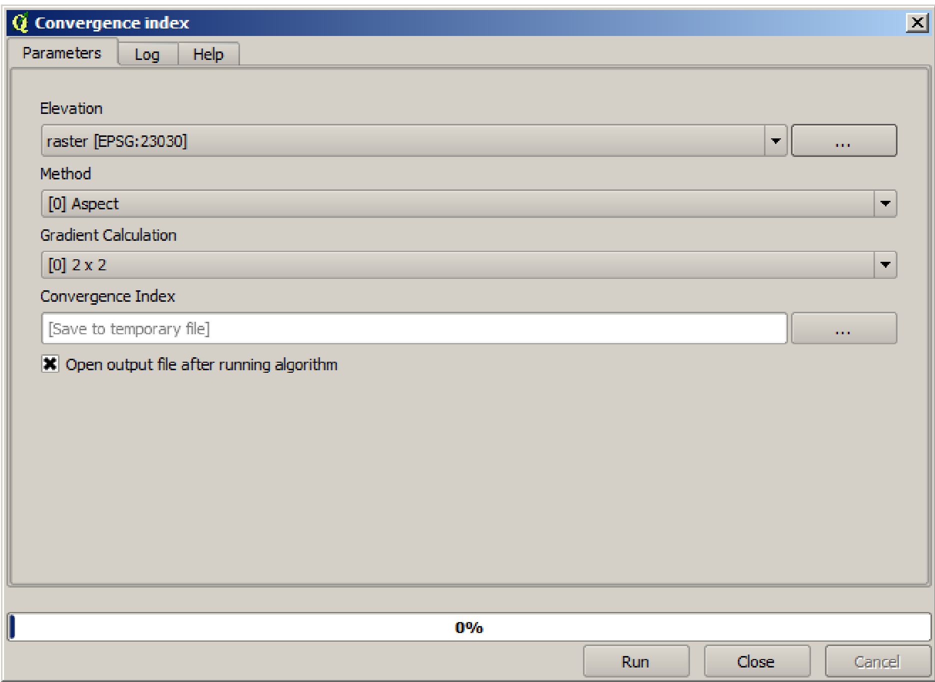

Figura 17.7: Parameters Dialog

This dialog is used to set the input values that the algorithm needs to be executed. It shows a table where input values and configuration parameters are to be set. It of course has a different content, depending on the requirements of the algorithm to be executed, and is created automatically based on those requirements. On the left side, the name of the parameter is shown. On the right side, the value of the parameter can be set.

Although the number and type of parameters depend on the characteristics of the algorithm, the structure is similar for all of them. The parameters found in the table can be of one of the following types.

- A raster layer, to select from a list of all such layers available (currently opened) in QGIS. The selector contains as well a button on its right-hand side, to let you select filenames that represent layers currently not loaded in QGIS.
- A vector layer, to select from a list of all vector layers available in QGIS. Layers not loaded in QGIS can be selected as well, as in the case of raster layers, but only if the algorithm does not require a table field selected from the attributes table of the layer. In that case, only opened layers can be selected, since they need to be open so as to retrieve the list of field names available.

  Se ve un botón por cada selector de capa vectorial, como se muestra en la figura inferior.

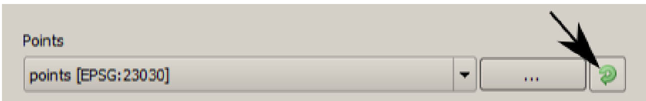

Figura 17.8: Vector iterator button

If the algorithm contains several of them, you will be able to toggle just one of them. If the button corresponding to a vector input is toggled, the algorithm will be executed iteratively on each one of its features, instead of just once for the whole layer, producing as many outputs as times the algorithm is executed. This allows for automating the process when all features in a layer have to be processed separately.

- A table, to select from a list of all available in QGIS. Non-spatial tables are loaded into QGIS like vector layers, and in fact they are treated as such by the program. Currently, the list of available tables that you will see when executing an algorithm that needs one of them is restricted to tables coming from files in dBase (`.dbf`) or Comma-Separated Values (`.csv`) formats.
- Una opción, a elegir de una lista de selección de posibles opciones.
- A numerical value, to be introduced in a text box. You will find a button by its side. Clicking on it, you will see a dialog that allows you to enter a mathematical expression, so you can use it as a handy calculator. Some useful variables related to data loaded into QGIS can be added to your expression, so you can select a value derived from any of these variables, such as the cell size of a layer or the northernmost coordinate of another one.

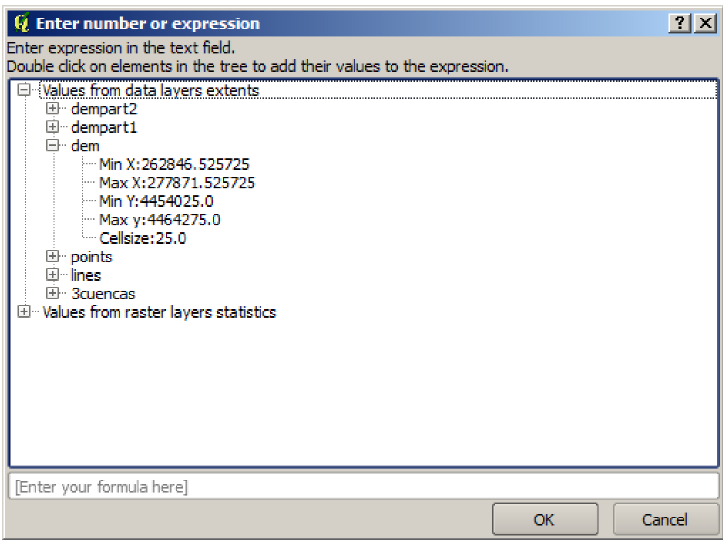

Figura 17.9: Number Selector

- Un rango, con valores mínimo y máximo que se introducen en dos cuadros de texto.
- Una cadena de texto, que se introduce en un cuadro de texto.
- Un campo, a elegir desde la tabla de atributos de una capa vectorial o una tabla sencilla seleccionada en otro parámetro.
- A coordinate reference system. You can type the EPSG code directly in the text box, or select it from the CRS selection dialog that appears when you click on the button on the right-hand side.
- An extent, to be entered by four numbers representing its `xmin`, `xmax`, `ymin`, `ymax` limits. Clicking on the button on the right-hand side of the value selector, a pop-up menu will appear, giving you two options: to select the value from a layer or the current canvas extent, or to define it by dragging directly onto the map canvas.

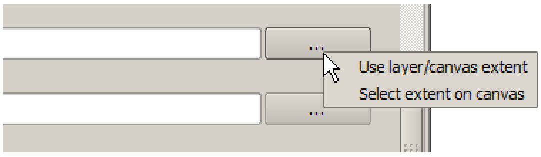

Figura 17.10: Extent selector

Si se selecciona la primera opción, se verá una ventana como la siguiente.

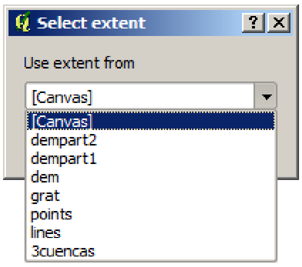

Figura 17.11: Extent List

Si se selecciona la segunda opción, la ventana de parámetros se ocultará, para que se pueda definir el rectángulo haciendo click y arrastrando dentro del lienzo. Una vez hecho esto, el cuadro de diálogo reaparecerá, con los valores correspondientes ya rellenos en en cuadro de texto.

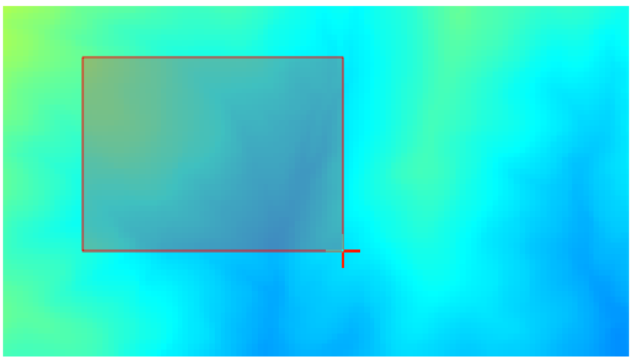

Figura 17.12: Extent Drag

- A list of elements (whether raster layers, vector layers or tables), to select from the list of such layers available in QGIS. To make the selection, click on the small button on the left side of the corresponding row to see a dialog like the following one.

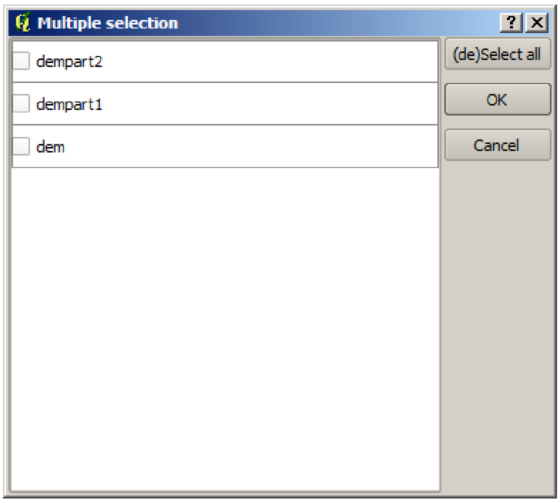

Figura 17.13: Selección múltiple

- Una pequeña tabla para que la edite el usuario. Éstas se usan para definir parámetros como tablas de búsqueda o matrices de convolución entre otros.

  Click en el botón del lado derecho para ver la tabla y editar sus valores.

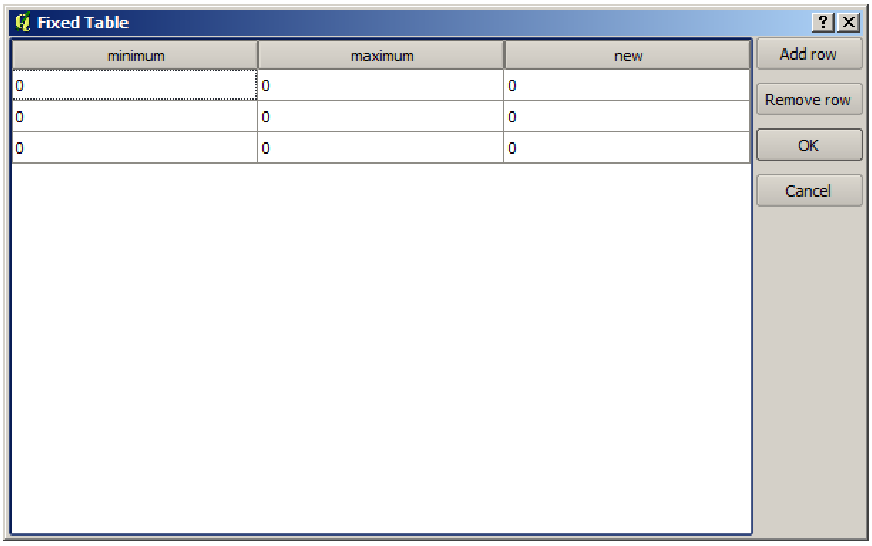

Figura 17.14: Fixed Table

  Depending on the algorithm, the number of rows can be modified or not by using the buttons on the right side of the window.

You will find a **[Help]** tab in the the parameters dialog. If a help file is available, it will be shown, giving you more information about the algorithm and detailed descriptions of what each parameter does. Unfortunately, most algorithms lack good documentation, but if you feel like contributing to the project, this would be a good place to start.

Un comentario sobre proyecciones

Algorithms run from the processing framework — this is also true of most of the external applications whose algorithms are exposed through it. Do not perform any reprojection on input layers and assume that all of them are already in a common coordinate system and ready to be analized. Whenever you use more than one layer as input to an algorithm, whether vector or raster, it is up to you to make sure that they are all in the same coordinate system.

Note that, due to QGIS's on-the-fly reprojecting capabilities, although two layers might seem to overlap and match, that might not be true if their original coordinates are used without reprojecting them onto a common coordinate system. That reprojection should be done manually, and then the resulting files should be used as input to the algorithm. Also, note that the reprojection process can be performed with the algorithms that are available in the processing framework itself.

By default, the parameters dialog will show a description of the CRS of each layer along with its name, making it easy to select layers that share the same CRS to be used as input layers. If you do not want to see this additional information, you can disable this functionality in the processing configuration dialog, unchecking the *Show CRS* option.

If you try to execute an algorithm using as input two or more layers with unmatching CRSs, a warning dialog will be shown.

Aún se puede ejecutar el algoritmo, pero en la mayoría de los casos se producirán resultados incorrectos, como capas vacias debido a que las capas de entrada no se solapan.

17.2.2 Resultados generados por algoritmos

Los tipos de resultados que se pueden generar cor un algoritmo son los siguientes:

- Una capa ráster.
- Una capa vectorial.
- Una tabla
- Un archivo HTML (usado para salidas de texto y salidas gráficas).

These are all saved to disk, and the parameters table will contain a text box corresponding to each one of these outputs, where you can type the output channel to use for saving it. An output channel contains the information needed to save the resulting object somewhere. In the most usual case, you will save it to a file, but the architecture allows for any other way of storing it. For instance, a vector layer can be stored in a database or even uploaded to a remote server using a WFS-T service. Although solutions like these are not yet implemented, the processing framework is prepared to handle them, and we expect to add new kinds of output channels in a near feature.

To select an output channel, just click on the button on the right side of the text box. That will open a save file dialog, where you can select the desired file path. Supported file extensions are shown in the file format selector of the dialog, depending on the kind of output and the algorithm.

The format of the output is defined by the filename extension. The supported formats depend on what is supported by the algorithm itself. To select a format, just select the corresponding file extension (or add it, if you are directly typing the file path instead). If the extension of the file path you entered does not match any of the supported formats, a default extension (usually `.dbf`' for tables, `.tif` for raster layers and `.shp` for vector layers) will be appended to the file path, and the file format corresponding to that extension will be used to save the layer or table.

If you do not enter any filename, the result will be saved as a temporary file in the corresponding default file format, and it will be deleted once you exit QGIS (take care with that, in case you save your project and it contains temporary layers).

You can set a default folder for output data objects. Go to the configuration dialog (you can open it from the *Processing* menu), and in the *General* group, you will find a parameter named *Output folder*. This output folder is used as the default path in case you type just a filename with no path (i.e., `myfile.shp`) when executing an algorithm.

When running an algorithm that uses a vector layer in iterative mode, the entered file path is used as the base path for all generated files, which are named using the base name and appending a number representing the index of the iteration. The file extension (and format) is used for all such generated files.

Apart from raster layers and tables, algorithms also generate graphics and text as HTML files. These results are shown at the end of the algorithm execution in a new dialog. This dialog will keep the results produced by any algorithm during the current session, and can be shown at any time by selecting *Processing* → *Results viewer* from the QGIS main menu.

Some external applications might have files (with no particular extension restrictions) as output, but they do not belong to any of the categories above. Those output files will not be processed by QGIS (opened or included into the current QGIS project), since most of the time they correspond to file formats or elements not supported by QGIS. This is, for instance, the case with LAS files used for LiDAR data. The files get created, but you won't see anything new in your QGIS working session.

For all the other types of output, you will find a checkbox that you can use to tell the algorithm whether to load the file once it is generated by the algorithm or not. By default, all files are opened.

Optional outputs are not supported. That is, all outputs are created. However, you can uncheck the corresponding checkbox if you are not interested in a given output, which essentially makes it behave like an optional output (in other words, the layer is created anyway, but if you leave the text box empty, it will be saved to a temporary file and deleted once you exit QGIS).

17.2.3 Configurar el entorno de trabajo de procesamiento

As has been mentioned, the configuration menu gives access to a new dialog where you can configure how algorithms work. Configuration parameters are structured in separate blocks that you can select on the left-hand side of the dialog.

Al igual que con la ya mencionada *Carpeta de salida*, el bloque *General* contienen parámetros para configurar el estilo de renderizado por defecto para capas de salida (es decir, capas que se generan usando algoritmos desde cualquiera de los componentes GUI del entorno de trabajo). Hay que crear el estilo deseado usando QGIS, salvarlo en un archivo, e introducir ela ruta a ese archivo en la configuración para que los algorimos lo puedan usar. Si SEXTANTE carga una capa y la añade al lienzo de QGIS , se renderizará usando ese estilo.

Los estilos de renderizado se pueden configurar individualmente para cada algoritmo y cada una de sus salidad. Basta con hacer clic derecho en el nombre del algoritmo en la caja de herramientas y seleccionar *Editar estilos de renderizados para salidas*. Aparecerá un cuadro de diálogo como el mostrado a continuación.

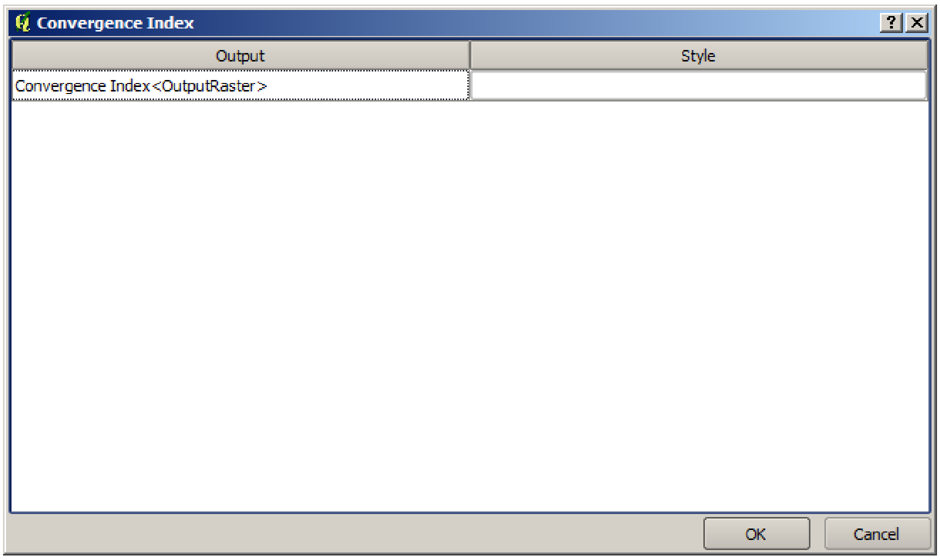

Figura 17.15: Estilos de Renderizado

Seleccionar el archivo de estilo (`.qml`) que se desee para cada salida y presionar **[Aceptar]**.

Other configuration parameters in the *General* group are listed below:

- *Use filename as layer name*. The name of each resulting layer created by an algorithm is defined by the algorithm itself. In some cases, a fixed name might be used, meaning that the same output name will be used, no matter which input layer is used. In other cases, the name might depend on the name of the input layer or some of the parameters used to run the algorithm. If this checkbox is checked, the name will be taken from the output filename instead. Notice that, if the output is saved to a temporary file, the filename of this temporary file is usually a long and meaningless one intended to avoid collision with other already existing filenames.

- *Use only selected features*. If this option is selected, whenever a vector layer is used as input for an algorithm, only its selected features will be used. If the layer has no selected features, all features will be used.
- *Pre-execution script file* and *Post-execution script file*. These parameters refer to scripts written using the processing scripting functionality, and are explained in the section covering scripting and the console.

Apart from the *General* block in the settings dialog, you will also find a block for algorithm providers. Each entry in this block contains an *Activate* item that you can use to make algorithms appear or not in the toolbox. Also, some algorithm providers have their own configuration items, which we will explain later when covering particular algorithm providers.

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17.3 &Modelador gráfico...

The *graphical modeler* allows you to create complex models using a simple and easy-to-use interface. When working with a GIS, most analysis operations are not isolated, but rather part of a chain of operations instead. Using the graphical modeler, that chain of processes can be wrapped into a single process, so it is as easy and convenient to execute as a single process later on a different set of inputs. No matter how many steps and different algorithms it involves, a model is executed as a single algorithm, thus saving time and effort, especially for larger models.

El modelador puede ser abierto desde el menu de procesamiento

The modeler has a working canvas where the structure of the model and the workflow it represents are shown. On the left part of the window, a panel with two tabs can be used to add new elements to the model.

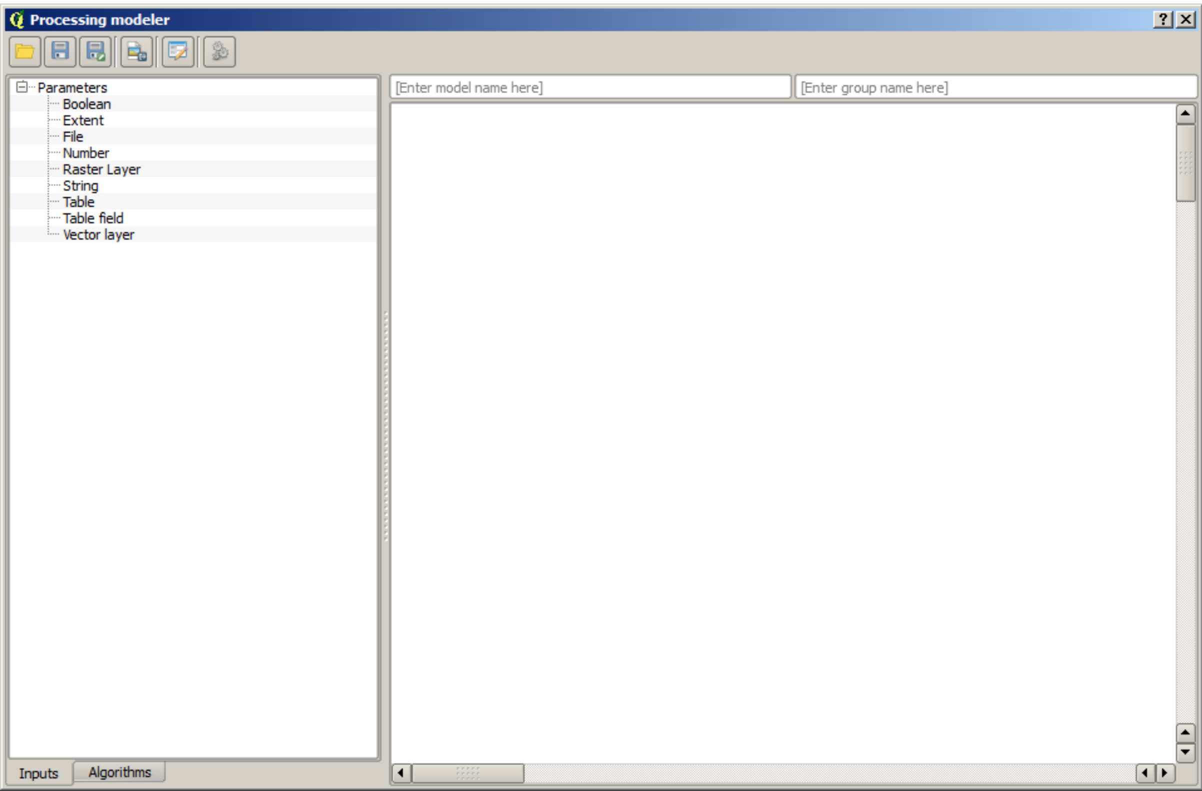

Figura 17.16: Modeler

Creating a model involves two steps:

1. *Definition of necessary inputs*. These inputs will be added to the parameters window, so the user can set their values when executing the model. The model itself is an algorithm, so the parameters window is generated automatically as it happens with all the algorithms available in the processing framework.
2. *Definition of the workflow*. Using the input data of the model, the workflow is defined by adding algorithms and selecting how they use those inputs or the outputs generated by other algorithms already in the model.

17.3.1 Definition of inputs

The first step to create a model is to define the inputs it needs. The following elements are found in the *Inputs* tab on the left side of the modeler window:

- Raster layer
- Vector layer
- String
- Table field
- Table
- Extent
- Number
- Boolean
- File

Double-clicking on any of these elements, a dialog is shown to define its characteristics. Depending on the parameter itself, the dialog may contain just one basic element (the description, which is what the user will see when executing the model) or more of them. For instance, when adding a numerical value, as can be seen in the next figure, apart from the description of the parameter, you have to set a default value and a range of valid values.

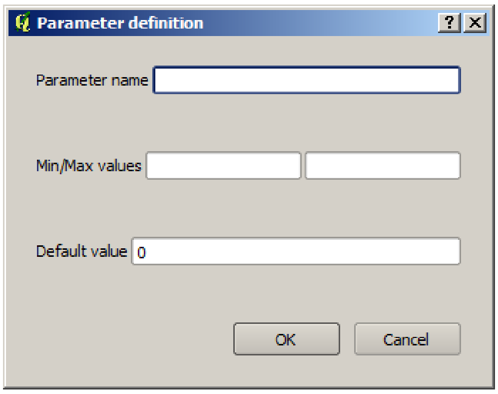

Figura 17.17: Model Parameters

For each added input, a new element is added to the modeler canvas.

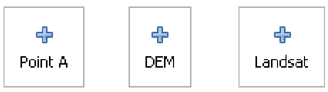

Figura 17.18: Model Parameters

You can also add inputs by dragging the input type from the list and dropping it in the modeler canvas, in the position where you want to place it.

17.3.2 Definition of the workflow

Once the inputs have been defined, it is time to define the algorithms to apply on them. Algorithms can be found in the *Algorithms* tab, grouped much in the same way as they are in the toolbox.

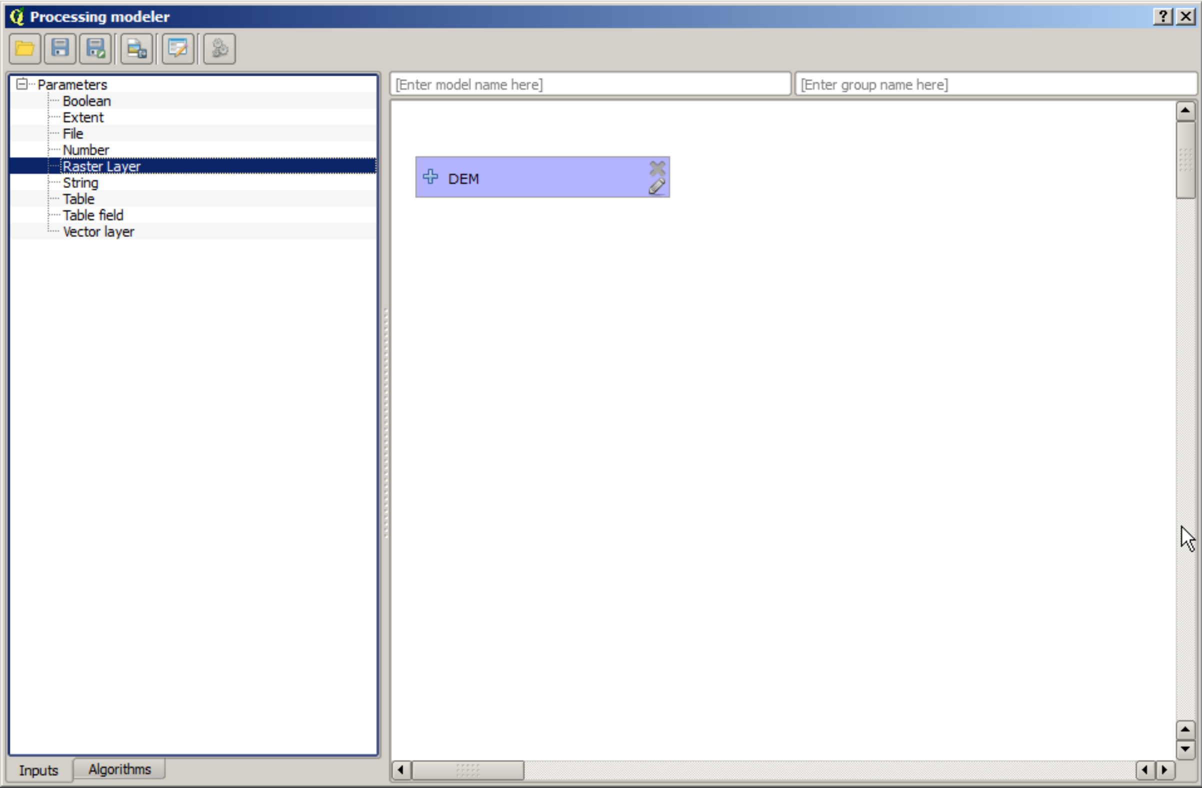

Figura 17.19: Model Parameters

The appearance of the toolbox has two modes here as well: simplified and advanced. However, there is no element to switch between views in the modeler, so you have to do it in the toolbox. The mode that is selected in the toolbox is the one that will be used for the list of algorithms in the modeler.

To add an algorithm to a model, double-click on its name or drag and drop it, just like it was done when adding inputs. An execution dialog will appear, with a content similar to the one found in the execution panel that is shown when executing the algorithm from the toolbox. The one shown next corresponds to the SAGA 'Convergence index' algorithm, the same example we saw in the section dedicated to the toolbox.

As you can see, some differences exist. Instead of the file output box that was used to set the file path for output layers and tables, a simple text box is used here. If the layer generated by the algorithm is just a temporary result that will be used as the input of another algorithm and should not be kept as a final result, just do not edit that text box. Typing anything in it means that the result is final and the text that you supply will be the description for the output, which will be the output the user will see when executing the model.

Selecting the value of each parameter is also a bit different, since there are important differences between the context of the modeler and that of the toolbox. Let's see how to introduce the values for each type of parameter.

- Layers (raster and vector) and tables. These are selected from a list, but in this case, the possible values are not the layers or tables currently loaded in QGIS, but the list of model inputs of the corresponding type, or other layers or tables generated by algorithms already added to the model.
- Numerical values. Literal values can be introduced directly in the text box. But this text box is also a list that can be used to select any of the numerical value inputs of the model. In this case, the parameter will take the value introduced by the user when executing the model.
- String. As in the case of numerical values, literal strings can be typed, or an input string can be selected.

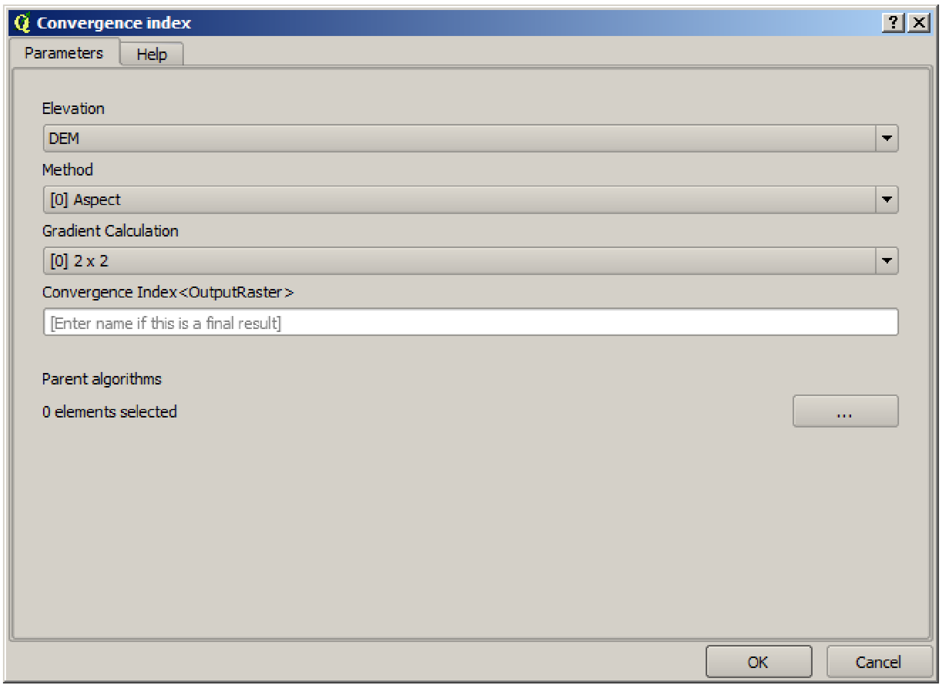

Figura 17.20: Model Parameters

- Table field. The fields of the parent table or layer cannot be known at design time, since they depend on the selection of the user each time the model is executed. To set the value for this parameter, type the name of a field directly in the text box, or use the list to select a table field input already added to the model. The validity of the selected field will be checked at run time.

In all cases, you will find an additional parameter named *Parent algorithms* that is not available when calling the algorithm from the toolbox. This parameter allows you to define the order in which algorithms are executed by explicitly defining one algorithm as a parent of the current one, which will force the parent algorithm to be executed before the current one.

When you use the output of a previous algorithm as the input of your algorithm, that implicitly sets the previous algorithm as parent of the current one (and places the corresponding arrow in the modeler canvas). However, in some cases an algorithm might depend on another one even if it does not use any output object from it (for instance, an algorithm that executes an SQL sentence on a PostGIS database and another one that imports a layer into that same database). In that case, just select the previous algorithm in the *Parent algorithms* parameter and the two steps will be executed in the correct order.

Once all the parameters have been assigned valid values, click on **[OK]** and the algorithm will be added to the canvas. It will be linked to all the other elements in the canvas, whether algorithms or inputs, that provide objects that are used as inputs for that algorithm.

Elements can be dragged to a different position within the canvas, to change the way the module structure is displayed and make it more clear and intuitive. Links between elements are updated automatically. You can zoom in and out by using the mouse wheel.

You can run your algorithm anytime by clicking on the **[Run]** button. However, in order to use the algorithm from the toolbox, it has to be saved and the modeler dialog closed, to allow the toolbox to refresh its contents.

17.3.3 Saving and loading models

Use the **[Save]** button to save the current model and the **[Open]** button to open any model previously saved. Models are saved with the `.model` extension. If the model has been previously saved from the modeler window, you will not be prompted for a filename. Since there is already a file associated with that model, the same file will be used for any subsequent saves.

Before saving a model, you have to enter a name and a group for it, using the text boxes in the upper part of the window.

Models saved on the `models` folder (the default folder when you are prompted for a filename to save the model) will appear in the toolbox in the corresponding branch. When the toolbox is invoked, it searches the `models` folder for files with the `.model` extension and loads the models they contain. Since a model is itself an algorithm, it can be added to the toolbox just like any other algorithm.

The models folder can be set from the processing configuration dialog, under the *Modeler* group.

Models loaded from the `models` folder appear not only in the toolbox, but also in the algorithms tree in the *Algorithms* tab of the modeler window. That means that you can incorporate a model as a part of a bigger model, just as you add any other algorithm.

In some cases, a model might not be loaded because not all the algorithms included in its workflow are available. If you have used a given algorithm as part of your model, it should be available (that is, it should appear in the toolbox) in order to load that model. Deactivating an algorithm provider in the processing configuration window renders all the algorithms in that provider unusable by the modeler, which might cause problems when loading models. Keep that in mind when you have trouble loading or executing models.

17.3.4 Editing a model

You can edit the model you are currently creating, redefining the workflow and the relationships between the algorithms and inputs that define the model itself.

If you right-click on an algorithm in the canvas representing the model, you will see a context menu like the one shown next:

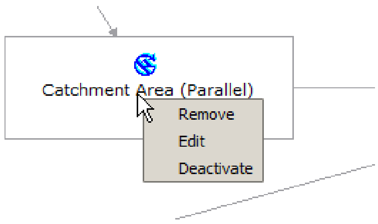

Figura 17.21: Modeler Right Click

Selecting the *Remove* option will cause the selected algorithm to be removed. An algorithm can be removed only if there are no other algorithms depending on it. That is, if no output from the algorithm is used in a different one as input. If you try to remove an algorithm that has others depending on it, a warning message like the one you can see below will be shown:

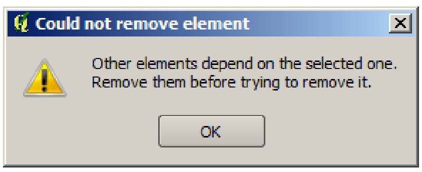

Figura 17.22: Cannot Delete Algorithm

Selecting the *Edit* option or simply double-clicking on the algorithm icon will show the parameters dialog of the algorithm, so you can change the inputs and parameter values. Not all input elements available in the model will appear in this case as available inputs. Layers or values generated at a more advanced step in the workflow defined by the model will not be available if they cause circular dependencies.

Select the new values and then click on the **[OK]** button as usual. The connections between the model elements will change accordingly in the modeler canvas.

17.3.5 Editing model help files and meta-information

You can document your models from the modeler itself. Just click on the **[Edit model help]** button and a dialog like the one shown next will appear.

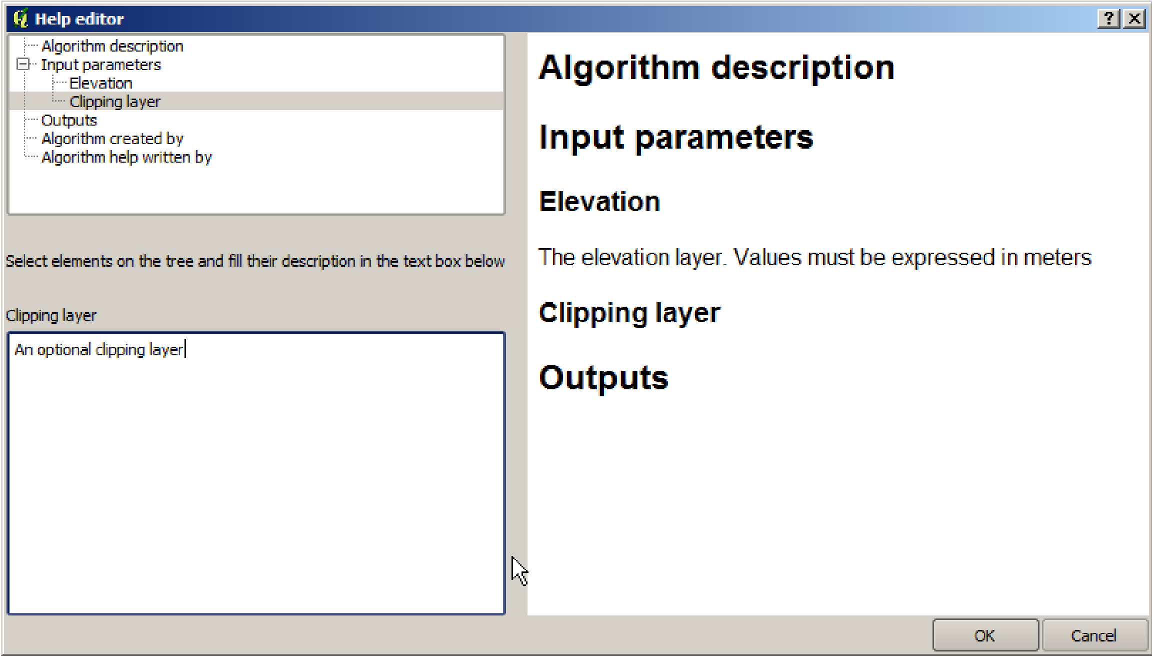

Figura 17.23: Help Edition

On the right-hand side, you will see a simple HTML page, created using the description of the input parameters and outputs of the algorithm, along with some additional items like a general description of the model or its author. The first time you open the help editor, all these descriptions are empty, but you can edit them using the elements on the left-hand side of the dialog. Select an element on the upper part and then write its description in the text box below.

Model help is saved in a file in the same folder as the model itself. You do not have to worry about saving it, since it is done automatically.

17.3.6 About available algorithms

You might notice that some algorithms that can be be executed from the toolbox do not appear in the list of available algorithms when you are designing a model. To be included in a model, an algorithm must have a correct semantic, so as to be properly linked to others in the workflow. If an algorithm does not have such a well-defined semantic (for instance, if the number of output layers cannot be known in advance), then it is not possible to use it within a model, and thus, it does not appear in the list of algorithms that you can find in the modeler dialog.

Additionally, you will see some algorithms in the modeler that are not found in the toolbox. These algorithms are meant to be used exclusively as part of a model, and they are of no interest in a different context. The 'Calculator' algorithm is an example of that. It is just a simple arithmetic calculator that you can use to modify numerical values (entered by the user or generated by some other algorithm). This tool is really useful within a model, but outside of that context, it doesn't make too much sense.

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17.4 La interfaz de procesamiento por lotes

17.4.1 Introducción

Todos los algoritmos (incluyendo modelos) se pueden ejecutar como un proceso por lotes. Es decir, que se pueden ejecutar utilizando no sólo un único conjunto de insumos, sino varios de ellos y ejecutar el algoritmo tantas veces sea necesario. Esto es útil al procesar grandes cantidades de datos, ya que no es necesario poner en marcha el algoritmo muchas veces desde la caja de herramientas.

Para ejecutar un algoritmo como un proceso por lotes, haga clic en su nombre en la caja de herramientas y seleccionar la opción *Ejecutar como proceso por lotes* en el menú emergente que aparecerá.

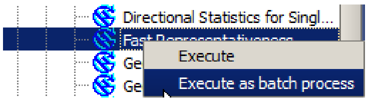


Figura 17.24: Haga clic derecho en Procesamiento por lotes

17.4.2 La tabla de parámetros

La ejecución de un proceso por lotes es similar a la realización de una sola ejecución de un algoritmo. Los valores de los parámetros tienen que ser definidos, pero en este caso no sólo necesitan un valor único para cada parámetro, sino un conjunto de ellos en su lugar, una por cada vez que el algoritmo tiene que ser ejecutado. Los valores se introducen mediante una tabla como la que se muestra a continuación.

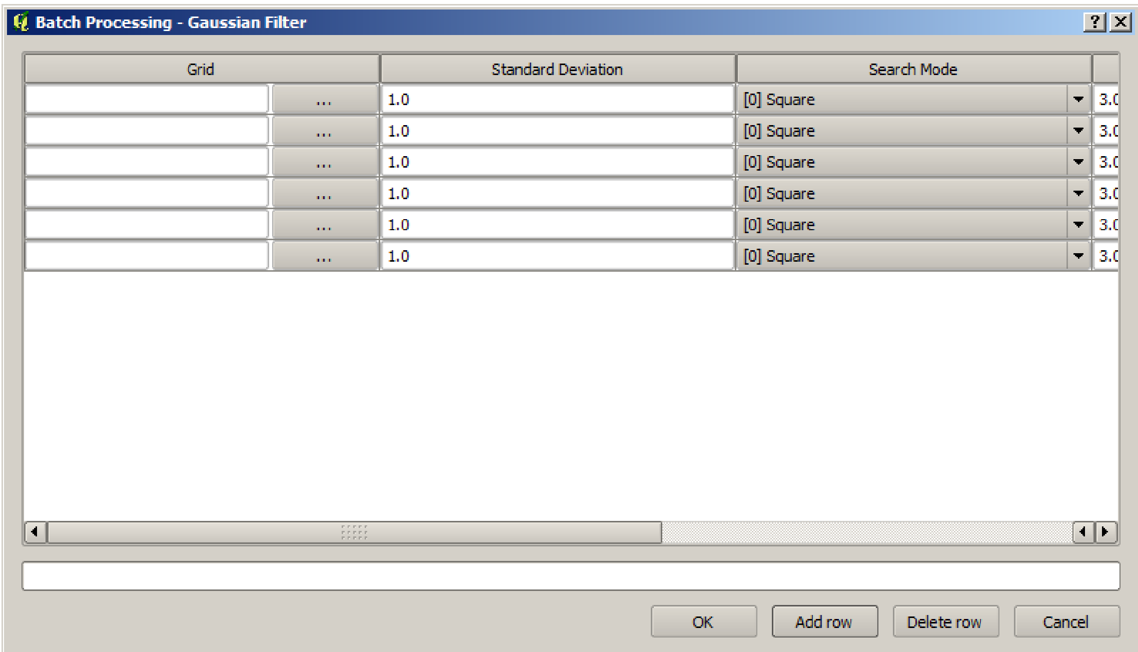


Figura 17.25: Procesamiento por lotes

Cada línea de esta tabla representa una sola ejecución del algoritmo, y cada celda contiene el valor de uno de los parámetros. Es similar al diálogo de los parámetros que se ve cuando se ejecuta un algoritmo de la caja de herramientas, pero con una disposición diferente.

Por defecto, la tabla contiene sólo dos filas. Puede agregar o quitar filas utilizando los botones de la parte inferior de la ventana.

Una vez que el tamaño de la tabla se ha establecido, este tiene que ser llenado con los valores deseados.

17.4.3 Llenado de la tabla de parámetros

Para la mayoría de los parámetros, establecen el valor es trivial. Sólo tienes que escribir el valor o seleccionarlo de la lista de opciones disponibles, dependiendo del tipo de parámetro.

Las principales diferencias se encuentran en parámetros que representan capas o tablas, y para las rutas de archivos de salida. En cuanto a las capas de entrada y tablas, cuando un algoritmo se ejecuta como parte de un proceso por lotes, los objetos de datos de entrada se toman directamente de los archivos, y no desde el conjunto de ellos ya abiertos en QGIS. Por esta razón, cualquier algoritmo puede ser ejecutado como un proceso por lotes, incluso si no hay objetos de datos en absoluto y el algoritmo no se puede ejecutar desde la caja de herramientas.

Los nombres de archivo para los objetos de datos de entrada se introducen escribiendo directamente o, más convenientemente, al hacer clic en el botón ... en la parte derecha de la celda, que muestra un diálogo típico de selección de archivos. Múltiples archivos se pueden seleccionar a la vez. Si el parámetro de entrada representa un solo objeto de datos y varios archivos se seleccionan, cada uno de ellos serán puestos en una fila separada, añadiendo otras nuevas si es necesario. Si el parámetro representa una entrada múltiple, se añadirán todos los archivos seleccionados a una sola celda, separados por punto y coma (`;`).

Los objetos de datos de salida siempre se guardan en un archivo y, a diferencia de cuando se ejecuta un algoritmo de la caja de herramientas, guardar en un archivo temporal no está permitido. Puede escribir el nombre directamente o utilizar el diálogo de selector de archivos que aparece al hacer clic en el botón que lo acompaña.

Una ves que seleccione el archivo, un nuevo diálogo se mostrará para permitir la terminación automática de otras celdas en la misma columna (mismo parámetro).

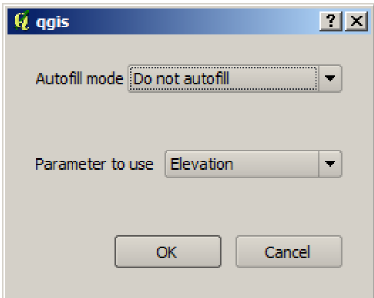
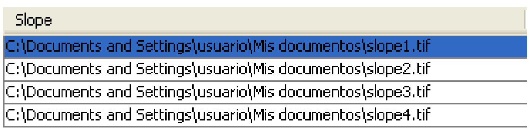


Figura 17.26: Guardar Procesamiento por lotes

Si se selecciona el valor por defecto (‘No autocompletar’), se acaba de poner el nombre del archivo seleccionado en la celda seleccionada de la tabla de parámetros. Si se selecciona cualquiera de las otras opciones, todas las celdas debajo de la seleccionada será automáticamente llenado basado en un criterio definido. De esta manera, es mucho más fácil llenar la tabla, y el proceso por lotes se puede definir con menos esfuerzo.

El llenado automático puede hacerse por simple adición de los números correlativos a la ruta del archivo seleccionado, o al añadir el valor de otro campo en la misma fila. Esto es particularmente útil para nombrar a los objetos de datos de salida de acuerdo con los de entrada.



Slope
C:\Documents and Settings\usuario\Mis documentos\slope1.tif
C:\Documents and Settings\usuario\Mis documentos\slope2.tif
C:\Documents and Settings\usuario\Mis documentos\slope3.tif
C:\Documents and Settings\usuario\Mis documentos\slope4.tif

Figura 17.27: Ruta de archivo de procesamiento por lotes

17.4.4 Ejecutar el proceso por lotes

Para ejecutar el proceso por lotes una vez que haya introducido todos los valores necesarios, simplemente haga clic en **[Aceptar]**. El progreso de la tarea por lotes global se mostrará en la barra de progreso en la parte inferior del diálogo

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17.5 Utilizar algoritmos de procesamiento desde la consola

The console allows advanced users to increase their productivity and perform complex operations that cannot be performed using any of the other GUI elements of the processing framework. Models involving several algorithms can be defined using the command-line interface, and additional operations such as loops and conditional sentences can be added to create more flexible and powerful workflows.

There is not a proccesing console in QGIS, but all processing commands are available instead from the QGIS built-in Python console. That means that you can incorporate those commands into your console work and connect processing algorithms to all the other features (including methods from the QGIS API) available from there.

The code that you can execute from the Python console, even if it does not call any specific processing method, can be converted into a new algorithm that you can later call from the toolbox, the graphical modeler or any other component, just like you do with any other algorithm. In fact, some algorithms that you can find in the toolbox are simple scripts.

In this section, we will see how to use processing algorithms from the QGIS Python console, and also how to write algorithms using Python.

17.5.1 Invocando algoritmos desde la consola de Python

The first thing you have to do is to import the processing functions with the following line:

```
>>> import processing
```

Now, there is basically just one (interesting) thing you can do with that from the console: execute an algorithm. That is done using the `runalg()` method, which takes the name of the algorithm to execute as its first parameter, and then a variable number of additional parameters depending on the requirements of the algorithm. So the first thing you need to know is the name of the algorithm to execute. That is not the name you see in the toolbox, but rather a unique command–line name. To find the right name for your algorithm, you can use the `algslist()` method. Type the following line in your console:

```
>>> processing.alglist()
```

Veras algo como esto:

```
Accumulated Cost (Anisotropic)---------------->saga:accumulatedcost(anisotropic)
Accumulated Cost (Isotropic)------------------>saga:accumulatedcost(isotropic)
Add Coordinates to points--------------------->saga:addcoordinatestopoints
Add Grid Values to Points--------------------->saga:addgridvaluestopoints
Add Grid Values to Shapes--------------------->saga:addgridvaluestoshapes
Add Polygon Attributes to Points-------------->saga:addpolygonattributestopoints
Aggregate------------------------------------->saga:aggregate
Aggregate Point Observations------------------>saga:aggregatepointobservations
Aggregation Index----------------------------->saga:aggregationindex
Analytical Hierarchy Process------------------>saga:analyticalhierarchyprocess
Analytical Hillshading------------------------>saga:analyticalhillshading
Average With Mask 1--------------------------->saga:averagewithmask1
Average With Mask 2--------------------------->saga:averagewithmask2
Average With Thereshold 1--------------------->saga:averagewiththereshold1
Average With Thereshold 2--------------------->saga:averagewiththereshold2
Average With Thereshold 3--------------------->saga:averagewiththereshold3
B-Spline Approximation------------------------>saga:b-splineapproximation
...
```

That's a list of all the available algorithms, alphabetically ordered, along with their corresponding command-line names.

You can use a string as a parameter for this method. Instead of returning the full list of algorithms, it will only display those that include that string. If, for instance, you are looking for an algorithm to calculate slope from a DEM, type `alglist("slope")` to get the following result:

```
DTM Filter (slope-based)---------------------->saga:dtmfilter(slope-based)
Downslope Distance Gradient------------------->saga:downslopedistancegradient
Relative Heights and Slope Positions---------->saga:relativeheightsandslopepositions
Slope Length---------------------------------->saga:slopelength
Slope, Aspect, Curvature---------------------->saga:slopeaspectcurvature
Upslope Area---------------------------------->saga:upslopearea
Vegetation Index[slope based]----------------->saga:vegetationindex[slopebased]
```

This result might change depending on the algorithms you have available.

It is easier now to find the algorithm you are looking for and its command-line name, in this case `saga:slopeaspectcurvature`.

Once you know the command-line name of the algorithm, the next thing to do is to determine the right syntax to execute it. That means knowing which parameters are needed and the order in which they have to be passed when calling the `runalg()` method. There is a method to describe an algorithm in detail, which can be used to get a list of the parameters that an algorithm requires and the outputs that it will generate. To get this information, you can use the `alghelp(name_of_the_algorithm)` method. Use the command-line name of the algorithm, not the full descriptive name.

Calling the method with `saga:slopeaspectcurvature` as parameter, you get the following description:

```
>>> processing.alghelp("saga:slopeaspectcurvature")
ALGORITHM: Slope, Aspect, Curvature
   ELEVATION <ParameterRaster>
   METHOD <ParameterSelection>
   SLOPE <OutputRaster>
   ASPECT <OutputRaster>
   CURV <OutputRaster>
   HCURV <OutputRaster>
   VCURV <OutputRaster>
```

Now you have everything you need to run any algorithm. As we have already mentioned, there is only one single command to execute algorithms: `runalg()`. Its syntax is as follows:

```
>>> processing.runalg(name_of_the_algorithm, param1, param2, ..., paramN,
         Output1, Output2, ..., OutputN)
```

The list of parameters and outputs to add depends on the algorithm you want to run, and is exactly the list that the `alghelp()` method gives you, in the same order as shown.

Depending on the type of parameter, values are introduced differently. The next list gives a quick review of how to introduce values for each type of input parameter:

- Raster Layer, Vector Layer or Table. Simply use a string with the name that identifies the data object to use (the name it has in the QGIS Table of Contents) or a filename (if the corresponding layer is not opened, it will be opened but not added to the map canvas). If you have an instance of a QGIS object representing the layer, you can also pass it as parameter. If the input is optional and you do not want to use any data object, use `None`.
- Selection. If an algorithm has a selection parameter, the value of that parameter should be entered using an integer value. To know the available options, you can use the `algoptions()` command, as shown in the following example:

  ```
  >>> processing.algoptions("saga:slopeaspectcurvature")
  METHOD(Method)
      0 - [0] Maximum Slope (Travis et al. 1975)
      1 - [1] Maximum Triangle Slope (Tarboton 1997)
      2 - [2] Least Squares Fitted Plane (Horn 1981, Costa-Cabral & Burgess 1996)
      3 - [3] Fit 2.Degree Polynom (Bauer, Rohdenburg, Bork 1985)
      4 - [4] Fit 2.Degree Polynom (Heerdegen & Beran 1982)
  ```

```
5 - [5] Fit 2.Degree Polynom (Zevenbergen & Thorne 1987)
6 - [6] Fit 3.Degree Polynom (Haralick 1983)
```

In this case, the algorithm has one such parameter, with seven options. Notice that ordering is zero-based.

- Multiple input. The value is a string with input descriptors separated by semicolons (`;`). As in the case of single layers or tables, each input descriptor can be the data object name, or its file path.
- Table Field from XXX. Use a string with the name of the field to use. This parameter is case-sensitive.
- Fixed Table. Type the list of all table values separated by commas (`,`) and enclosed between quotes (`"`). Values start on the upper row and go from left to right. You can also use a 2-D array of values representing the table.
- CRS. Enter the EPSG code number of the desired CRS.
- Extent. You must use a string with `xmin`, `xmax`, `ymin` and `ymax` values separated by commas (`,`).

Boolean, file, string and numerical parameters do not need any additional explanations.

Input parameters such as strings, booleans, or numerical values have default values. To use them, specify `None` in the corresponding parameter entry.

For output data objects, type the file path to be used to save it, just as it is done from the toolbox. If you want to save the result to a temporary file, use `None`. The extension of the file determines the file format. If you enter a file extension not supported by the algorithm, the default file format for that output type will be used, and its corresponding extension appended to the given file path.

Unlike when an algorithm is executed from the toolbox, outputs are not added to the map canvas if you execute that same algorithm from the Python console. If you want to add an output to the map canvas, you have to do it yourself after running the algorithm. To do so, you can use QGIS API commands, or, even easier, use one of the handy methods provided for such tasks.

The `runalg` method returns a dictionary with the output names (the ones shown in the algorithm description) as keys and the file paths of those outputs as values. You can load those layers by passing the corresponding file paths to the `load()` method.

17.5.2 Funciones adicionales para manipular datos

Apart from the functions used to call algorithms, importing the `processing` package will also import some additional functions that make it easier to work with data, particularly vector data. They are just convenience functions that wrap some functionality from the QGIS API, usually with a less complex syntax. These functions should be used when developing new algorithms, as they make it easier to operate with input data.

Below is a list of some of these commands. More information can be found in the classes under the `processing/tools` package, and also in the example scripts provided with QGIS.

- `getObject(obj)`: Returns a QGIS object (a layer or table) from the passed object, which can be a filename or the name of the object in the QGIS Table of Contents.
- `values(layer, fields)`: Returns the values in the attributes table of a vector layer, for the passed fields. Fields can be passed as field names or as zero-based field indices. Returns a dict of lists, with the passed field identifiers as keys. It considers the existing selection.
- `features(layer)`: Returns an iterator over the features of a vector layer, considering the existing selection.
- `uniqueValues(layer, field)`: Returns a list of unique values for a given attribute. Attributes can be passed as a field name or a zero-based field index. It considers the existing selection.

17.5.3 Crear scripts y ejecurarlos desde le Caja de Herramientas

You can create your own algorithms by writing the corresponding Python code and adding a few extra lines to supply additional information needed to define the semantics of the algorithm. You can find a *Create new script* menu under the *Tools* group in the *Script* algorithms block of the toolbox. Double-click on it to open the script editing dialog. That's where you should type your code. Saving the script from there in the `scripts` folder (the default folder when you open the save file dialog) with `.py` extension will automatically create the corresponding algorithm.

The name of the algorithm (the one you will see in the toolbox) is created from the filename, removing its extension and replacing low hyphens with blank spaces.

Let's have a look at the following code, which calculates the Topographic Wetness Index (TWI) directly from a DEM.

```
##dem=raster
##twi=output
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea(mass-fluxmethod)", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindex(twi), ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

As you can see, the calculation involves three algorithms, all of them coming from SAGA. The last one calculates the TWI, but it needs a slope layer and a flow accumulation layer. We do not have these layers, but since we have the DEM, we can calculate them by calling the corresponding SAGA algorithms.

The part of the code where this processing takes place is not difficult to understand if you have read the previous sections in this chapter. The first lines, however, need some additional explanation. They provide the information that is needed to turn your code into an algorithm that can be run from any of the GUI components, like the toolbox or the graphical modeler.

These lines start with a double Python comment symbol (`##`) and have the following structure:

```
[parameter_name]=[parameter_type] [optional_values]
```

Here is a list of all the parameter types that are supported in processing scripts, their syntax and some examples.

- `raster`. A raster layer.
- `vector`. Una capa vectorial.
- `table`. Una tabla.
- `number`. A numerical value. A default value must be provided. For instance, `depth=number 2.4`.
- `string`. A text string. As in the case of numerical values, a default value must be added. For instance, `name=string Victor`.
- `boolean`. A boolean value. Add `True` or `False` after it to set the default value. For example, `verbose=boolean True`.
- `multiple raster`. A set of input raster layers.
- `multiple vector`. A set of input vector layers.
- `field`. A field in the attributes table of a vector layer. The name of the layer has to be added after the `field` tag. For instance, if you have declared a vector input with `mylayer=vector`, you could use `myfield=field mylayer` to add a field from that layer as parameter.
- `folder`. Una carpeta.
- `file`. A nombre de archivo.

The parameter name is the name that will be shown to the user when executing the algorithm, and also the variable name to use in the script code. The value entered by the user for that parameter will be assigned to a variable with that name.

When showing the name of the parameter to the user, the name will be edited to improve its appearance, replacing low hyphens with spaces. So, for instance, if you want the user to see a parameter named `A numerical value`, you can use the variable name `A_numerical_value`.

Layers and table values are strings containing the file path of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the file paths to all selected object, separated by semicolons (`;`).

Outputs are defined in a similar manner, using the following tags:

- `output raster`
- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`

The value assigned to the output variables is always a string with a file path. It will correspond to a temporary file path in case the user has not entered any output filename.

When you declare an output, the algorithm will try to add it to QGIS once it is finished. That is why, although the `runalg()` method does not load the layers it produces, the final TWI layer will be loaded (using the case of our previous example), since it is saved to the file entered by the user, which is the value of the corresponding output.

Do not use the `load()` method in your script algorithms, just when working with the console line. If a layer is created as output of an algorithm, it should be declared as such. Otherwise, you will not be able to properly use the algorithm in the modeler, since its syntax (as defined by the tags explained above) will not match what the algorithm really creates.

Hidden outputs (numbers and strings) do not have a value. Instead, you have to assign a value to them. To do so, just set the value of a variable with the name you used to declare that output. For instance, if you have used this declaration,

```
##average=output number
```

the following line will set the value of the output to 5:

```
average = 5
```

In addition to the tags for parameters and outputs, you can also define the group under which the algorithm will be shown, using the `group` tag.

If your algorithm takes a long time to process, it is a good idea to inform the user. You have a global named `progress` available, with two possible methods: `setText(text)` and `setPercentage(percent)` to modify the progress text and the progress bar.

Several examples are provided. Please check them to see real examples of how to create algorithms using the processing framework classes. You can right-click on any script algorithm and select *Edit script* to edit its code or just to see it.

17.5.4 Documenting your scripts

As in the case of models, you can create additional documentation for your scripts, to explain what they do and how to use them. In the script editing dialog, you will find an **[Edit script help]** button. Click on it and it will take you to the help editing dialog. Check the section about the graphical modeler to know more about this dialog and how to use it.

Help files are saved in the same folder as the script itself, adding the `.help` extension to the filename. Notice that you can edit your script's help before saving the script for the first time. If you later close the script editing dialog without saving the script (i.e., you discard it), the help content you wrote will be lost. If your script was already saved and is associated to a filename, saving the help content is done automatically.

17.5.5 Pre- and post-execution script hooks

Scripts can also be used to set pre- and post-execution hooks that are run before and after an algorithm is run. This can be used to automate tasks that should be performed whenever an algorithm is executed.

The syntax is identical to the syntax explained above, but an additional global variable named `alg` is available, representing the algorithm that has just been (or is about to be) executed.

In the *General* group of the processing configuration dialog, you will find two entries named *Pre-execution script file* and *Post-execution script file* where the filename of the scripts to be run in each case can be entered.

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17.6 El administrador del historial

17.6.1 El historial del procesamiento

Cada vez que ejecutas un algoritmo, la información acerca del proceso es almacenado en el administrador de la historia. Junto con los parámetros usados, la fecha y hora de la ejecución también se guardan.

De esta manera, es fácil rastrear y controlar todo el trabajo que se ha desarrollado usando la caja de herramientas de procesado, y fácil reproducirlo.

El administrador del historial es un conjunto de entradas de registros agrupados de acuerdo a su fecha de ejecución, por lo que es más fácil encontrar información sobre un algoritmo ejecutado en cualquier momento en particular.

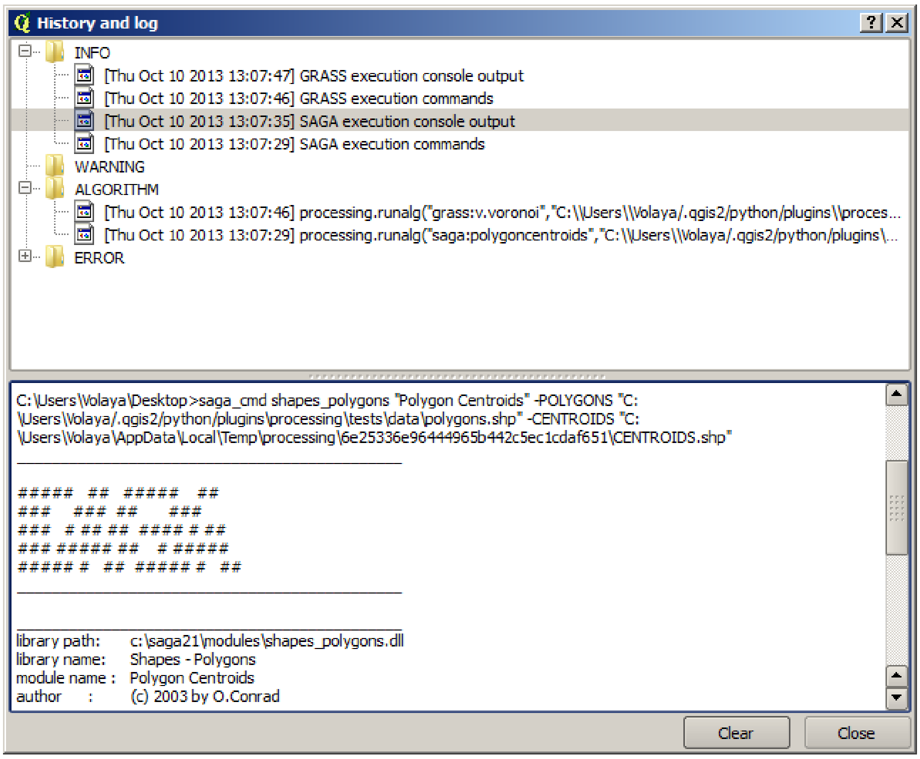


Figura 17.28: Historial

Información del proceso se mantiene como una expresión de línea de comandos, incluso si el algoritmo fue lanzado desde la caja de herramientas. Esto hace que sea también útil para aquellos que están aprendiendo cómo utilizar la interfaz de línea de comandos, ya que se pueden llamar un algoritmo usando la caja de herramientas y compruebe el administrados del historial para ver cómo ese mismo algoritmo podría ser llamado desde la línea de comandos.

Parte de la navegación por las entradas en el registro, también puede volver a ejecutar los procesos al hacer doble clic en la entrada correspondiente.

Junto con el registro de algoritmos ejecutados, la caja de herramientas de procesado se comunica con el usuario por medio de los otros grupos del registro, a saber *Errors*, *WARNING* y *INFO*. En caso de que algo no este funcionando adecuadamente, echar un vistazo a *ERROR* que pueden ayudarle a ver lo que está sucediendo. Si se pone en contacto con un desarrollador para informar de un bug o error, la información en ese grupo va a ser muy útil para él o ella para averiguar lo que está mal.

Los algoritmos de terceros se ejecutan normalmente llamando su interfaz de linea de comandos, que se comunica con el usuario vía consola. Aunque la consola no se muestra, una copia completa de la misma se almacena en el grupo *INFO* cada vez que se ejecuta uno de estos algoritmos. Si, por ejemplo, se tienen problemas al ejecutar el algoritmo de SAGA, busque una entrada denominada 'SAGA execution console output' para comprobar todos los mensajes generados por SAGA y tratar de localizar donde esta el problema.

Algunos algoritmos, incluso pueden producir un resultado con los datos de entrada dados , puede añadir comentarios o información adicional para el bloque *WARNING* si detectan problemas potenciales con los datos, con el fin de advertirle. Asegúrese de revisar esos mensajes si se esta teniendo resultados inesperados.

17.7 Writing new Processing algorithms as python scripts

You can create your own algorithms by writing the corresponding Python code and adding a few extra lines to supply additional information needed to define the semantics of the algorithm. You can find a *Create new script* menu under the *Tools* group in the *Script* algorithms block of the toolbox. Double-click on it to open the script edition dialog. That's where you should type your code. Saving the script from there in the `scripts` folder (the default one when you open the save file dialog), with `.py` extension, will automatically create the corresponding algorithm.

The name of the algorithm (the one you will see in the toolbox) is created from the filename, removing its extension and replacing low hyphens with blank spaces.

Let's have the following code, which calculates the Topographic Wetness Index (TWI) directly from a DEM

```
##dem=raster
##twi=output raster
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindextwi, ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

As you can see, it involves 3 algorithms, all of them coming from SAGA. The last one of them calculates the TWI, but it needs a slope layer and a flow accumulation layer. We do not have these ones, but since we have the DEM, we can calculate them calling the corresponding SAGA algorithms.

The part of the code where this processing takes place is not difficult to understand if you have read the previous chapter. The first lines, however, need some additional explanation. They provide the information that is needed to turn your code into an algorithm that can be run from any of the GUI components, like the toolbox or the graphical modeler.

These lines start with a double Python comment symbol (`##`) and have the following structure

```
[parameter_name]=[parameter_type] [optional_values]
```

Here is a list of all the parameter types that are supported in processign scripts, their syntax and some examples.

- `raster`. A raster layer
- `vector`. A vector layer
- `table`. A table
- `number`. A numerical value. A default value must be provided. For instance, `depth=number 2.4`

- `string`. A text string. As in the case of numerical values, a default value must be added. For instance, `name=string Victor`
- `longstring`. Same as string, but a larger text box will be shown, so it is better suited for long strings, such as for a script expecting a small code snippet.
- `boolean`. A boolean value. Add `True` or `False` after it to set the default value. For example, `verbose=boolean True`.
- `multiple raster`. A set of input raster layers.
- `multiple vector`. A set of input vector layers.
- `field`. A field in the attributes table of a vector layer. The name of the layer has to be added after the `field` tag. For instance, if you have declared a vector input with `mylayer=vector`, you could use `myfield=field mylayer` to add a field from that layer as parameter.
- `folder`. A folder
- `file`. A filename
- `crs`. A Coordinate Reference System

The parameter name is the name that will be shown to the user when executing the algorithm, and also the variable name to use in the script code. The value entered by the user for that parameter will be assigned to a variable with that name.

When showing the name of the parameter to the user, the name will be edited it to improve its appearance, replacing low hyphens with spaces. So, for instance, if you want the user to see a parameter named `A numerical value`, you can use the variable name `A_numerical_value`.

Layers and tables values are strings containing the filepath of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the filepaths to all selected objects, separated by semicolons (`;`).

Outputs are defined in a similar manner, using the following tags:

- `output raster`
- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`
- `output extent`

The value assigned to the output variables is always a string with a filepath. It will correspond to a temporary filepath in case the user has not entered any output filename.

In addition to the tags for parameters and outputs, you can also define the group under which the algorithm will be shown, using the `group` tag.

The last tag that you can use in your script header is `##nomodeler`. Use that when you do not want your algorithm to be shown in the modeler window. This should be used for algorithms that do not have a clear syntax (for instance, if the number of layers to be created is not known in advance, at design time), which make them unsuitable for the graphical modeler

17.8 Handing data produced by the algorithm

When you declare an output representing a layer (raster, vector or table), the algorithm will try to add it to QGIS once it is finished. That is the reason why, although the `runalg()` method does not load the layers it produces, the final *TWI* layer will be loaded, since it is saved to the file entered by the user, which is the value of the corresponding output.

Do not use the `load()` method in your script algorithms, but just when working with the console line. If a layer is created as output of an algorithm, it should be declared as such. Otherwise, you will not be able to properly use the algorithm in the modeler, since its syntax (as defined by the tags explained above) will not match what the algorithm really creates.

Hidden outputs (numbers and strings) do not have a value. Instead, it is you who has to assign a value to them. To do so, just set the value of a variable with the name you used to declare that output. For instance, if you have used this declaration,

```
##average=output number
```

the following line will set the value of the output to 5:

```
average = 5
```

17.9 Communicating with the user

If your algorithm takes a long time to process, it is a good idea to inform the user. You have a global named `progress` available, with two available methods: `setText(text)` and `setPercentage(percent)` to modify the progress text and the progress bar.

If you have to provide some information to the user, not related to the progress of the algorithm, you can use the `setInfo(text)` method, also from the `progress` object.

If your script has some problem, the correct way of propagating it is to raise an exception of type `GeoAlgorithmExecutionException()`. You can pass a message as argument to the constructor of the exception. Processing will take care of handling it and communicating with the user, depending on where the algorithm is being executed from (toolbox, modeler, Python console...)

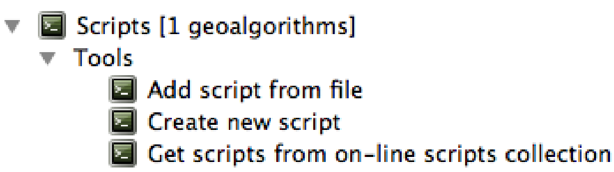
17.10 Documenting your scripts

As in the case of models, you can create additional documentation for your script, to explain what they do and how to use them. In the script editing dialog you will find a **[Edit script help]** button. Click on it and it will take you to the help editing dialog. Check the chapter about the graphical modeler to know more about this dialog and how to use it.

Help files are saved in the same folder as the script itself, adding the `.help` extension to the filename. Notice that you can edit your script's help before saving it for the first time. If you later close the script editing dialog without saving the script (i.e. you discard it), the help content you wrote will be lost. If your script was already saved and is associated to a filename, saving is done automatically.

17.11 Example scripts

Several examples are available in the on-line collection of scripts, which you can access by selecting the *Get script from on-line script collection* tool under the *Scripts/tools* entry in the toolbox.



Please, check them to see real examples of how to create algorithms using the processing framework classes. You can right-click on any script algorithm and select *Edit script* to edit its code or just to see it.

17.12 Best practices for writing script algorithms

Here's a quick summary of ideas to consider when creating your script algorithms and, epsecially, if you want to share with other QGIS users. Following these simple rules will ensure consistency across the different Processing elements such as the toolbox, the modeler or the batch processing interface.

- Do not load resulting layers. Let Processing handle your results and load your layers if needed.
- Always declare the outputs your algorithm creates. Avoid things such as decalring one output and then using the destination filename set for that output to create a collection of them. That will break the correct semantics of the algorithm and make it impossible to use it safely in the modeler. If you have to write an algorithm like that, make sure you add the `##nomodeler` tag.
- Do not show message boxes or use any GUI element from the script. If you want to communicate with the user, use the `setInfo()` method or throw an `GeoAlgorithmExecutionException`
- As a rule of thumb, do not forget that your agorithm might be executed in a context other than the Processing toolbox.

17.13 Pre- and post-execution script hooks

Scripts can also be used to set pre- and post-execution hooks that are run before and after an algorithm is run. This can be used to automate tasks that should be performed whenever an algorithm is executed.

The syntax is identical to the syntax explained above, but an additional global variable named `alg` is available, representing the algorithm that has just been (or is about to be) executed.

In the *General* group of the processing config dialog you will find two entries named *Pre-execution script file* and *Post-execution script file* where the filename of the scripts to be run in each case can be entered.

.

17.14 Configurar aplicaciones externas

El entorno de procesamiento se puede extender el uso de aplicaciones adicionales. Actualmente, SAGA, GRASS, OTB (Orfeo Toolbox) y R son reconocidos, junto con algunas otras aplicaciones de línea de comandos que proporcionan funcionalidades de análisis de datos espaciales. Los algoritmos que dependen de una aplicación externa son administrados por su propio proveedor de algoritmos.

Esta sección le mostrará cómo configurar el entorno de procesamiento para incluir estas aplicaciones adicionales, y le explicará algunas de las características particulares de los algoritmos basados en ellos. Una vez que haya configurado correctamente el sistema, usted será capaz de ejecutar algoritmos externos de cualquier componente, como la caja de herramientas o el modelador gráfico, tal como lo hace con cualquier otro geoalgoritmo.

Por defecto, todos los algoritmos que dependen de aplicaciones externas no incluidas con QGIS no estarán habilitados. Pueden ser habilitados en el diálogo de configuración. Asegúrese de que la aplicación de la que depende esté instalada en el sistema. En caso de no hacerlo, los algoritmos aparecerán en la Caja de Herramientas, pero se emitirá un mensaje de error cuando se intente hacer uso de ellos.

Esto se debe a las descripciones de algoritmos (necesarios para crear el diálogo de parámetros y proporcionar la información necesaria sobre el algoritmo) no se incluyen con cada aplicación, pero con QGIS en lugar de. Es decir, que son parte de QGIS, por lo que ellos están en su instalación, incluso si no ha instalado ningún otro software. La ejecución del algoritmo, sin embargo, necesita de los binarios de la aplicación para ser instalada en su sistema.

17.14.1 Aclaración para los usuarios de Windows

Si no es un usuario avanzado y está ejecutando QGIS en Windows, podría no estar interesado en leer el resto de este capítulo. Asegure que la instalación de QGIS en su sistema utiliza el instalador independiente. Esto instalará automáticamente SAGA, GRASS y OTB en su sistema y configurarlos para que se pueden ejecutar desde QGIS. Todos los algoritmos de la vista simplificada de la caja de herramientas estarán listas para ser ejecutado sin necesidad de alguna configuración adicional. Si va a instalar mediante la aplicación OSGeo4W, asegúrese de seleccionar SAGA, OTB para la instalación.

Si quiere saber más sobre cómo funcionan estos proveedores, o si quiere utilizar algún algoritmo que no se encuentre en la Caja de Herramientas simplificada (como los scripts de R), siga leyendo.

17.14.2 Aclaración respecto a los formatos de archivos

Cuando se utiliza un software externo, la apertura de un archivo en QGIS no significa que se puede abrir y procesar bien en ese otro software. En la mayoría de los casos, otro software puede leer lo que ha abierto en QGIS, pero en algunos casos, eso puede no ser cierto. Al utilizar las bases de datos o formatos de archivo poco comunes, ya sea para capas raster o vectoriales, podrían surgir problemas. Si eso sucede, trate de utilizar formatos de archivo conocidos que este seguro que ambos programas entiendan, y comprobar la salida de la consola (en el historico y el diálogo de registro) para saber más acerca de lo que va mal.

Utilizar capas raster de GRASS es, por ejemplo, uno de los casos en los que pueden existir problemas y no completarse el trabajo si se invoca un algoritmo externo que use dicha capa como entrada. Por este motivo, estas capas no aparecerán como disponibles para los algoritmos.

Debe, sin embargo, no encontrar ningún problema en absoluto con las capas vectoriales, ya que QGIS convierte automáticamente desde el formato de archivo original a uno aceptado por la aplicación externa antes de pasar la capa a la misma. Esto suma tiempo de procesamiento adicional, que podría ser significativo si la capa tiene un tamaño grande, así que no se sorprenda si se necesita más tiempo para procesar una capa de una conexión de DB que lo hace para procesar una de un tamaño similar almacenada en un archivo de shape.

Los proveedores que no utilizan aplicaciones externas pueden procesar cualquier capa que se pueda abrir en QGIS, ya que son abiertas para el análisis mediante QGIS.

En cuanto a formatos de salida, todos los formatos reconocidos por QGIS como salida se pueden utilizar, tanto para capas ráster y vectoriales. Algunos proveedores no admiten determinados formatos, pero todos pueden exportar a los formatos de capa raster comunes que luego pueden transformarse con QGIS automáticamente. Al igual que en el caso de las capas de entrada, si es necesaria esta conversión, podría aumentar el tiempo de procesamiento.

Si la extensión del nombre de archivo especificado cuando se llama a un algoritmo no coincide con la extensión de cualquiera de los formatos reconocidos por QGIS, entonces se agregará un sufijo para establecer un formato predeterminado. En el caso de las capas ráster, la extensión `.tif` se usa, mientras que `.shp` se utiliza para las capas vectoriales.

17.14.3 Nota referente a las seleccion de capas vectoriales

External applications may also be made aware of the selections that exist in vector layers within QGIS. However, that requires rewriting all input vector layers, just as if they were originally in a format not supported by the external application. Only when no selection exists, or the *Use only selected features* option is not enabled in the processing general configuration, can a layer be directly passed to an external application.

En otros casos sólo es necesario exportar un conjunto de características seleccionadas, lo que hará que los tiempos de ejecución sean mayores.

SAGA

Los algoritmos de SAGA pueden ser ejecutados desde QGIS si se tiene SAGA instalado en su sistema y se puede configurar correctamente el entorno de procesamiento para que pueda encontrar ejecutables SAGA. En particular, se necesita la línea de comandos SAGA ejecutable para ejecutar algoritmos SAGA.

Si ejecuta Windows, tanto el instalador estándar como el de OSGeo4W incluyen SAGA junto con QGIS y la ruta se configura automáticamente, por lo qu eno es necesrio hacer nada más.

If you have installed SAGA yourself (remember, you need version 2.1), the path to the SAGA executable must be configured. To do this, open the configuration dialog. In the *SAGA* block, you will find a setting named *SAGA Folder*. Enter the path to the folder where SAGA is installed. Close the configuration dialog, and now you are ready to run SAGA algorithms from QGIS.

If you are running Linux, SAGA binaries are not included with SEXTANTE, so you have to download and install the software yourself. Please check the SAGA website for more information. SAGA 2.1 is needed.

In this case, there is no need to configure the path to the SAGA executable, and you will not see those folders. Instead, you must make sure that SAGA is properly installed and its folder is added to the PATH environment variable. Just open a console and type `saga_cmd` to check that the system can find where the SAGA binaries are located.

17.14.4 Sobre las limitaciones del sistema de cuadrícula de SAGA

Most SAGA algorithms that require several input raster layers require them to have the same grid system. That is, they must cover the same geographic area and have the same cell size, so their corresponding grids match. When calling SAGA algorithms from QGIS, you can use any layer, regardless of its cell size and extent. When multiple raster layers are used as input for a SAGA algorithm, QGIS resamples them to a common grid system and then passes them to SAGA (unless the SAGA algorithm can operate with layers from different grid systems).

The definition of that common grid system is controlled by the user, and you will find several parameters in the SAGA group of the settings window to do so. There are two ways of setting the target grid system:

- Setting it manually. You define the extent by setting the values of the following parameters:
  - *Resampling min X*
  - *Resampling max X*
  - *Resampling min Y*
  - *Resampling max Y*
  - *Resampling cellsize*

  Nótese que QGIS volverá a muestrear las capas de entrada en dicha medida, incluso si no se solapan con ésta.

- Setting it automatically from input layers. To select this option, just check the *Use min covering grid system for resampling* option. All the other settings will be ignored and the minimum extent that covers all the input layers will be used. The cell size of the target layer is the maximum of all cell sizes of the input layers.

Para los algoritmos que no utilizan múltiples capas raster, o para aquellos que no necesitan un único sistema de cuadrícula de entrada, no se realizará un remuestreo antes de invocar SAG y dichos parámetros no son utilizados.

17.14.5 Limitaciones para las capas multibanda

Unlike QGIS, SAGA has no support for multi-band layers. If you want to use a multiband layer (such as an RGB or multispectral image), you first have to split it into single-banded images. To do so, you can use the 'SAGA/Grid - Tools/Split RGB image' algorithm (which creates three images from an RGB image) or the 'SAGA/Grid - Tools/Extract band' algorithm (to extract a single band).

17.14.6 Limitaciones en el tamaño de celda

SAGA assumes that raster layers have the same cell size in the X and Y axis. If you are working with a layer with different values for horizontal and vertical cell size, you might get unexpected results. In this case, a warning will be added to the processing log, indicating that an input layer might not be suitable to be processed by SAGA.

17.14.7 Registro

When QGIS calls SAGA, it does so using its command-line interface, thus passing a set of commands to perform all the required operations. SAGA shows its progress by writing information to the console, which includes the percentage of processing already done, along with additional content. This output is filtered and used to update the progress bar while the algorithm is running.

Both the commands sent by QGIS and the additional information printed by SAGA can be logged along with other processing log messages, and you might find them useful to track in detail what is going on when QGIS runs a SAGA algorithm. You will find two settings, namely *Log console output* and *Log execution commands*, to activate that logging mechanism.

La mayoría del resto de proveedores que utilizan una aplicación externa y la invocan a través de la línea de comandos tienen opciones similares, de forma que las podrá encontrar también en otros lugares de la lista de ajustes de procesamiento.

R. Creating R scripts

La integración R en QGIS es diferente al de SAGA y es que no hay un conjunto predefinido de algoritmos que pueda ejecutar (a excepción de algunos ejemplos). En su lugar, debe escribir sus scripts y llamar a los comandos R, al igual que lo haría desde R, y de una manera muy similar a lo que vimos en la sección dedicada a scripts de procesamiento. En esta sección se muestra la sintaxis para usar y llamar a los comandos de R QGIS y cómo usar en QGIS los objetos (capas, tablas) en ellos.

The first thing you have to do, as we saw in the case of SAGA, is to tell QGIS where your R binaries are located. You can do this using the *R folder* entry in the processing configuration dialog. Once you have set that parameter, you can start creating and executing your own R scripts.

De nuevo, esto es diferente en Linux, dónde sólo hay que asegurarse de que el directorio de R está correctamente incluido en la variable de entorno PATH. Si R puede iniciarse simplemente escribiendo `R` en una consola, entonces la configuración es correcta.

Para añadir un nuevo algoritmo que invoque a una función de R (u otro script de R que se haya creado anteriormente y se quiera tener disponible desde QGIS), es necesario crear un archivo de script que indique al entorno de procesamiento cómo realizar dicha operación y los comandos de R necesarios para ello.

R script files have the extension `.rsx`, and creating them is pretty easy if you just have a basic knowledge of R syntax and R scripting. They should be stored in the R scripts folder. You can set this folder in the *R* settings group (available from the processing settings dialog), just like you do with the folder for regular processing scripts.

Let's have a look at a very simple script file, which calls the R method `spsample` to create a random grid within the boundary of the polygons in a given polygon layer. This method belongs to the `maptools` package. Since almost all the algorithms that you might like to incorporate into QGIS will use or generate spatial data, knowledge of spatial packages like `maptools` and, especially, `sp`, is mandatory.

```
##polyg=vector
##numpoints=number 10
##output=output vector
##sp=group
pts=spsample(polyg,numpoints,type="random")
output=SpatialPointsDataFrame(pts, as.data.frame(pts))
```

Las primeras líneas, que comienzan con el símblo doble de comentario en Python (`##`), indican a QGIS las entradas del algoritmo descritas en el archivo y las salidas que éste generará. Estas líneas utilizan la misma sintaxis que los scripts de SEXTANTE que vimos anteriormente por lo que no las describiremos aquí de nuevo.

Cuando se declara un parámetro de entrada, QGIS usa esa información con dos finalidades: crear la interfaz de usuario que solicita al usuario el valor de dicho parámetro y crear la variable correspondiente en R que se pueda usar después como entrada para los comandos en R.

In the above example, we are declaring an input of type `vector` named `polyg`. When executing the algorithm, QGIS will open in R the layer selected by the user and store it in a variable also named `polyg`. So, the name of a parameter is also the name of the variable that we can use in R for accesing the value of that parameter (thus, you should avoid using reserved R words as parameter names).

Spatial elements such as vector and raster layers are read using the `readOGR()` and `brick()` commands (you do not have to worry about adding those commands to your description file – QGIS will do it), and they are stored as `Spatial*DataFrame` objects. Table fields are stored as strings containing the name of the selected field.

Tables are opened using the `read.csv()` command. If a table entered by the user is not in CSV format, it will be converted prior to importing it into R.

Additionally, raster files can be read using the `readGDAL()` command instead of `brick()` by using the `##usereadgdal`.

Si se es un usuario avanzado y no quiere QGIS para crear el objeto que representado la capa, puede utilizar la etiqueta `##passfilename` para indicar que prefiere una cadena con el nombre de archivo en su lugar. En este caso, le corresponde abrir el archivo antes de realizar cualquier operación sobre los datos que contiene.

Con la información anterior, se puede comprender la primera línea de nuestro primer script de ejemplo (la primera línea que no comienza con un comentario de Python).

```
pts=spsample(polyg,numpoints,type="random")
```

La variable `polygon` ya contiene un objeto `SpatialPolygonsDataFrame`, por lo que se puede utilizar para llamar al método `spsample`, al igual que `numpoints`, que indica el número de puntos a añadir a la rejilla de ejemplo creada.

Since we have declared an output of type vector named `out`, we have to create a variable named `out` and store a `Spatial*DataFrame` object in it (in this case, a `SpatialPointsDataFrame`). You can use any name for your intermediate variables. Just make sure that the variable storing your final result has the same name that you used to declare it, and that it contains a suitable value.

En este caso, el resultado obtenido del método `spsample` ha de ser convertido de forma explícita a un objeto de tipo `SpatialPointsDataFrame`, since it is itself an object of class `ppp`, which is not a suitable class to be returned to QGIS.

If your algorithm generates raster layers, the way they are saved will depend on whether or not you have used the `#dontuserasterpackage` option. In you have used it, layers are saved using the `writeGDAL()` method. If not, the `writeRaster()` method from the `raster` package will be used.

Si ha utilizado la opción `#passfilename`, las salidas se generan utilizando el paquete `raster` (mediante `writeRaster()`), incluso cuando no se utiliza para las entradas.

Si el algoritmo no genera ninguna capa, sino más bien en su lugar regresa un texto en la consola, tiene que indicar lo que desea que la consola mostrará una vez finalizada la ejecución. Para ello, basta con iniciar la línea de comandos que producen los resultados que desea imprimir con el signo > '('mayor'). La salida de todas las otras líneas no se mostrará. Por ejemplo, aquí está el archivo de descripción de un algoritmo que realiza una prueba normalmente en un determinado campo (columna) de los atributos de una capa vectorial:

```
##layer=vector
##field=field layer
##nortest=group
library(nortest)
>lillie.test(layer[[field]])
```

The output of the last line is printed, but the output of the first is not (and neither are the outputs from other command lines added automatically by QGIS).

Si su algoritmo crea algún tipo de gráficos (utilizando el método `plot()`), añada la siguiente línea:

```
##showplots
```

This will cause QGIS to redirect all R graphical outputs to a temporary file, which will be opened once R execution has finished.

Tanto los resultados gráficos como de consola, se mostrará en el gesto de resultados de procesamiento.

For more information, please check the script files provided with SEXTANTE. Most of them are rather simple and will greatly help you understand how to create your own scripts.

Nota: Las bibliotecas `rgdal` y `maptools` se cargan por defecto, por lo que no tiene que añadir el comando correspondiente ``library()``(sólo hay que asegurarse de que los dos paquetes se instalaron en su distribución R). Sin embargo, otras bibliotecas adicionales que pueda necesitar tener ser cargaran de forma explícita. Sólo tiene que añadir los comandos necesarios al inicio de su script. También tiene que asegurarse de que los paquetes correspondientes se instalen en la distribución R utilizada por QGIS. El marco de procesamiento no se hará cargo de alguna instalación de paquete. Si ejecuta un script que requiere un paquete que no está instalado, la ejecución fallará y SEXTANTE intentará detectar qué paquetes hacen falta. Debe instalar las bibliotecas que faltan manualmente antes de poder ejecutar el algoritmo.

GRASS

Configurar GRASS no es muy diferente de la configuración de SAGA. En primer lugar, la ruta de la carpeta GRASS debe ser definido, pero solo si se ejecuta en Windows. Adicionalmente, un interprete de comandos (usualmente `msys.exe`, que se puede encontrar en la mayoría de distribuciones GRASS para Windows) tiene que ser definido y establecer la ruta también.

Por defecto, el marco de procesamiento intenta configurar el conector de GRASS para utilizar la distribución GRASS que se incluye junto con QGIS. Esto debería funcionar sin problemas en la mayoría de los sistemas, pero si tiene problemas, puede que tenga que configurar el conector GRASS manualmente. Además, si usted desea utilizar una instalación diferente de GRASS, puede cambiar esta configuración y seleccionar la carpeta donde está instalada la otra versión. GRASS 6.4 es necesaria para que los algoritmos funcione correctamente.

Si se utiliza Linux, hay que asegurarse de que GRASS está correctamente instalado y que se puede ejecutar sin problemas desde una consola.

GRASS algorithms use a region for calculations. This region can be defined manually using values similar to the ones found in the SAGA configuration, or automatically, taking the minimum extent that covers all the input layers used to execute the algorithm each time. If the latter approach is the behaviour you prefer, just check the *Use min covering region* option in the GRASS configuration parameters.

The last parameter that has to be configured is related to the mapset. A mapset is needed to run GRASS, and the processing framework creates a temporary one for each execution. You have to specify if the data you are working with uses geographical (lat/lon) coordinates or projected ones.

GDAL

No es necesaria ninguna configuración adicional para ejecutar los algoritmos de GDAL. Al estar estos incluidos en QGIS, los algoritmos infieren su configuración de forma automática.

Caja de Herramientas de Orfeo

Orfeo Toolbox (OTB) algorithms can be run from QGIS if you have OTB installed in your system and you have configured QGIS properly, so it can find all necessary files (command-line tools and libraries).

As in the case of SAGA, OTB binaries are included in the stand-alone installer for Windows, but they are not included if you are runing Linux, so you have to download and install the software yourself. Please check the OTB website for more information.

Once OTB is installed, start QGIS, open the processing configuration dialog and configure the OTB algorithm provider. In the *Orfeo Toolbox (image analysis)* block, you will find all settings related to OTB. First, ensure that algorithms are enabled.

Entonces, configurar la ruta al directorio donde las aplicaciones de línea de comandos y las librerías de OTB se encuentran instaladas:

- Normalmente, el directorio de aplicaciones de *OTB apunta a* '/usr/lib/otb/applications'' y el directorio con los programas de línea de comandos de *OTB es* '/usr/bin''.
- If you use the OSGeo4W installer, then install `otb-bin` package and enter `C:\OSGeo4W\apps\orfeotoolbox\applications` as *OTB applications folder* and `C:\OSGeo4W\bin` as *OTB command line tools folder*. These values should be configured by default, but if you have a different OTB installation, configure them to the corresponding values in your system.

TauDEM

Para utilizar este proveedor, es necesrio instalar las herramientas de linea de comandos de TauDEM.

17.14.8 Windows

Please visit the TauDEM homepage for installation instructions and precompiled binaries for 32-bit and 64-bit systems. **IMPORTANT**: You need TauDEM 5.0.6 executables. Version 5.2 is currently not supported.

17.14.9 Linux

There are no packages for most Linux distributions, so you should compile TauDEM by yourself. As TauDEM uses MPICH2, first install it using your favorite package manager. Alternatively, TauDEM works fine with Open MPI, so you can use it instead of MPICH2.

Descargar el código fuente de TauDEM 5.0.6 <http://hydrology.usu.edu/taudem/taudem5.0/TauDEM5PCsrc_506.zip>'_ y extraer los archivos en algún directorio.

Abrir el archivo `linearpart.h` , y después de la línea

```
#include "mpi.h"
```

añadir una nueva linea con

```
#include <stdint.h>
```

y obtendrá

```
#include "mpi.h"
#include <stdint.h>
```

Guardar los cambios y cerrar el archivo. Ahora abir `tiffIO.h`, buscar la línea `#include "stdint.h"` y sustituir las comillas (`""`) con <>, para obtener

```
#include <stdint.h>
```

Guardar los cambios y cerrar el archivo. Crear un directorio de compilación y entrar en él

```
mkdir build
cd build
```

Configure your build with the command

```
CXX=mpicxx cmake -DCMAKE_INSTALL_PREFIX=/usr/local ..
```

y entonces compilar

```
make
```

Finalmente, para instalar TauDEM en `/usr/local/bin`, ejecutar

```
sudo make install
```

.

17.15 Los Comandos QGIS

El procesado incluye una herramienta practica que le permite ejecutar algoritmos sin tener que utilizar la caja de herramientas, pero tan solo escribir el nombre del algoritmo que se desee ejecutar.

Esta herramienta es conocida como *Comandos GQIS*, y esto es solo una sencilla caja de texto con autocompletado donde se escribe el nombre del comando que se desee ejecutar.

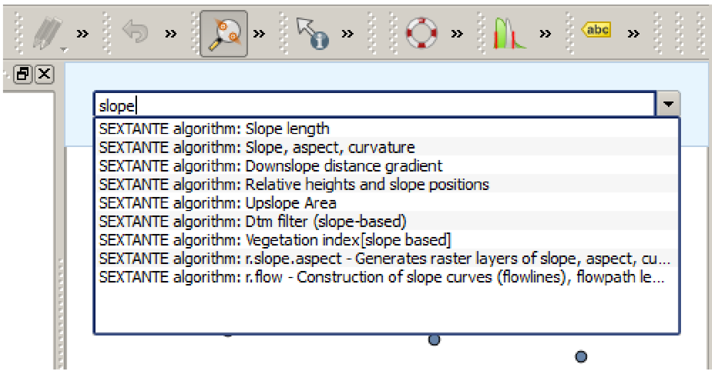


Figura 17.29: Comandos QGIS

Comandos se inicia del menú *Análisis* o, mas practico, al presionar `Shift + Ctrl + M` (puede cambiar ese atajo de teclado en la configuración de QGIS si prefiere definir uno diferente). Ademas de la ejecución de algoritmos de procesado, Comandos da acceso a la mayoría de las funcionalidades en QGIS, lo que significa que le da una forma práctica y eficaz de ejecutar tareas QGIS y le permite controlar QGIS con un uso reducido de botones y menús .

Además, el comandante es configurable, así que puede agregar sus comandos personalizados y ellos tienen sólo unas pocas teclas de distancia, por lo que es una herramienta de gran alcance para ayudarle a ser más productivo en su trabajo diario con QGIS.

17.15.1 Comandos disponibles

Los comandos disponibles en el Comandante caen en la siguiente categoría:

- Algoritmos de procesado. Estos se muestran como `Algoritmo de procesamiento: <nombre del algoritmo>`.
- Los elementos del menú. Estos se muestran como `Menu item: <Texto de entrada del menú>`. Todos los elementos de los menús disponibles desde la interfaz QGIS están disponibles, incluso si se incluyen en un submenú.
- Funciones Python. Puede crear funciones cortas en Python que serán entonces incluidas en la lista de comandos disponibles. Ellos se muestran como `Function: <nombre de la función>`.

Para ejecutar cualquiera de los anteriores, inicie escribiendo y a continuación, seleccione el elemento de la lista de comandos disponibles que aparecen después de filtrar toda la lista de comandos con el texto que ha introducido.

En caso de llamar a una función de Python, puede seleccionar la entrada en la lista, que tiene el prefijo `Function:` (por ejemplo, `Command: removeall), o simplemente escribir directamente el nombre de la función (``removeall` en el ejemplo anterior). No hay necesidad de añadir espacios después del nombre de la función.

17.15.2 Crear funciones personalizadas

Las funciones personalizadas se añaden al introducir el código correspondiente de Python en el archivo `commands.py` que se encuentra en el directorio `.qgis/sextante/commander` en su carpeta de usuario. Es solo un archivo Python simple donde puede añadir las funciones que necesite.

Se crea el archivo con unas pocas funciones de ejemplo la primera vez que se abre Comandos. Si no ha lanzado Comandos, puedes crear el archivo usted mismo. Para editar el archivo de comandos, utilice su editor de texto favorito. También se puede utilizar un editor incorporado llamando al comando `edit` de Comandos. Se abrirá el editor con el archivo de comandos, y se puede editar directamente y luego guardar los cambios.

Por ejemplo, puede añadir la siguiente función, la cual borre todas las capa:

```
from qgis.gui import *

def removeall():
    mapreg = QgsMapLayerRegistry.instance()
    mapreg.removeAllMapLayers()
```

Una vez que se haya añadido la función, estará disponible en Comandos, y puede invocarlo escribiendo `removeall`. No hay necesidad de hacer algo más aparte de escribir la función en sí.

Las funciones pueden recibir parámetros. Añadir `*args` a la definición de su función para recibir argumentos. Cuando llame a la función desde Comandos, los parámetros tienen que ser pasados separados por espacios.

Aquí esta un ejemplo de una función que carga una capa y toma un parámetro con el nombre del archivo de la capa cargada.

```
import processing

def load(*args):
  processing.load(args[0])
```

Si desea cargar la capa en `/home/myuser/points.shp`, tipo `load /home/myuser/points.shp` en la caja de texto de Comandos.

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CAPÍTULO 18

Proveedor de procesos y algoritmos

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18.1 Proveedor de algoritmos GDAL

GDAL (Geospatial Data Abstraction Library) es una biblioteca traductor para formatos de datos geoespaciales ráster y vector.

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18.1.1 GDAL analysis

Aspect

Description

<put algortithm description here>

Parameters

`Input layer` **[raster]** <put parameter description here>

`Band number` **[number]** <put parameter description here>

Default: *1*

`Compute edges` **[boolean]** <put parameter description here>

Default: *False*

`Use Zevenbergen&Thorne formula (instead of the Horn's one)` **[boolean]** <put parameter description here>

Default: *False*

`Return trigonometric angle (instead of azimuth)` **[boolean]** <put parameter description here>

Default: *False*

`Return o for flat (instead of -9999)` **[boolean]** <put parameter description here>

Default: *False*

Outputs

`Output file` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:aspect', input, band, compute_edges, zevenbergen, trig_angle, zero_flat
```

See also

Color relief

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Band number` [number] <put parameter description here>

Default: *1*

`Compute edges` [boolean] <put parameter description here>

Default: *False*

`Color configuration file` [file] <put parameter description here>

`Matching mode` [selection] <put parameter description here>

Options:

- 0 — "0,0,0,0" RGBA
- 1 — Exact color
- 2 — Nearest color

Default: *0*

Outputs

`Output file` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:colorrelief', input, band, compute_edges, color_table, match_mode, outp
```

See also

Fill nodata

Description

<put algortithm description here>

Parameters

`Input layer` **[raster]** <put parameter description here>

`Search distance` **[number]** <put parameter description here>

Default: *100*

`Smooth iterations` **[number]** <put parameter description here>

Default: *0*

`Band to operate on` **[number]** <put parameter description here>

Default: *1*

`Validity mask` **[raster]** Optional.

<put parameter description here>

`Do not use default validity mask` **[boolean]** <put parameter description here>

Default: *False*

Outputs

`Output layer` **[raster]** <put output description here>

Console usage

```
processing.runalg('gdalogr:fillnodata', input, distance, iterations, band, mask, no_default_mask,
```

See also

Grid (Moving average)

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: point]** <put parameter description here>

`Z field` **[tablefield: numeric]** Optional.

<put parameter description here>

`Radius 1` **[number]** <put parameter description here>

Default: *0.0*

`Radius 2` **[number]** <put parameter description here>

Default: *0.0*

`Min points` **[number]** <put parameter description here>

Default: *0.0*

`Angle` **[number]** <put parameter description here>

Default: *0.0*

Nodata **[number]** <put parameter description here>

Default: *0.0*

Output raster type **[selection]** <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

Output file **[raster]** <put output description here>

Console usage

```
processing.runalg('gdalogr:gridaverage', input, z_field, radius_1, radius_2, min_points, angle, no
```

See also

Grid (Data metrics)

Description

<put algortithm description here>

Parameters

Input layer **[vector: point]** <put parameter description here>

Z field **[tablefield: numeric]** Optional.

<put parameter description here>

Metrics **[selection]** <put parameter description here>

Options:

- 0 — Minimum
- 1 — Maximum
- 2 — Range

- 3 — Count
- 4 — Average distance
- 5 — Average distance between points

Default: *0*

Radius 1 [number] <put parameter description here>

Default: *0.0*

Radius 2 [number] <put parameter description here>

Default: *0.0*

Min points [number] <put parameter description here>

Default: *0.0*

Angle [number] <put parameter description here>

Default: *0.0*

Nodata [number] <put parameter description here>

Default: *0.0*

Output raster type [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

Output file [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:griddatametrics', input, z_field, metric, radius_1, radius_2, min_point
```

See also

Grid (Inverse distance to a power)

Description

<put algortithm description here>

Parameters

`Input layer` [vector: point] <put parameter description here>

`Z field` [tablefield: numeric] Optional.

<put parameter description here>

`Power` [number] <put parameter description here>

Default: *2.0*

`Smothing` [number] <put parameter description here>

Default: *0.0*

`Radius 1` [number] <put parameter description here>

Default: *0.0*

`Radius 2` [number] <put parameter description here>

Default: *0.0*

`Max points` [number] <put parameter description here>

Default: *0.0*

`Min points` [number] <put parameter description here>

Default: *0.0*

`Angle` [number] <put parameter description here>

Default: *0.0*

`Nodata` [number] <put parameter description here>

Default: *0.0*

`Output raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32

- 10 — CFloat64

Default: *5*

Outputs

`Output file` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:gridinvdist', input, z_field, power, smothing, radius_1, radius_2, max_
```

See also

Grid (Nearest neighbor)

Description

<put algortithm description here>

Parameters

`Input layer` [vector: point] <put parameter description here>

`Z field` [tablefield: numeric] Optional.

<put parameter description here>

`Radius 1` [number] <put parameter description here>

Default: *0.0*

`Radius 2` [number] <put parameter description here>

Default: *0.0*

`Angle` [number] <put parameter description here>

Default: *0.0*

`Nodata` [number] <put parameter description here>

Default: *0.0*

`Output raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32

- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

Output file [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:gridnearestneighbor', input, z_field, radius_1, radius_2, angle, nodata
```

See also

Hillshade

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Band number [number] <put parameter description here>

Default: *1*

Compute edges [boolean] <put parameter description here>

Default: *False*

Use Zevenbergen&Thorne formula (instead of the Horn's one) [boolean] <put parameter description here>

Default: *False*

Z factor (vertical exaggeration) [number] <put parameter description here>

Default: *1.0*

Scale (ratio of vert. units to horiz.) [number] <put parameter description here>

Default: *1.0*

Azimuth of the light [number] <put parameter description here>

Default: *315.0*

Altitude of the light [number] <put parameter description here>

Default: *45.0*

Outputs

Output file [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:hillshade', input, band, compute_edges, zevenbergen, z_factor, scale,
```

See also

Near black

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`How far from black (white)` [number] <put parameter description here>

Default: *15*

`Search for nearly white pixels instead of nearly black` [boolean] <put parameter description here>

Default: *False*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:nearblack', input, near, white, output)
```

See also

Proximity (raster distance)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Values` [string] <put parameter description here>

Default: *(not set)*

`Dist units` [selection] <put parameter description here>

Options:

- 0 — GEO
- 1 — PIXEL

Default: *0*

Max dist (negative value to ignore) [number] <put parameter description here>

Default: *-1*

No data (negative value to ignore) [number] <put parameter description here>

Default: *-1*

Fixed buf val (negative value to ignore) [number] <put parameter description here>

Default: *-1*

Output raster type [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

Output layer [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:proximity', input, values, units, max_dist, nodata, buf_val, rtype, out
```

See also

Roughness

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Band number [number] <put parameter description here>

Default: *1*

`Compute edges` **[boolean]** <put parameter description here>

Default: *False*

Outputs

`Output file` **[raster]** <put output description here>

Console usage

```
processing.runalg('gdalogr:roughness', input, band, compute_edges, output)
```

See also

Sieve

Description

<put algortithm description here>

Parameters

`Input layer` **[raster]** <put parameter description here>

`Threshold` **[number]** <put parameter description here>

Default: *2*

`Pixel connection` **[selection]** <put parameter description here>

Options:

- 0 — 4
- 1 — 8

Default: *0*

Outputs

`Output layer` **[raster]** <put output description here>

Console usage

```
processing.runalg('gdalogr:sieve', input, threshold, connections, output)
```

See also

Slope

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Band number` [number] <put parameter description here>

Default: *1*

`Compute edges` [boolean] <put parameter description here>

Default: *False*

`Use Zevenbergen&Thorne formula (instead of the Horn's one)` [boolean] <put parameter description here>

Default: *False*

`Slope expressed as percent (instead of degrees)` [boolean] <put parameter description here>

Default: *False*

`Scale (ratio of vert. units to horiz.)` [number] <put parameter description here>

Default: *1.0*

Outputs

`Output file` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:slope', input, band, compute_edges, zevenbergen, as_percent, scale, ou
```

See also

TPI (Topographic Position Index)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Band number` [number] <put parameter description here>

Default: *1*

`Compute edges` [boolean] <put parameter description here>

Default: *False*

Outputs

`Output file` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:tpitopographicpositionindex', input, band, compute_edges, output)
```

See also

TRI (Terrain Ruggedness Index)

Description

<put algortithm description here>

Parameters

`Input layer` **[raster]** <put parameter description here>

`Band number` **[number]** <put parameter description here>

Default: *1*

`Compute edges` **[boolean]** <put parameter description here>

Default: *False*

Outputs

`Output file` **[raster]** <put output description here>

Console usage

```
processing.runalg('gdalogr:triterrainruggednessindex', input, band, compute_edges, output)
```

See also

.

18.1.2 GDAL conversion

gdal2xyz

Description

<put algortithm description here>

Parameters

`Input layer` **[raster]** <put parameter description here>

`Band number` **[number]** <put parameter description here>

Default: *1*

Outputs

`Output file` [table] <put output description here>

Console usage

```
processing.runalg('gdalogr:gdal2xyz', input, band, output)
```

See also

PCT to RGB

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Band to convert` [selection] <put parameter description here>

Options:

- 0 — 1
- 1 — 2
- 2 — 3
- 3 — 4
- 4 — 5
- 5 — 6
- 6 — 7
- 7 — 8
- 8 — 9
- 9 — 10
- 10 — 11
- 11 — 12
- 12 — 13
- 13 — 14
- 14 — 15
- 15 — 16
- 16 — 17
- 17 — 18
- 18 — 19
- 19 — 20
- 20 — 21

- 21 — 22
- 22 — 23
- 23 — 24
- 24 — 25

Default: *0*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:pcttorgb', input, nband, output)
```

See also

Polygonize (raster to vector)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Output field name` [string] <put parameter description here>

Default: *DN*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:polygonize', input, field, output)
```

See also

Rasterize (vector to raster)

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Attribute field` [tablefield: any] <put parameter description here>

`Write values inside an existing raster layer(*)` [boolean] <put parameter description here>

Default: *False*

`Set output raster size (ignored if above option is checked)` [selection] <put parameter description here>

Options:

- 0 — Output size in pixels
- 1 — Output resolution in map units per pixel

Default: *1*

`Horizontal` [number] <put parameter description here>

Default: *100.0*

`Vertical` [number] <put parameter description here>

Default: *100.0*

`Raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *0*

Outputs

`Output layer: mandatory to choose an existing raster layer if the (*) option is selected` <put output description here>

Console usage

```
processing.runalg('gdalogr:rasterize', input, field, writeover, dimensions, width, height, rtype,
```

See also

RGB to PCT

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Number of colors` [number] <put parameter description here>

Default: *2*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:rgbtopct', input, ncolors, output)
```

See also

Translate (convert format)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Set the size of the output file (In pixels or %)` [number] <put parameter description here>

Default: *100*

`Output size is a percentage of input size` [boolean] <put parameter description here>

Default: *True*

`Nodata value, leave as none to take the nodata value from input` [string] <put parameter description here>

Default: *none*

`Expand` [selection] <put parameter description here>

Options:

- 0 — none
- 1 — gray
- 2 — rgb

- 3 — rgba

Default: *0*

`Output projection for output file [leave blank to use input projection]` [crs] <put parameter description here>

Default: *None*

`Subset based on georeferenced coordinates` [extent] <put parameter description here>

Default: *0,1,0,1*

`Copy all subdatasets of this file to individual output files` [boolean] <put parameter description here>

Default: *False*

`Additional creation parameters` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Output raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:translate', input, outsize, outsize_perc, no_data, expand, srs, projwi
```

See also

.

18.1.3 Extracción GDAL

Clip raster by extent

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Nodata value, leave as none to take the nodata value from input [string] <put parameter description here>

Default: *none*

Clipping extent [extent] <put parameter description here>

Default: *0,1,0,1*

Additional creation parameters [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

Output layer [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:cliprasterbyextent', input, no_data, projwin, extra, output)
```

See also

Clip raster by mask layer

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Mask layer [vector: polygon] <put parameter description here>

Nodata value, leave as none to take the nodata value from input [string] <put parameter description here>

Default: *none*

Create and output alpha band [boolean] <put parameter description here>

Default: *False*

`Keep resolution of output raster` [boolean] <put parameter description here>

Default: *False*

`Additional creation parameters` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:cliprasterbymasklayer', input, mask, no_data, alpha_band, keep_resolut
```

See also

Contour

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Interval between contour lines` [number] <put parameter description here>

Default: *10.0*

`Attribute name (if not set, no elevation attribute is attached)` [string] Optional.

<put parameter description here>

Default: *ELEV*

`Additional creation parameters` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Output file for contour lines (vector)` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:contour', input_raster, interval, field_name, extra, output_vector)
```

See also

.

18.1.4 Miscelánea GDAL

Build Virtual Raster

Description

<put algortithm description here>

Parameters

`Input layers` [multipleinput: rasters] <put parameter description here>

`Resolution` [selection] <put parameter description here>

Options:

- 0 — average
- 1 — highest
- 2 — lowest

Default: *0*

`Layer stack` [boolean] <put parameter description here>

Default: *True*

`Allow projection difference` [boolean] <put parameter description here>

Default: *False*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:buildvirtualraster', input, resolution, separate, proj_difference, outp
```

See also

Merge

Description

<put algortithm description here>

Parameters

`Input layers` [multipleinput: rasters] <put parameter description here>

`Grab pseudocolor table from first layer` [boolean] <put parameter description here>

Default: *False*

`Layer stack` [boolean] <put parameter description here>

Default: *False*

`Output raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:merge', input, pct, separate, rtype, output)
```

See also

Build overviews (pyramids)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Overview levels` [string] <put parameter description here>

Default: *2 4 8 16*

`Remove all existing overviews` [boolean] <put parameter description here>

Default: *False*

`Resampling method` [selection] <put parameter description here>

Options:

- 0 — nearest
- 1 — average
- 2 — gauss
- 3 — cubic
- 4 — average_mp
- 5 — average_magphase
- 6 — mode

Default: *0*

`Overview format` [selection] <put parameter description here>

Options:

- 0 — Internal (if possible)
- 1 — External (GTiff .ovr)
- 2 — External (ERDAS Imagine .aux)

Default: *0*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:overviews', input, levels, clean, resampling_method, format)
```

See also

Information

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Suppress GCP info` [boolean] <put parameter description here>

Default: *False*

`Suppress metadata info` [boolean] <put parameter description here>

Default: *False*

Outputs

`Layer information` [html] <put output description here>

Console usage

```
processing.runalg('gdalorg:rasterinfo', input, nogcp, nometadata, output)
```

See also

.

18.1.5 Proyecciones GDAL

Extraer proyección

Descripción

<colocar descripción de algoritmo aquí>

Parámetros

`Archivo de entrada` [ráster] <colocar descripción de parámetro aquí>

`También crear archivo .prj` [boolean] <colocar descripción de parámetro aquí>

Por defecto:*Falso*

Salidas

Uso de la consola

```
processing.runalg('gdalogr:extractprojection', input, prj_file)
```

También vea

Warp (reproject)

Description

<put algortithm description here>

Parameters

`Input layer` [raster] <put parameter description here>

`Source SRS (EPSG Code)` [crs] <put parameter description here>

Default: *EPSG:4326*

`Destination SRS (EPSG Code)` [crs] <put parameter description here>

Default: *EPSG:4326*

`Output file resolution in target georeferenced units (leave 0 for no change)` [number]
<put parameter description here>

Default: *0.0*

`Resampling method` [selection] <put parameter description here>

Options:

- 0 — near
- 1 — bilinear
- 2 — cubic
- 3 — cubicspline
- 4 — lanczos

Default: *0*

`Additional creation parameters` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Output raster type` [selection] <put parameter description here>

Options:

- 0 — Byte
- 1 — Int16
- 2 — UInt16
- 3 — UInt32
- 4 — Int32
- 5 — Float32
- 6 — Float64
- 7 — CInt16
- 8 — CInt32
- 9 — CFloat32
- 10 — CFloat64

Default: *5*

Outputs

`Output layer` [raster] <put output description here>

Console usage

```
processing.runalg('gdalogr:warpreproject', input, source_srs, dest_srs, tr, method, extra, rtype,
```

See also

.

18.1.6 Conversión OGR

Convert format

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Destination Format` [selection] <put parameter description here>

Options:

- 0 — ESRI Shapefile
- 1 — GeoJSON
- 2 — GeoRSS
- 3 — SQLite
- 4 — GMT
- 5 — MapInfo File
- 6 — INTERLIS 1
- 7 — INTERLIS 2
- 8 — GML
- 9 — Geoconcept
- 10 — DXF
- 11 — DGN
- 12 — CSV
- 13 — BNA
- 14 — S57
- 15 — KML
- 16 — GPX
- 17 — PGDump
- 18 — GPSTrackMaker
- 19 — ODS
- 20 — XLSX
- 21 — PDF

Default: *0*

`Creation Options` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:convertformat', input_layer, format, options, output_layer)
```

See also

.

18.1.7 Geoprocesamiento OGC

Clip vectors by extent

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Clip extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Additional creation Options` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:clipvectorsbyextent', input_layer, clip_extent, options, output_layer)
```

See also

Clip vectors by polygon

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Clip layer` [vector: polygon] <put parameter description here>

`Additional creation Options` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:clipvectorsbypolygon', input_layer, clip_layer, options, output_layer)
```

See also

.

18.1.8 miscelánea OGC

Execute SQL

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`SQL` [string] <put parameter description here>

Default: *(not set)*

Outputs

`SQL result` [vector] <put output description here>

Console usage

```
processing.runalg('gdalogr:executesql', input, sql, output)
```

See also

Import Vector into PostGIS database (available connections)

Description

<put algortithm description here>

Parameters

`Database (connection name)` **[selection]** <put parameter description here>

Options:

- 0 — local

Default: *0*

`Input layer` **[vector: any]** <put parameter description here>

`Output geometry type` **[selection]** <put parameter description here>

Options:

- 0 —
- 1 — NONE
- 2 — GEOMETRY
- 3 — POINT
- 4 — LINESTRING
- 5 — POLYGON
- 6 — GEOMETRYCOLLECTION
- 7 — MULTIPOINT
- 8 — MULTIPOLYGON
- 9 — MULTILINESTRING

Default: *5*

`Input CRS (EPSG Code)` **[crs]** <put parameter description here>

Default: *EPSG:4326*

`Output CRS (EPSG Code)` **[crs]** <put parameter description here>

Default: *EPSG:4326*

`Schema name` **[string]** Optional.

<put parameter description here>

Default: *public*

`Table name, leave blank to use input name` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

`Primary Key` **[string]** Optional.

<put parameter description here>

Default: *id*

`Geometry column name` **[string]** Optional.

<put parameter description here>

Default: *geom*

`Vector dimensions` **[selection]** <put parameter description here>

Options:

- 0 — 2
- 1 — 3

Default: *0*

`Distance tolerance for simplification` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

`Maximum distance between 2 nodes (densification)` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

`Select features by extent (defined in input layer CRS)` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Clip the input layer using the above (rectangle) extent` **[boolean]** <put parameter description here>

Default: *False*

`Select features using a SQL "WHERE" statement (Ex: column="value")` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

`Group "n" features per transaction (Default: 20000)` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

`Overwrite existing table?` **[boolean]** <put parameter description here>

Default: *True*

`Append to existing table?` **[boolean]** <put parameter description here>

Default: *False*

`Append and add new fields to existing table?` **[boolean]** <put parameter description here>

Default: *False*

`Do not launder columns/table name/s?` **[boolean]** <put parameter description here>

Default: *False*

`Do not create Spatial Index?` **[boolean]** <put parameter description here>

Default: *False*

`Continue after a failure, skipping the failed feature` **[boolean]** <put parameter description here>

Default: *False*

`Additional creation options` **[string]** Optional.

<put parameter description here>

Default: *(not set)*

Outputs

Console usage

```
processing.runalg('gdalogr:importvectorintopostgisdatabaseavailableconnections', database, input_l
```

See also

Import Vector into PostGIS database (new connection)

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Output geometry type` **[selection]** <put parameter description here>

Options:

- 0 —
- 1 — NONE
- 2 — GEOMETRY
- 3 — POINT
- 4 — LINESTRING
- 5 — POLYGON
- 6 — GEOMETRYCOLLECTION
- 7 — MULTIPOINT
- 8 — MULTIPOLYGON
- 9 — MULTILINESTRING

Default: *5*

`Input CRS (EPSG Code)` **[crs]** <put parameter description here>

Default: *EPSG:4326*

`Output CRS (EPSG Code)` **[crs]** <put parameter description here>

Default: *EPSG:4326*

`Host` **[string]** <put parameter description here>

Default: *localhost*

`Port` **[string]** <put parameter description here>

Default: *5432*

`Username` [string] <put parameter description here>

Default: *(not set)*

`Database Name` [string] <put parameter description here>

Default: *(not set)*

`Password` [string] <put parameter description here>

Default: *(not set)*

`Schema name` [string] Optional.

<put parameter description here>

Default: *public*

`Table name, leave blank to use input name` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Primary Key` [string] Optional.

<put parameter description here>

Default: *id*

`Geometry column name` [string] Optional.

<put parameter description here>

Default: *geom*

`Vector dimensions` [selection] <put parameter description here>

Options:

- 0 — 2
- 1 — 3

Default: *0*

`Distance tolerance for simplification` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Maximum distance between 2 nodes (densification)` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Select features by extent (defined in input layer CRS)` [extent] <put parameter description here>

Default: *0,1,0,1*

`Clip the input layer using the above (rectangle) extent` [boolean] <put parameter description here>

Default: *False*

`Select features using a SQL "WHERE" statement (Ex: column="value")` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Group "n" features per transaction (Default: 20000)` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Overwrite existing table?` [boolean] <put parameter description here>

Default: *True*

`Append to existing table?` [boolean] <put parameter description here>

Default: *False*

`Append and add new fields to existing table?` [boolean] <put parameter description here>

Default: *False*

`Do not launder columns/table name/s?` [boolean] <put parameter description here>

Default: *False*

`Do not create Spatial Index?` [boolean] <put parameter description here>

Default: *False*

`Continue after a failure, skipping the failed feature` [boolean] <put parameter description here>

Default: *False*

`Additional creation options` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

Console usage

```
processing.runalg('gdalogr:importvectorintopostgisdatabasenewconnection', input_layer, gtype, s_s
```

See also

Information

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

Outputs

`Layer information` [html] <put output description here>

Console usage

```
processing.runalg('gdalogr:information', input, output)
```

See also

.

18.2 LAStools

LAStools es una colección de herramientas altamente eficientes, multinúcleo para el procesamiento de datos LiDAR.

18.2.1 las2las_filter

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

filter (by return, classification, flags) [selection] <put parameter description here>

Options:

- 0 — —
- 1 — keep_last
- 2 — keep_first
- 3 — keep_middle
- 4 — keep_single
- 5 — drop_single
- 6 — keep_double
- 7 — keep_class 2
- 8 — keep_class 2 8
- 9 — keep_class 8
- 10 — keep_class 6
- 11 — keep_class 9
- 12 — keep_class 3 4 5
- 13 — keep_class 2 6
- 14 — drop_class 7
- 15 — drop_withheld

Default: *0*

`second filter (by return, classification, flags)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — keep_last
- 2 — keep_first
- 3 — keep_middle
- 4 — keep_single
- 5 — drop_single
- 6 — keep_double
- 7 — keep_class 2
- 8 — keep_class 2 8
- 9 — keep_class 8
- 10 — keep_class 6
- 11 — keep_class 9
- 12 — keep_class 3 4 5
- 13 — keep_class 2 6
- 14 — drop_class 7
- 15 — drop_withheld

Default: *0*

`filter (by coordinate, intensity, GPS time, ...)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — clip_x_above
- 2 — clip_x_below
- 3 — clip_y_above
- 4 — clip_y_below
- 5 — clip_z_above
- 6 — clip_z_below
- 7 — drop_intensity_above
- 8 — drop_intensity_below
- 9 — drop_gps_time_above
- 10 — drop_gps_time_below
- 11 — drop_scan_angle_above
- 12 — drop_scan_angle_below
- 13 — keep_point_source
- 14 — drop_point_source
- 15 — drop_point_source_above

- 16 — drop_point_source_below
- 17 — keep_user_data
- 18 — drop_user_data
- 19 — drop_user_data_above
- 20 — drop_user_data_below
- 21 — keep_every_nth
- 22 — keep_random_fraction
- 23 — thin_with_grid

Default: *0*

`value for filter (by coordinate, intensity, GPS time, ...)` **[string]** <put parameter description here>

Default: *(not set)*

`second filter (by coordinate, intensity, GPS time, ...)` **[selection]** <put parameter description here>

Options:

- 0 — —
- 1 — clip_x_above
- 2 — clip_x_below
- 3 — clip_y_above
- 4 — clip_y_below
- 5 — clip_z_above
- 6 — clip_z_below
- 7 — drop_intensity_above
- 8 — drop_intensity_below
- 9 — drop_gps_time_above
- 10 — drop_gps_time_below
- 11 — drop_scan_angle_above
- 12 — drop_scan_angle_below
- 13 — keep_point_source
- 14 — drop_point_source
- 15 — drop_point_source_above
- 16 — drop_point_source_below
- 17 — keep_user_data
- 18 — drop_user_data
- 19 — drop_user_data_above
- 20 — drop_user_data_below
- 21 — keep_every_nth
- 22 — keep_random_fraction
- 23 — thin_with_grid

Default: *0*

value for second filter (by coordinate, intensity, GPS time, ...) [string] <put parameter description here>

Default: *(not set)*

Outputs

output LAS/LAZ file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:las2lasfilter', verbose, input_laslaz, filter_return_class_flags1, f
```

See also

18.2.2 las2las_project

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

source projection [selection] <put parameter description here>

Options:

- 0 — —
- 1 — utm
- 2 — sp83
- 3 — sp27
- 4 — longlat
- 5 — latlong

Default: *0*

source utm zone [selection] <put parameter description here>

Options:

- 0 — —
- 1 — 1 (north)
- 2 — 2 (north)
- 3 — 3 (north)
- 4 — 4 (north)
- 5 — 5 (north)
- 6 — 6 (north)

- 7 — 7 (north)
- 8 — 8 (north)
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- 109 — 49 (south)
- 110 — 50 (south)
- 111 — 51 (south)
- 112 — 52 (south)
- 113 — 53 (south)
- 114 — 54 (south)
- 115 — 55 (south)
- 116 — 56 (south)
- 117 — 57 (south)
- 118 — 58 (south)
- 119 — 59 (south)
- 120 — 60 (south)

Default: *0*

`source state plane code` **[selection]** <put parameter description here>

Options:

- 0 — —
- 1 — AK_10
- 2 — AK_2
- 3 — AK_3
- 4 — AK_4
- 5 — AK_5
- 6 — AK_6
- 7 — AK_7
- 8 — AK_8
- 9 — AK_9
- 10 — AL_E
- 11 — AL_W
- 12 — AR_N
- 13 — AR_S
- 14 — AZ_C
- 15 — AZ_E
- 16 — AZ_W
- 17 — CA_I
- 18 — CA_II
- 19 — CA_III
- 20 — CA_IV
- 21 — CA_V
- 22 — CA_VI
- 23 — CA_VII
- 24 — CO_C
- 25 — CO_N
- 26 — CO_S
- 27 — CT
- 28 — DE
- 29 — FL_E
- 30 — FL_N
- 31 — FL_W
- 32 — GA_E
- 33 — GA_W
- 34 — HI_1
- 35 — HI_2
- 36 — HI_3
- 37 — HI_4
- 38 — HI_5

- 39 — IA_N
- 40 — IA_S
- 41 — ID_C
- 42 — ID_E
- 43 — ID_W
- 44 — IL_E
- 45 — IL_W
- 46 — IN_E
- 47 — IN_W
- 48 — KS_N
- 49 — KS_S
- 50 — KY_N
- 51 — KY_S
- 52 — LA_N
- 53 — LA_S
- 54 — MA_I
- 55 — MA_M
- 56 — MD
- 57 — ME_E
- 58 — ME_W
- 59 — MI_C
- 60 — MI_N
- 61 — MI_S
- 62 — MN_C
- 63 — MN_N
- 64 — MN_S
- 65 — MO_C
- 66 — MO_E
- 67 — MO_W
- 68 — MS_E
- 69 — MS_W
- 70 — MT_C
- 71 — MT_N
- 72 — MT_S
- 73 — NC
- 74 — ND_N
- 75 — ND_S
- 76 — NE_N
- 77 — NE_S

- 78 — NH
- 79 — NJ
- 80 — NM_C
- 81 — NM_E
- 82 — NM_W
- 83 — NV_C
- 84 — NV_E
- 85 — NV_W
- 86 — NY_C
- 87 — NY_E
- 88 — NY_LI
- 89 — NY_W
- 90 — OH_N
- 91 — OH_S
- 92 — OK_N
- 93 — OK_S
- 94 — OR_N
- 95 — OR_S
- 96 — PA_N
- 97 — PA_S
- 98 — PR
- 99 — RI
- 100 — SC_N
- 101 — SC_S
- 102 — SD_N
- 103 — SD_S
- 104 — St.Croix
- 105 — TN
- 106 — TX_C
- 107 — TX_N
- 108 — TX_NC
- 109 — TX_S
- 110 — TX_SC
- 111 — UT_C
- 112 — UT_N
- 113 — UT_S
- 114 — VA_N
- 115 — VA_S
- 116 — VT

- 117 — WA_N
- 118 — WA_S
- 119 — WI_C
- 120 — WI_N
- 121 — WI_S
- 122 — WV_N
- 123 — WV_S
- 124 — WY_E
- 125 — WY_EC
- 126 — WY_W
- 127 — WY_WC

Default: *0*

`target projection` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — utm
- 2 — sp83
- 3 — sp27
- 4 — longlat
- 5 — latlong

Default: *0*

`target utm zone` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — 1 (north)
- 2 — 2 (north)
- 3 — 3 (north)
- 4 — 4 (north)
- 5 — 5 (north)
- 6 — 6 (north)
- 7 — 7 (north)
- 8 — 8 (north)
- 9 — 9 (north)
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- 106 — 46 (south)
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- 110 — 50 (south)
- 111 — 51 (south)
- 112 — 52 (south)
- 113 — 53 (south)
- 114 — 54 (south)
- 115 — 55 (south)
- 116 — 56 (south)
- 117 — 57 (south)
- 118 — 58 (south)
- 119 — 59 (south)
- 120 — 60 (south)

Default: *0*

`target state plane code` **[selection]** <put parameter description here>

Options:

- 0 — —
- 1 — AK_10
- 2 — AK_2
- 3 — AK_3
- 4 — AK_4
- 5 — AK_5
- 6 — AK_6
- 7 — AK_7
- 8 — AK_8

- 9 — AK_9
- 10 — AL_E
- 11 — AL_W
- 12 — AR_N
- 13 — AR_S
- 14 — AZ_C
- 15 — AZ_E
- 16 — AZ_W
- 17 — CA_I
- 18 — CA_II
- 19 — CA_III
- 20 — CA_IV
- 21 — CA_V
- 22 — CA_VI
- 23 — CA_VII
- 24 — CO_C
- 25 — CO_N
- 26 — CO_S
- 27 — CT
- 28 — DE
- 29 — FL_E
- 30 — FL_N
- 31 — FL_W
- 32 — GA_E
- 33 — GA_W
- 34 — HI_1
- 35 — HI_2
- 36 — HI_3
- 37 — HI_4
- 38 — HI_5
- 39 — IA_N
- 40 — IA_S
- 41 — ID_C
- 42 — ID_E
- 43 — ID_W
- 44 — IL_E
- 45 — IL_W
- 46 — IN_E
- 47 — IN_W

- 48 — KS_N
- 49 — KS_S
- 50 — KY_N
- 51 — KY_S
- 52 — LA_N
- 53 — LA_S
- 54 — MA_I
- 55 — MA_M
- 56 — MD
- 57 — ME_E
- 58 — ME_W
- 59 — MI_C
- 60 — MI_N
- 61 — MI_S
- 62 — MN_C
- 63 — MN_N
- 64 — MN_S
- 65 — MO_C
- 66 — MO_E
- 67 — MO_W
- 68 — MS_E
- 69 — MS_W
- 70 — MT_C
- 71 — MT_N
- 72 — MT_S
- 73 — NC
- 74 — ND_N
- 75 — ND_S
- 76 — NE_N
- 77 — NE_S
- 78 — NH
- 79 — NJ
- 80 — NM_C
- 81 — NM_E
- 82 — NM_W
- 83 — NV_C
- 84 — NV_E
- 85 — NV_W
- 86 — NY_C

- 87 — NY_E
- 88 — NY_LI
- 89 — NY_W
- 90 — OH_N
- 91 — OH_S
- 92 — OK_N
- 93 — OK_S
- 94 — OR_N
- 95 — OR_S
- 96 — PA_N
- 97 — PA_S
- 98 — PR
- 99 — RI
- 100 — SC_N
- 101 — SC_S
- 102 — SD_N
- 103 — SD_S
- 104 — St.Croix
- 105 — TN
- 106 — TX_C
- 107 — TX_N
- 108 — TX_NC
- 109 — TX_S
- 110 — TX_SC
- 111 — UT_C
- 112 — UT_N
- 113 — UT_S
- 114 — VA_N
- 115 — VA_S
- 116 — VT
- 117 — WA_N
- 118 — WA_S
- 119 — WI_C
- 120 — WI_N
- 121 — WI_S
- 122 — WV_N
- 123 — WV_S
- 124 — WY_E
- 125 — WY_EC

- 126 — WY_W
- 127 — WY_WC

Default: *0*

Outputs

`output LAS/LAZ file` [file] <put output description here>

Console usage

```
processing.runalg('lidartools:las2lasproject', verbose, input_laslaz, source_projection, source_ut
```

See also

18.2.3 las2las_transform

Description

<put algortithm description here>

Parameters

`verbose` [boolean] <put parameter description here>

Default: *False*

`input LAS/LAZ file` [file] Optional.

<put parameter description here>

`transform (coordinates)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — translate_x
- 2 — translate_y
- 3 — translate_z
- 4 — scale_x
- 5 — scale_y
- 6 — scale_z
- 7 — clamp_z_above
- 8 — clamp_z_below

Default: *0*

`value for transform (coordinates)` [string] <put parameter description here>

Default: *(not set)*

`second transform (coordinates)` [selection] <put parameter description here>

Options:

- 0 — —

- 1 — translate_x
- 2 — translate_y
- 3 — translate_z
- 4 — scale_x
- 5 — scale_y
- 6 — scale_z
- 7 — clamp_z_above
- 8 — clamp_z_below

Default: *0*

`value for second transform (coordinates)` [string] <put parameter description here>

Default: *(not set)*

`transform (intensities, scan angles, GPS times, ...)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — scale_intensity
- 2 — translate_intensity
- 3 — clamp_intensity_above
- 4 — clamp_intensity_below
- 5 — scale_scan_angle
- 6 — translate_scan_angle
- 7 — translate_gps_time
- 8 — set_classification
- 9 — set_user_data
- 10 — set_point_source
- 11 — scale_rgb_up
- 12 — scale_rgb_down
- 13 — repair_zero_returns

Default: *0*

`value for transform (intensities, scan angles, GPS times, ...)` [string] <put parameter description here>

Default: *(not set)*

`second transform (intensities, scan angles, GPS times, ...)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — scale_intensity
- 2 — translate_intensity
- 3 — clamp_intensity_above
- 4 — clamp_intensity_below

- 5 — scale_scan_angle
- 6 — translate_scan_angle
- 7 — translate_gps_time
- 8 — set_classification
- 9 — set_user_data
- 10 — set_point_source
- 11 — scale_rgb_up
- 12 — scale_rgb_down
- 13 — repair_zero_returns

Default: *0*

`value for second transform (intensities, scan angles, GPS times, ...)` [string] <put parameter description here>

Default: *(not set)*

`operations (first 7 need an argument)` [selection] <put parameter description here>

Options:

- 0 — —
- 1 — set_point_type
- 2 — set_point_size
- 3 — set_version_minor
- 4 — set_version_major
- 5 — start_at_point
- 6 — stop_at_point
- 7 — remove_vlr
- 8 — auto_reoffset
- 9 — week_to_adjusted
- 10 — adjusted_to_week
- 11 — scale_rgb_up
- 12 — scale_rgb_down
- 13 — remove_all_vlrs
- 14 — remove_extra
- 15 — clip_to_bounding_box

Default: *0*

`argument for operation` [string] <put parameter description here>

Default: *(not set)*

Outputs

`output LAS/LAZ file` [file] <put output description here>

Console usage

```
processing.runalg('lidartools:las2lastransform', verbose, input_laslaz, transform_coordinate1, tra
```

See also

18.2.4 las2txt

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

parse_string [string] <put parameter description here>

Default: *xyz*

Outputs

Output ASCII file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:las2txt', verbose, input_laslaz, parse_string, output)
```

See also

18.2.5 lasindex

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

is mobile or terrestrial LiDAR (not airborne) [boolean] <put parameter description here>

Default: *False*

Outputs

Console usage

```
processing.runalg('lidartools:lasindex', verbose, input_laslaz, mobile_or_terrestrial)
```

See also

18.2.6 lasinfo

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

Outputs

Output ASCII file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:lasinfo', verbose, input_laslaz, output)
```

See also

18.2.7 lasmerge

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

files are flightlines [boolean] <put parameter description here>

Default: *True*

input LAS/LAZ file [file] Optional.

<put parameter description here>

2nd file [file] Optional.

<put parameter description here>

3rd file [file] Optional.

<put parameter description here>

4th file [file] Optional.

<put parameter description here>

5th file [file] Optional.

<put parameter description here>

6th file [file] Optional.

<put parameter description here>

7th file [file] Optional.

<put parameter description here>

Outputs

output LAS/LAZ file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:lasmerge', verbose, files_are_flightlines, input_laslaz, file2, file
```

See also

18.2.8 lasprecision

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

Outputs

Output ASCII file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:lasprecision', verbose, input_laslaz, output)
```

See also

18.2.9 lasquery

Description

<put algortithm description here>

Parameters

`verbose` [boolean] <put parameter description here>

Default: *False*

`area of interest` [extent] <put parameter description here>

Default: *0,1,0,1*

Outputs

Console usage

```
processing.runalg('lidartools:lasquery', verbose, aoi)
```

See also

18.2.10 lasvalidate

Description

<put algortithm description here>

Parameters

`verbose` [boolean] <put parameter description here>

Default: *False*

`input LAS/LAZ file` [file] Optional.

<put parameter description here>

Outputs

`Output XML file` [file] <put output description here>

Console usage

```
processing.runalg('lidartools:lasvalidate', verbose, input_laslaz, output)
```

See also

18.2.11 laszip

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

input LAS/LAZ file [file] Optional.

<put parameter description here>

only report size [boolean] <put parameter description here>

Default: *False*

Outputs

output LAS/LAZ file [file] <put output description here>

Console usage

```
processing.runalg('lidartools:laszip', verbose, input_laslaz, report_size, output_laslaz)
```

See also

18.2.12 txt2las

Description

<put algortithm description here>

Parameters

verbose [boolean] <put parameter description here>

Default: *False*

Input ASCII file [file] Optional.

<put parameter description here>

parse lines as [string] <put parameter description here>

Default: *xyz*

skip the first n lines [number] <put parameter description here>

Default: *0*

resolution of x and y coordinate [number] <put parameter description here>

Default: *0.01*

`resolution of z coordinate` **[number]** <put parameter description here>

Default: *0.01*

Outputs

`output LAS/LAZ file` **[file]** <put output description here>

Console usage

```
processing.runalg('lidartools:txt2las', verbose, input, parse_string, skip, scale_factor_xy, scal
```

See also

.

18.3 Herramientas del Modelador

18.3.1 Calculator

Description

<put algortithm description here>

Parameters

`Formula` **[string]** <put parameter description here>

Default: *(not set)*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

`dummy` **[number]** <put parameter description here>

Default: *0.0*

dummy [number] <put parameter description here>

Default: *0.0*

dummy [number] <put parameter description here>

Default: *0.0*

Outputs

Result [number] <put output description here>

Console usage

```
processing.runalg('modelertools:calculator', formula, number0, number1, number2, number3, number4
```

See also

18.3.2 Raster layer bounds

Description

<put algortithm description here>

Parameters

Layer [raster] <put parameter description here>

Outputs

min X [number] <put output description here>

max X [number] <put output description here>

min Y [number] <put output description here>

max Y [number] <put output description here>

Extent [extent] <put output description here>

Console usage

```
processing.runalg('modelertools:rasterlayerbounds', layer)
```

See also

18.3.3 Vector layer bounds

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Outputs

`min X` [number] <put output description here>

`max X` [number] <put output description here>

`min Y` [number] <put output description here>

`max Y` [number] <put output description here>

`Extent` [extent] <put output description here>

Console usage

```
processing.runalg('modelertools:vectorlayerbounds', layer)
```

See also

.

18.4 OrfeoToolbox algorithm provider

Orfeo ToolBox (OTB) is an open source library of image processing algorithms. OTB is based on the medical image processing library ITK and offers particular functionalities for remote sensing image processing in general and for high spatial resolution images in particular. Targeted algorithms for high resolution optical images (Pleiades, SPOT, QuickBird, WorldView, Landsat, Ikonos), hyperspectral sensors (Hyperion) or SAR (TerraSarX, ERS, Palsar) are available.

Nota: Please remember that Processing contains only the interface description, so you need to install OTB by yourself and configure Processing properly.

.

18.4.1 Calibration

Optical calibration

Description

<put algortithm description here>

Parameters

`Input` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Calibration Level` [selection] <put parameter description here>

Options:

- 0 — toa

Default: *0*

`Convert to milli reflectance` [boolean] <put parameter description here>

Default: *True*

`Clamp of reflectivity values between [0, 100]` [boolean] <put parameter description here>

Default: *True*

`Relative Spectral Response File` [file] Optional.

<put parameter description here>

Outputs

`Output` [raster] <put output description here>

Console usage

```
processing.runalg('otb:opticalcalibration', -in, -ram, -level, -milli, -clamp, -rsr, -out)
```

See also

.

18.4.2 Extracción de objeto espacial

BinaryMorphologicalOperation (closing)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Structuring Element Type` [selection] <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` [number] <put parameter description here>

Default: *5*

`Morphological Operation` [selection] <put parameter description here>

Options:

- 0 — closing

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:binarymorphologicaloperationclosing', -in, -channel, -ram, -structype, -st
```

See also

BinaryMorphologicalOperation (dilate)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Structuring Element Type` [selection] <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` [number] <put parameter description here>

Default: *5*

`Morphological Operation` [selection] <put parameter description here>

Options:

- 0 — dilate

Default: *0*

`Foreground Value` [number] <put parameter description here>

Default: *1*

`Background Value` [number] <put parameter description here>

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:binarymorphologicaloperationdilate', -in, -channel, -ram, -structype, -stru
```

See also

BinaryMorphologicalOperation (erode)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Structuring Element Type` [selection] <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` [number] <put parameter description here>

Default: *5*

`Morphological Operation` [selection] <put parameter description here>

Options:

- 0 — erode

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:binarymorphologicaloperationerode', -in, -channel, -ram, -structype, -struc
```

See also

BinaryMorphologicalOperation (opening)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Selected Channel` **[number]** <put parameter description here>

Default: *1*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Structuring Element Type` **[selection]** <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` **[number]** <put parameter description here>

Default: *5*

`Morphological Operation` **[selection]** <put parameter description here>

Options:

- 0 — opening

Default: *0*

Outputs

`Feature Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:binarymorphologicaloperationopening', -in, -channel, -ram, -structype, -st
```

See also

EdgeExtraction (gradient)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Selected Channel` **[number]** <put parameter description here>

Default: *1*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Edge feature` **[selection]** <put parameter description here>

Options:

- 0 — gradient

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:edgeextractiongradient', -in, -channel, -ram, -filter, -out)
```

See also

EdgeExtraction (sobel)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Edge feature` [selection] <put parameter description here>

Options:

- 0 — sobel

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:edgeextractionsobel', -in, -channel, -ram, -filter, -out)
```

See also

EdgeExtraction (touzi)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Selected Channel` **[number]** <put parameter description here>

Default: *1*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Edge feature` **[selection]** <put parameter description here>

Options:

- 0 — touzi

Default: *0*

`The Radius` **[number]** <put parameter description here>

Default: *1*

Outputs

`Feature Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:edgeextractiontouzi', -in, -channel, -ram, -filter, -filter.touzi.xradius,
```

See also

GrayScaleMorphologicalOperation (closing)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Selected Channel` **[number]** <put parameter description here>

Default: *1*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Structuring Element Type` **[selection]** <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` **[number]** <put parameter description here>

Default: *5*

Morphological Operation [selection] <put parameter description here>

Options:

- 0 — closing

Default: *0*

Outputs

Feature Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:grayscalemorphologicaloperationclosing', -in, -channel, -ram, -structype, -
```

See also

GrayScaleMorphologicalOperation (dilate)

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Selected Channel [number] <put parameter description here>

Default: *1*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Structuring Element Type [selection] <put parameter description here>

Options:

- 0 — ball

Default: *0*

The Structuring Element Radius [number] <put parameter description here>

Default: *5*

Morphological Operation [selection] <put parameter description here>

Options:

- 0 — dilate

Default: *0*

Outputs

Feature Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:grayscalemorphologicaloperationdilate', -in, -channel, -ram, -structype, -s
```

See also

GrayScaleMorphologicalOperation (erode)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Selected Channel` **[number]** <put parameter description here>

Default: *1*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Structuring Element Type` **[selection]** <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` **[number]** <put parameter description here>

Default: *5*

`Morphological Operation` **[selection]** <put parameter description here>

Options:

- 0 — erode

Default: *0*

Outputs

`Feature Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:grayscalemorphologicaloperationerode', -in, -channel, -ram, -structype, -st
```

See also

GrayScaleMorphologicalOperation (opening)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Structuring Element Type` [selection] <put parameter description here>

Options:

- 0 — ball

Default: *0*

`The Structuring Element Radius` [number] <put parameter description here>

Default: *5*

`Morphological Operation` [selection] <put parameter description here>

Options:

- 0 — opening

Default: *0*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:grayscalemorphologicaloperationopening', -in, -channel, -ram, -structype, -
```

See also

Haralick Texture Extraction

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`X Radius` [number] <put parameter description here>

Default: *2*

`Y Radius` [number] <put parameter description here>

Default: *2*

`X Offset` [number] <put parameter description here>

Default: *1*

`Y Offset` [number] <put parameter description here>

Default: *1*

`Image Minimum` [number] <put parameter description here>

Default: *0*

`Image Maximum` [number] <put parameter description here>

Default: *255*

`Histogram number of bin` [number] <put parameter description here>

Default: *8*

`Texture Set Selection` [selection] <put parameter description here>

Options:

- 0 — simple
- 1 — advanced
- 2 — higher

Default: *0*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:haralicktextureextraction', -in, -channel, -ram, -parameters.xrad, -paramet
```

See also

Line segment detection

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`No rescaling in [0, 255]` [boolean] <put parameter description here>

Default: *True*

Outputs

`Output Detected lines` [vector] <put output description here>

Console usage

```
processing.runalg('otb:linesegmentdetection', -in, -norescale, -out)
```

See also

Local Statistic Extraction

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Selected Channel` [number] <put parameter description here>

Default: *1*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Neighborhood radius` [number] <put parameter description here>

Default: *3*

Outputs

`Feature Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:localstatisticextraction', -in, -channel, -ram, -radius, -out)
```

See also

Multivariate alteration detector

Description

<put algortithm description here>

Parameters

`Input Image 1` **[raster]** <put parameter description here>

`Input Image 2` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

Outputs

`Change Map` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:multivariatealterationdetector', -in1, -in2, -ram, -out)
```

See also

Radiometric Indices

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Blue Channel` **[number]** <put parameter description here>

Default: *1*

`Green Channel` **[number]** <put parameter description here>

Default: *1*

`Red Channel` **[number]** <put parameter description here>

Default: *1*

`NIR Channel` **[number]** <put parameter description here>

Default: *1*

`Mir Channel` **[number]** <put parameter description here>

Default: *1*

`Available Radiometric Indices` **[selection]** <put parameter description here>

Options:

- 0 — ndvi
- 1 — tndvi
- 2 — rvi

- 3 — savi
- 4 — tsavi
- 5 — msavi
- 6 — msavi2
- 7 — gemi
- 8 — ipvi
- 9 — ndwi
- 10 — ndwi2
- 11 — mndwi
- 12 — ndpi
- 13 — ndti
- 14 — ri
- 15 — ci
- 16 — bi
- 17 — bi2

Default: *0*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:radiometricindices', -in, -ram, -channels.blue, -channels.green, -channels
```

See also

.

18.4.3 Geometría

Image Envelope

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Sampling Rate` **[number]** <put parameter description here>

Default: *0*

`Projection` **[string]** Optional.

<put parameter description here>

Default: *None*

Outputs

`Output Vector Data` **[vector]** <put output description here>

Console usage

```
processing.runalg('otb:imageenvelope', -in, -sr, -proj, -out)
```

See also

OrthoRectification (epsg)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Output Cartographic Map Projection` **[selection]** <put parameter description here>

Options:

- 0 — epsg

Default: *0*

`EPSG Code` **[number]** <put parameter description here>

Default: *4326*

`Parameters estimation modes` **[selection]** <put parameter description here>

Options:

- 0 — autosize
- 1 — autospacing

Default: *0*

`Default pixel value` **[number]** <put parameter description here>

Default: *0*

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — bco
- 1 — nn
- 2 — linear

Default: *0*

Radius for bicubic interpolation [number] <put parameter description here>

Default: *2*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Resampling grid spacing [number] <put parameter description here>

Default: *4*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:orthorectificationepsg', -io.in, -map, -map.epsg.code, -outputs.mode, -out
```

See also

OrthoRectification (fit-to-ortho)

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Parameters estimation modes [selection] <put parameter description here>

Options:

- 0 — orthofit

Default: *0*

Model ortho-image [raster] Optional.

<put parameter description here>

Default pixel value [number] <put parameter description here>

Default: *0*

Default elevation [number] <put parameter description here>

Default: *0*

Interpolation [selection] <put parameter description here>

Options:

- 0 — bco
- 1 — nn
- 2 — linear

Default: *0*

`Radius for bicubic interpolation` **[number]** <put parameter description here>

Default: *2*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Resampling grid spacing` **[number]** <put parameter description here>

Default: *4*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:orthorectificationfittoortho', -io.in, -outputs.mode, -outputs.ortho, -outp
```

See also

OrthoRectification (lambert-WGS84)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Output Cartographic Map Projection` **[selection]** <put parameter description here>

Options:

- 0 — lambert2
- 1 — lambert93
- 2 — wgs

Default: *0*

`Parameters estimation modes` **[selection]** <put parameter description here>

Options:

- 0 — autosize
- 1 — autospacing

Default: *0*

`Default pixel value` **[number]** <put parameter description here>

Default: *0*

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — bco
- 1 — nn
- 2 — linear

Default: *0*

`Radius for bicubic interpolation` [number] <put parameter description here>

Default: *2*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Resampling grid spacing` [number] <put parameter description here>

Default: *4*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:orthorectificationlambertwgs84', -io.in, -map, -outputs.mode, -outputs.defa
```

See also

OrthoRectification (utm)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Output Cartographic Map Projection` [selection] <put parameter description here>

Options:

- 0 — utm

Default: *0*

`Zone number` [number] <put parameter description here>

Default: *31*

`Northern Hemisphere` [boolean] <put parameter description here>

Default: *True*

`Parameters estimation modes` [selection] <put parameter description here>

Options:

- 0 — autosize
- 1 — autospacing

Default: *0*

`Default pixel value` **[number]** <put parameter description here>

Default: *0*

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — bco
- 1 — nn
- 2 — linear

Default: *0*

`Radius for bicubic interpolation` **[number]** <put parameter description here>

Default: *2*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Resampling grid spacing` **[number]** <put parameter description here>

Default: *4*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:orthorectificationutm', -io.in, -map, -map.utm.zone, -map.utm.northhem, -o
```

See also

Pansharpening (bayes)

Description

<put algortithm description here>

Parameters

`Input PAN Image` **[raster]** <put parameter description here>

`Input XS Image` **[raster]** <put parameter description here>

`Algorithm` **[selection]** <put parameter description here>

Options:

- 0 — bayes

Default: *0*

`Weight` **[number]** <put parameter description here>

Default: *0.9999*

S coefficient [number] <put parameter description here>

Default: *1*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Output image [raster] <put output description here>

Console usage

```
processing.runalg('otb:pansharpeningbayes', -inp, -inxs, -method, -method.bayes.lambda, -method.ba
```

See also

Pansharpening (lmvm)

Description

<put algortithm description here>

Parameters

Input PAN Image [raster] <put parameter description here>

Input XS Image [raster] <put parameter description here>

Algorithm [selection] <put parameter description here>

Options:

- 0 — lmvm

Default: *0*

X radius [number] <put parameter description here>

Default: *3*

Y radius [number] <put parameter description here>

Default: *3*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Output image [raster] <put output description here>

Console usage

```
processing.runalg('otb:pansharpeninglmvm', -inp, -inxs, -method, -method.lmvm.radiusx, -method.lmv
```

See also

Pansharpening (rcs)

Description

<put algortithm description here>

Parameters

`Input PAN Image` [raster] <put parameter description here>

`Input XS Image` [raster] <put parameter description here>

`Algorithm` [selection] <put parameter description here>

Options:

- 0 — rcs

Default: *0*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Output image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:pansharpeningrcs', -inp, -inxs, -method, -ram, -out)
```

See also

RigidTransformResample (id)

Description

<put algortithm description here>

Parameters

`Input image` [raster] <put parameter description here>

`Type of transformation` [selection] <put parameter description here>

Options:

- 0 — id

Default: *0*

`X scaling` [number] <put parameter description here>

Default: *1*

Y scaling [number] <put parameter description here>

Default: *1*

Interpolation [selection] <put parameter description here>

Options:

- 0 — nn
- 1 — linear
- 2 — bco

Default: *2*

Radius for bicubic interpolation [number] <put parameter description here>

Default: *2*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Output image [raster] <put output description here>

Console usage

```
processing.runalg('otb:rigidtransformresampleid', -in, -transform.type, -transform.type.id.scalex,
```

See also

RigidTransformResample (rotation)

Description

<put algortithm description here>

Parameters

Input image [raster] <put parameter description here>

Type of transformation [selection] <put parameter description here>

Options:

- 0 — rotation

Default: *0*

Rotation angle [number] <put parameter description here>

Default: *0*

X scaling [number] <put parameter description here>

Default: *1*

Y scaling [number] <put parameter description here>

Default: *1*

`Interpolation` [selection] <put parameter description here>

Options:

- 0 — nn
- 1 — linear
- 2 — bco

Default: *2*

`Radius for bicubic interpolation` [number] <put parameter description here>

Default: *2*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Output image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:rigidtransformresamplerotation', -in, -transform.type, -transform.type.rota
```

See also

RigidTransformResample (translation)

Description

<put algortithm description here>

Parameters

`Input image` [raster] <put parameter description here>

`Type of transformation` [selection] <put parameter description here>

Options:

- 0 — translation

Default: *0*

`The X translation (in physical units)` [number] <put parameter description here>

Default: *0*

`The Y translation (in physical units)` [number] <put parameter description here>

Default: *0*

`X scaling` [number] <put parameter description here>

Default: *1*

`Y scaling` [number] <put parameter description here>

Default: *1*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — nn
- 1 — linear
- 2 — bco

Default: *2*

`Radius for bicubic interpolation` **[number]** <put parameter description here>

Default: *2*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

Outputs

`Output image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:rigidtransformresampletranslation', -in, -transform.type, -transform.type.t
```

See also

Superimpose sensor

Description

<put algortithm description here>

Parameters

`Reference input` **[raster]** <put parameter description here>

`The image to reproject` **[raster]** <put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Spacing of the deformation field` **[number]** <put parameter description here>

Default: *4*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — bco
- 1 — nn
- 2 — linear

Default: *0*

`Radius for bicubic interpolation` **[number]** <put parameter description here>

Default: *2*

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

Outputs

`Output image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:superimposesensor', -inr, -inm, -elev.default, -lms, -interpolator, -interp
```

See also

.

18.4.4 Filtrado de imagen

DimensionalityReduction (ica)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Algorithm` **[selection]** <put parameter description here>

Options:

- 0 — ica

Default: *0*

`number of iterations` **[number]** <put parameter description here>

Default: *20*

`Give the increment weight of W in [0, 1]` **[number]** <put parameter description here>

Default: *1*

`Number of Components` **[number]** <put parameter description here>

Default: *0*

`Normalize` **[boolean]** <put parameter description here>

Default: *True*

Outputs

`Output Image` **[raster]** <put output description here>

‘‘ Inverse Output Image‘‘ [raster] <put output description here>

`Transformation matrix output` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:dimensionalityreductionica', -in, -method, -method.ica.iter, -method.ica.mu
```

See also

DimensionalityReduction (maf)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Algorithm` [selection] <put parameter description here>

Options:

- 0 — maf

Default: *0*

`Number of Components.` [number] <put parameter description here>

Default: *0*

`Normalize.` [boolean] <put parameter description here>

Default: *True*

Outputs

`Output Image` [raster] <put output description here>

`Transformation matrix output` [file] <put output description here>

Console usage

```
processing.runalg('otb:dimensionalityreductionmaf', -in, -method, -nbcomp, -normalize, -out, -outm
```

See also

DimensionalityReduction (napca)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Algorithm` **[selection]** <put parameter description here>

Options:

- 0 — napca

Default: *0*

`Set the x radius of the sliding window.` **[number]** <put parameter description here>

Default: *1*

`Set the y radius of the sliding window.` **[number]** <put parameter description here>

Default: *1*

`Number of Components.` **[number]** <put parameter description here>

Default: *0*

`Normalize.` **[boolean]** <put parameter description here>

Default: *True*

Outputs

`Output Image` **[raster]** <put output description here>

“ Inverse Output Image“ [raster] <put output description here>

`Transformation matrix output` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:dimensionalityreductionnapca', -in, -method, -method.napca.radiusx, -metho
```

See also

DimensionalityReduction (pca)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Algorithm` **[selection]** <put parameter description here>

Options:

- 0 — pca

Default: *0*

`Number of Components.` **[number]** <put parameter description here>

Default: *0*

`Normalize.` **[boolean]** <put parameter description here>

Default: *True*

Outputs

`Output Image` **[raster]** <put output description here>

`` Inverse Output Image`` [raster] <put output description here>

`Transformation matrix output` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:dimensionalityreductionpca', -in, -method, -nbcomp, -normalize, -out, -out
```

See also

Mean Shift filtering (can be used as Exact Large-Scale Mean-Shift segmentation, step 1)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Spatial radius` **[number]** <put parameter description here>

Default: *5*

`Range radius` **[number]** <put parameter description here>

Default: *15*

`Mode convergence threshold` **[number]** <put parameter description here>

Default: *0.1*

`Maximum number of iterations` **[number]** <put parameter description here>

Default: *100*

`Range radius coefficient` **[number]** <put parameter description here>

Default: *0*

`Mode search.` **[boolean]** <put parameter description here>

Default: *True*

Outputs

`Filtered output` **[raster]** <put output description here>

`Spatial image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:meanshiftfilteringcanbeusedasexactlargescalemeanshiftsegmentationstep1', -i
```

See also

Smoothing (anidif)

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Smoothing Type [selection] <put parameter description here>

Options:

- 0 — anidif

Default: *2*

Time Step [number] <put parameter description here>

Default: *0.125*

Nb Iterations [number] <put parameter description here>

Default: *10*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:smoothinganidif', -in, -ram, -type, -type.anidif.timestep, -type.anidif.nb
```

See also

Smoothing (gaussian)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Smoothing Type` **[selection]** <put parameter description here>

Options:

- 0 — gaussian

Default: *2*

`Radius` **[number]** <put parameter description here>

Default: *2*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:smoothinggaussian', -in, -ram, -type, -type.gaussian.radius, -out)
```

See also

Smoothing (mean)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Smoothing Type` **[selection]** <put parameter description here>

Options:

- 0 — mean

Default: *2*

`Radius` **[number]** <put parameter description here>

Default: *2*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:smoothingmean', -in, -ram, -type, -type.mean.radius, -out)
```

See also

.

18.4.5 Image manipulation

ColorMapping (continuous)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Operation` **[selection]** <put parameter description here>

Options:

- 0 — labeltocolor

Default: *0*

`Color mapping method` **[selection]** <put parameter description here>

Options:

- 0 — continuous

Default: *0*

`Look-up tables` **[selection]** <put parameter description here>

Options:

- 0 — red
- 1 — green
- 2 — blue
- 3 — grey
- 4 — hot
- 5 — cool
- 6 — spring
- 7 — summer
- 8 — autumn
- 9 — winter
- 10 — copper

- 11 — jet
- 12 — hsv
- 13 — overunder
- 14 — relief

Default: *0*

Mapping range lower value [number] <put parameter description here>

Default: *0*

Mapping range higher value [number] <put parameter description here>

Default: *255*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:colormappingcontinuous', -in, -ram, -op, -method, -method.continuous.lut, -
```

See also

ColorMapping (custom)

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Operation [selection] <put parameter description here>

Options:

- 0 — labeltocolor

Default: *0*

Color mapping method [selection] <put parameter description here>

Options:

- 0 — custom

Default: *0*

Look-up table file [file] <put parameter description here>

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:colormappingcustom', -in, -ram, -op, -method, -method.custom.lut, -out)
```

See also

ColorMapping (image)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Available RAM (Mb)` **[number]** <put parameter description here>

Default: *128*

`Operation` **[selection]** <put parameter description here>

Options:

- 0 — labeltocolor

Default: *0*

`Color mapping method` **[selection]** <put parameter description here>

Options:

- 0 — image

Default: *0*

`Support Image` **[raster]** <put parameter description here>

`NoData value` **[number]** <put parameter description here>

Default: *0*

`lower quantile` **[number]** <put parameter description here>

Default: *2*

`upper quantile` **[number]** <put parameter description here>

Default: *2*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:colormappingimage', -in, -ram, -op, -method, -method.image.in, -method.imag
```

See also

ColorMapping (optimal)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Operation` [selection] <put parameter description here>

Options:

- 0 — labeltocolor

Default: *0*

`Color mapping method` [selection] <put parameter description here>

Options:

- 0 — optimal

Default: *0*

`Background label` [number] <put parameter description here>

Default: *0*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:colormappingoptimal', -in, -ram, -op, -method, -method.optimal.background,
```

See also

ExtractROI (fit)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Extraction mode` [selection] <put parameter description here>

Options:

- 0 — fit

Default: *0*

`Reference image` [raster] <put parameter description here>

`Default elevation` [number] <put parameter description here>

Default: *0*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:extractroifit', -in, -ram, -mode, -mode.fit.ref, -mode.fit.elev.default, -o
```

See also

ExtractROI (standard)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Extraction mode` [selection] <put parameter description here>

Options:

- 0 — standard

Default: *0*

`Start X` [number] <put parameter description here>

Default: *0*

`Start Y` [number] <put parameter description here>

Default: *0*

Size X [number] <put parameter description here>

Default: *0*

Size Y [number] <put parameter description here>

Default: *0*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:extractroistandard', -in, -ram, -mode, -startx, -starty, -sizex, -sizey, -
```

See also

Images Concatenation

Description

<put algortithm description here>

Parameters

Input images list [multipleinput: rasters] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:imagesconcatenation', -il, -ram, -out)
```

See also

Image Tile Fusion

Description

<put algortithm description here>

Parameters

`Input Tile Images` **[multipleinput: rasters]** <put parameter description here>

`Number of tile columns` **[number]** <put parameter description here>

Default: *0*

`Number of tile rows` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('otb:imagetilefusion', -il, -cols, -rows, -out)
```

See also

Read image information

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Display the OSSIM keywordlist` **[boolean]** <put parameter description here>

Default: *True*

`GCPs Id` **[string]** <put parameter description here>

Default: *None*

`GCPs Info` **[string]** <put parameter description here>

Default: *None*

`GCPs Image Coordinates` **[string]** <put parameter description here>

Default: *None*

`GCPs Geographic Coordinates` **[string]** <put parameter description here>

Default: *None*

Outputs

Console usage

```
processing.runalg('otb:readimageinformation', -in, -keywordlist, -gcp.ids, -gcp.info, -gcp.imcoor
```

See also

Rescale Image

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Output min value [number] <put parameter description here>

Default: *0*

Output max value [number] <put parameter description here>

Default: *255*

Outputs

Output Image [raster] <put output description here>

Console usage

```
processing.runalg('otb:rescaleimage', -in, -ram, -outmin, -outmax, -out)
```

See also

Split Image

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Output Image [file] <put output description here>

Console usage

```
processing.runalg('otb:splitimage', -in, -ram, -out)
```

See also

.

18.4.6 Learning

Classification Map Regularization

Description

<put algortithm description here>

Parameters

`Input classification image` [raster] <put parameter description here>

`Structuring element radius (in pixels)` [number] <put parameter description here>

Default: *1*

`Multiple majority: Undecided(X)/Original` [boolean] <put parameter description here>

Default: *True*

`Label for the NoData class` [number] <put parameter description here>

Default: *0*

`Label for the Undecided class` [number] <put parameter description here>

Default: *0*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Output regularized image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:classificationmapregularization', -io.in, -ip.radius, -ip.suvbool, -ip.noda
```

See also

ComputeConfusionMatrix (raster)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Ground truth` [selection] <put parameter description here>

Options:

- 0 — raster

Default: *0*

`Input reference image` [raster] <put parameter description here>

`Value for nodata pixels` [number] <put parameter description here>

Default: *0*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Matrix output` [file] <put output description here>

Console usage

```
processing.runalg('otb:computeconfusionmatrixraster', -in, -ref, -ref.raster.in, -nodatalabel, -ra
```

See also

ComputeConfusionMatrix (vector)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Ground truth` [selection] <put parameter description here>

Options:

- 0 — vector

Default: *0*

`Input reference vector data` [file] <put parameter description here>

`Field name` [string] Optional.

<put parameter description here>

Default: *Class*

`Value for nodata pixels` [number] <put parameter description here>

Default: *0*

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Outputs

Matrix output [file] <put output description here>

Console usage

```
processing.runalg('otb:computeconfusionmatrixvector', -in, -ref, -ref.vector.in, -ref.vector.fiel
```

See also

Compute Images second order statistics

Description

<put algortithm description here>

Parameters

Input images [multipleinput: rasters] <put parameter description here>

Background Value [number] <put parameter description here>

Default: *0.0*

Outputs

Output XML file [file] <put output description here>

Console usage

```
processing.runalg('otb:computeimagessecondorderstatistics', -il, -bv, -out)
```

See also

FusionOfClassifications (dempstershafer)

Description

<put algortithm description here>

Parameters

Input classifications [multipleinput: rasters] <put parameter description here>

Fusion method [selection] <put parameter description here>

Options:

- 0 — dempstershafer

Default: *0*

`Confusion Matrices` [multipleinput: files] <put parameter description here>

`Mass of belief measurement` [selection] <put parameter description here>

Options:

- 0 — precision
- 1 — recall
- 2 — accuracy
- 3 — kappa

Default: *0*

`Label for the NoData class` [number] <put parameter description here>

Default: *0*

`Label for the Undecided class` [number] <put parameter description here>

Default: *0*

Outputs

`The output classification image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:fusionofclassificationsdempstershafer', -il, -method, -method.dempstershafe
```

See also

FusionOfClassifications (majorityvoting)

Description

<put algortithm description here>

Parameters

`Input classifications` [multipleinput: rasters] <put parameter description here>

`Fusion method` [selection] <put parameter description here>

Options:

- 0 — majorityvoting

Default: *0*

`Label for the NoData class` [number] <put parameter description here>

Default: *0*

`Label for the Undecided class` [number] <put parameter description here>

Default: *0*

Outputs

`The output classification image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:fusionofclassificationsmajorityvoting', -il, -method, -nodatalabel, -undec
```

See also

Image Classification

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Input Mask` [raster] Optional.

<put parameter description here>

`Model file` [file] <put parameter description here>

`Statistics file` [file] Optional.

<put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:imageclassification', -in, -mask, -model, -imstat, -ram, -out)
```

See also

SOM Classification

Description

<put algortithm description here>

Parameters

`InputImage` [raster] <put parameter description here>

`ValidityMask` [raster] Optional.

<put parameter description here>

`TrainingProbability` [number] <put parameter description here>

Default: *1*

`TrainingSetSize` [number] <put parameter description here>

Default: *0*

`StreamingLines` [number] <put parameter description here>

Default: *0*

`SizeX` [number] <put parameter description here>

Default: *32*

`SizeY` [number] <put parameter description here>

Default: *32*

`NeighborhoodX` [number] <put parameter description here>

Default: *10*

`NeighborhoodY` [number] <put parameter description here>

Default: *10*

`NumberIteration` [number] <put parameter description here>

Default: *5*

`BetaInit` [number] <put parameter description here>

Default: *1*

`BetaFinal` [number] <put parameter description here>

Default: *0.1*

`InitialValue` [number] <put parameter description here>

Default: *0*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`set user defined seed` [number] <put parameter description here>

Default: *0*

Outputs

`OutputImage` [raster] <put output description here>

`SOM Map` [raster] <put output description here>

Console usage

```
processing.runalg('otb:somclassification', -in, -vm, -tp, -ts, -sl, -sx, -sy, -nx, -ny, -ni, -bi,
```

See also

TrainImagesClassifier (ann)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — ann

Default: *0*

`Train Method Type` **[selection]** <put parameter description here>

Options:

- 0 — reg
- 1 — back

Default: *0*

`Number of neurons in each intermediate layer` **[string]** <put parameter description here>

Default: *None*

`Neuron activation function type` **[selection]** <put parameter description here>

Options:

- 0 — ident
- 1 — sig

- 2 — gau

Default: *1*

`Alpha parameter of the activation function` **[number]** <put parameter description here>

Default: *1*

`Beta parameter of the activation function` **[number]** <put parameter description here>

Default: *1*

`Strength of the weight gradient term in the BACKPROP method` **[number]** <put parameter description here>

Default: *0.1*

`Strength of the momentum term (the difference between weights on the 2 previous iteratio`
<put parameter description here>

Default: *0.1*

`Initial value Delta_0 of update-values Delta_{ij} in RPROP method` **[number]**
<put parameter description here>

Default: *0.1*

`Update-values lower limit Delta_{min} in RPROP method` **[number]** <put parameter description here>

Default: *1e-07*

`Termination criteria` **[selection]** <put parameter description here>

Options:

- 0 — iter
- 1 — eps
- 2 — all

Default: *2*

`Epsilon value used in the Termination criteria` **[number]** <put parameter description here>

Default: *0.01*

`Maximum number of iterations used in the Termination criteria` **[number]** <put parameter description here>

Default: *1000*

`set user defined seed` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` **[file]** <put output description here>

`Output model` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierann', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

TrainImagesClassifier (bayes)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — bayes

Default: *0*

`set user defined seed` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` **[file]** <put output description here>

`Output model` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierbayes', -io.il, -io.vd, -io.imstat, -elev.default, -s
```

See also

TrainImagesClassifier (boost)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — boost

Default: *0*

`Boost Type` **[selection]** <put parameter description here>

Options:

- 0 — discrete
- 1 — real
- 2 — logit
- 3 — gentle

Default: *1*

`Weak count` **[number]** <put parameter description here>

Default: *100*

`Weight Trim Rate` **[number]** <put parameter description here>

Default: *0.95*

`Maximum depth of the tree` [number] <put parameter description here>

Default: *1*

`set user defined seed` [number] <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` [file] <put output description here>

`Output model` [file] <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierboost', -io.il, -io.vd, -io.imstat, -elev.default, -sa
```

See also

TrainImagesClassifier (dt)

Description

<put algortithm description here>

Parameters

`Input Image List` [multipleinput: rasters] <put parameter description here>

`Input Vector Data List` [multipleinput: any vectors] <put parameter description here>

`Input XML image statistics file` [file] Optional.

<put parameter description here>

`Default elevation` [number] <put parameter description here>

Default: *0*

`Maximum training sample size per class` [number] <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` [number] <put parameter description here>

Default: *1000*

`On edge pixel inclusion` [boolean] <put parameter description here>

Default: *True*

`Training and validation sample ratio` [number] <put parameter description here>

Default: *0.5*

`Name of the discrimination field` [string] <put parameter description here>

Default: *Class*

`Classifier to use for the training` [selection] <put parameter description here>

Options:

- 0 — dt

Default: *0*

Maximum depth of the tree [number] <put parameter description here>

Default: *65535*

Minimum number of samples in each node [number] <put parameter description here>

Default: *10*

Termination criteria for regression tree [number] <put parameter description here>

Default: *0.01*

Cluster possible values of a categorical variable into K <= cat clusters to find a subop
<put parameter description here>

Default: *10*

K-fold cross-validations [number] <put parameter description here>

Default: *10*

Set Use1seRule flag to false [boolean] <put parameter description here>

Default: *True*

Set TruncatePrunedTree flag to false [boolean] <put parameter description here>

Default: *True*

set user defined seed [number] <put parameter description here>

Default: *0*

Outputs

Output confusion matrix [file] <put output description here>

Output model [file] <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierdt', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

TrainImagesClassifier (gbt)

Description

<put algortithm description here>

Parameters

Input Image List [multipleinput: rasters] <put parameter description here>

Input Vector Data List [multipleinput: any vectors] <put parameter description here>

Input XML image statistics file [file] Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — gbt

Default: *0*

`Number of boosting algorithm iterations` **[number]** <put parameter description here>

Default: *200*

`Regularization parameter` **[number]** <put parameter description here>

Default: *0.01*

`Portion of the whole training set used for each algorithm iteration` **[number]** <put parameter description here>

Default: *0.8*

`Maximum depth of the tree` **[number]** <put parameter description here>

Default: *3*

`set user defined seed` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` **[file]** <put output description here>

`Output model` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifiergbt', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

TrainImagesClassifier (knn)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — knn

Default: *0*

`Number of Neighbors` **[number]** <put parameter description here>

Default: *32*

`set user defined seed` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` **[file]** <put output description here>

`Output model` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierknn', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

TrainImagesClassifier (libsvm)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — libsvm

Default: *0*

`SVM Kernel Type` **[selection]** <put parameter description here>

Options:

- 0 — linear
- 1 — rbf
- 2 — poly
- 3 — sigmoid

Default: *0*

`Cost parameter C` **[number]** <put parameter description here>

Default: *1*

`Parameters optimization` **[boolean]** <put parameter description here>

Default: *True*

`set user defined seed` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` **[file]** <put output description here>

`Output model` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierlibsvm', -io.il, -io.vd, -io.imstat, -elev.default, -s
```

See also

TrainImagesClassifier (rf)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` [selection] <put parameter description here>

Options:

- 0 — rf

Default: *0*

`Maximum depth of the tree` [number] <put parameter description here>

Default: *5*

`Minimum number of samples in each node` [number] <put parameter description here>

Default: *10*

`Termination Criteria for regression tree` [number] <put parameter description here>

Default: *0*

`Cluster possible values of a categorical variable into K <= cat clusters to find a subop`
<put parameter description here>

Default: *10*

`Size of the randomly selected subset of features at each tree node` [number]
<put parameter description here>

Default: *0*

`Maximum number of trees in the forest` [number] <put parameter description here>

Default: *100*

`Sufficient accuracy (OOB error)` [number] <put parameter description here>

Default: *0.01*

`set user defined seed` [number] <put parameter description here>

Default: *0*

Outputs

`Output confusion matrix` [file] <put output description here>

`Output model` [file] <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifierrf', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

TrainImagesClassifier (svm)

Description

<put algortithm description here>

Parameters

`Input Image List` **[multipleinput: rasters]** <put parameter description here>

`Input Vector Data List` **[multipleinput: any vectors]** <put parameter description here>

`Input XML image statistics file` **[file]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Maximum training sample size per class` **[number]** <put parameter description here>

Default: *1000*

`Maximum validation sample size per class` **[number]** <put parameter description here>

Default: *1000*

`On edge pixel inclusion` **[boolean]** <put parameter description here>

Default: *True*

`Training and validation sample ratio` **[number]** <put parameter description here>

Default: *0.5*

`Name of the discrimination field` **[string]** <put parameter description here>

Default: *Class*

`Classifier to use for the training` **[selection]** <put parameter description here>

Options:

- 0 — svm

Default: *0*

`SVM Model Type` **[selection]** <put parameter description here>

Options:

- 0 — csvc
- 1 — nusvc
- 2 — oneclass

Default: *0*

`SVM Kernel Type` **[selection]** <put parameter description here>

Options:

- 0 — linear
- 1 — rbf
- 2 — poly
- 3 — sigmoid

Default: *0*

`Cost parameter C` **[number]** <put parameter description here>

Default: *1*

`Parameter nu of a SVM optimization problem (NU_SVC / ONE_CLASS)` **[number]** <put parameter description here>

Default: *0*

Parameter coef0 of a kernel function (POLY / SIGMOID) [number] <put parameter description here>

Default: *0*

Parameter gamma of a kernel function (POLY / RBF / SIGMOID) [number] <put parameter description here>

Default: *1*

Parameter degree of a kernel function (POLY) [number] <put parameter description here>

Default: *1*

Parameters optimization [boolean] <put parameter description here>

Default: *True*

set user defined seed [number] <put parameter description here>

Default: *0*

Outputs

Output confusion matrix [file] <put output description here>

Output model [file] <put output description here>

Console usage

```
processing.runalg('otb:trainimagesclassifiersvm', -io.il, -io.vd, -io.imstat, -elev.default, -samp
```

See also

Unsupervised KMeans image classification

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Available RAM (Mb) [number] <put parameter description here>

Default: *128*

Validity Mask [raster] Optional.

<put parameter description here>

Training set size [number] <put parameter description here>

Default: *100*

Number of classes [number] <put parameter description here>

Default: *5*

Maximum number of iterations [number] <put parameter description here>

Default: *1000*

`Convergence threshold` [number] <put parameter description here>

Default: *0.0001*

Outputs

`Output Image` [raster] <put output description here>

`Centroid filename` [file] <put output description here>

Console usage

```
processing.runalg('otb:unsupervisedkmeansimageclassification', -in, -ram, -vm, -ts, -nc, -maxit, -
```

See also

.

18.4.7 Miscellaneous

Band Math

Description

<put algortithm description here>

Parameters

`Input image list` [multipleinput: rasters] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

`Expression` [string] <put parameter description here>

Default: *None*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:bandmath', -il, -ram, -exp, -out)
```

See also

ComputeModulusAndPhase-one (OneEntry)

Description

<put algortithm description here>

Parameters

`Number Of inputs` [selection] <put parameter description here>

Options:

- 0 — one

Default: *0*

`Input image` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Modulus` [raster] <put output description here>

`Phase` [raster] <put output description here>

Console usage

```
processing.runalg('otb:computemodulusandphaseoneentry', -nbinput, -nbinput.one.in, -ram, -mod,
```

See also

ComputeModulusAndPhase-two (TwoEntries)

Description

<put algortithm description here>

Parameters

`Number Of inputs` [selection] <put parameter description here>

Options:

- 0 — two

Default: *0*

`Real part input` [raster] <put parameter description here>

`Imaginary part input` [raster] <put parameter description here>

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Modulus` [raster] <put output description here>

`Phase` [raster] <put output description here>

Console usage

```
processing.runalg('otb:computemodulusandphasetwotwoentries', -nbinput, -nbinput.two.re, -nbinput.t
```

See also

Images comparaison

Description

<put algortithm description here>

Parameters

Reference image [raster] <put parameter description here>

Reference image channel [number] <put parameter description here>

Default: *1*

Measured image [raster] <put parameter description here>

Measured image channel [number] <put parameter description here>

Default: *1*

Start X [number] <put parameter description here>

Default: *0*

Start Y [number] <put parameter description here>

Default: *0*

Size X [number] <put parameter description here>

Default: *0*

Size Y [number] <put parameter description here>

Default: *0*

Outputs

Console usage

```
processing.runalg('otb:imagescomparaison', -ref.in, -ref.channel, -meas.in, -meas.channel, -roi.st
```

See also

Image to KMZ Export

Description

<put algortithm description here>

Parameters

`Input image` **[raster]** <put parameter description here>

`Tile Size` **[number]** <put parameter description here>

Default: *512*

`Image logo` **[raster]** Optional.

<put parameter description here>

`Image legend` **[raster]** Optional.

<put parameter description here>

`Default elevation` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output .kmz product` **[file]** <put output description here>

Console usage

```
processing.runalg('otb:imagetokmzexport', -in, -tilesize, -logo, -legend, -elev.default, -out)
```

See also

.

18.4.8 Segmentación

Connected Component Segmentation

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Mask expression` **[string]** Optional.

<put parameter description here>

Default: *None*

`Connected Component Expression` **[string]** <put parameter description here>

Default: *None*

`Minimum Object Size` **[number]** <put parameter description here>

Default: *2*

OBIA Expression [string] Optional.

<put parameter description here>

Default: *None*

Default elevation [number] <put parameter description here>

Default: *0*

Outputs

Output Shape [vector] <put output description here>

Console usage

```
processing.runalg('otb:connectedcomponentsegmentation', -in, -mask, -expr, -minsize, -obia, -elev
```

See also

Exact Large-Scale Mean-Shift segmentation, step 2

Description

<put algortithm description here>

Parameters

Filtered image [raster] <put parameter description here>

Spatial image [raster] Optional.

<put parameter description here>

Range radius [number] <put parameter description here>

Default: *15*

Spatial radius [number] <put parameter description here>

Default: *5*

Minimum Region Size [number] <put parameter description here>

Default: *0*

Size of tiles in pixel (X-axis) [number] <put parameter description here>

Default: *500*

Size of tiles in pixel (Y-axis) [number] <put parameter description here>

Default: *500*

Directory where to write temporary files [file] Optional.

<put parameter description here>

Temporary files cleaning [boolean] <put parameter description here>

Default: *True*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:exactlargescalemeanshiftsegmentationstep2', -in, -inpos, -ranger, -spatial
```

See also

Exact Large-Scale Mean-Shift segmentation, step 3 (optional)

Description

<put algortithm description here>

Parameters

`Input image` [raster] <put parameter description here>

`Segmented image` [raster] <put parameter description here>

`Minimum Region Size` [number] <put parameter description here>

Default: *50*

`Size of tiles in pixel (X-axis)` [number] <put parameter description here>

Default: *500*

`Size of tiles in pixel (Y-axis)` [number] <put parameter description here>

Default: *500*

Outputs

`Output Image` [raster] <put output description here>

Console usage

```
processing.runalg('otb:exactlargescalemeanshiftsegmentationstep3optional', -in, -inseg, -minsize,
```

See also

Exact Large-Scale Mean-Shift segmentation, step 4

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Segmented image` **[raster]** <put parameter description here>

`Size of tiles in pixel (X-axis)` **[number]** <put parameter description here>

Default: *500*

`Size of tiles in pixel (Y-axis)` **[number]** <put parameter description here>

Default: *500*

Outputs

`Output GIS vector file` **[vector]** <put output description here>

Console usage

```
processing.runalg('otb:exactlargescalemeanshiftsegmentationstep4', -in, -inseg, -tilesizex, -tile
```

See also

Hoover compare segmentation

Description

<put algortithm description here>

Parameters

`Input ground truth` **[raster]** <put parameter description here>

`Input machine segmentation` **[raster]** <put parameter description here>

`Background label` **[number]** <put parameter description here>

Default: *0*

`Overlapping threshold` **[number]** <put parameter description here>

Default: *0.75*

`Correct detection score` **[number]** <put parameter description here>

Default: *0.0*

`Over-segmentation score` **[number]** <put parameter description here>

Default: *0.0*

`Under-segmentation score` **[number]** <put parameter description here>

Default: *0.0*

`Missed detection score` **[number]** <put parameter description here>

Default: *0.0*

Outputs

Colored ground truth output [raster] <put output description here>

Colored machine segmentation output [raster] <put output description here>

Console usage

```
processing.runalg('otb:hoovercomparesegmentation', -ingt, -inms, -bg, -th, -rc, -rf, -ra, -rm, -o
```

See also

Segmentation (cc)

Description

<put algortithm description here>

Parameters

Input Image [raster] <put parameter description here>

Segmentation algorithm [selection] <put parameter description here>

Options:

- 0 — cc

Default: *0*

Condition [string] <put parameter description here>

Default: *None*

Processing mode [selection] <put parameter description here>

Options:

- 0 — vector

Default: *0*

Writing mode for the output vector file [selection] <put parameter description here>

Options:

- 0 — ulco
- 1 — ovw
- 2 — ulovw
- 3 — ulu

Default: *0*

Mask Image [raster] Optional.

<put parameter description here>

8-neighbor connectivity [boolean] <put parameter description here>

Default: *True*

`Stitch polygons` **[boolean]** <put parameter description here>

Default: *True*

`Minimum object size` **[number]** <put parameter description here>

Default: *1*

`Simplify polygons` **[number]** <put parameter description here>

Default: *0.1*

`Layer name` **[string]** <put parameter description here>

Default: *layer*

`Geometry index field name` **[string]** <put parameter description here>

Default: *DN*

`Tiles size` **[number]** <put parameter description here>

Default: *1024*

`Starting geometry index` **[number]** <put parameter description here>

Default: *1*

`OGR options for layer creation` **[string]** Optional.

<put parameter description here>

Default: *None*

Outputs

`Output vector file` **[vector]** <put output description here>

Console usage

```
processing.runalg('otb:segmentationcc', -in, -filter, -filter.cc.expr, -mode, -mode.vector.outmod
```

See also

Segmentation (edison)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Segmentation algorithm` **[selection]** <put parameter description here>

Options:

- 0 — edison

Default: *0*

`Spatial radius` **[number]** <put parameter description here>

Default: *5*

`Range radius` **[number]** <put parameter description here>

Default: *15*

`Minimum region size` **[number]** <put parameter description here>

Default: *100*

`Scale factor` **[number]** <put parameter description here>

Default: *1*

`Processing mode` **[selection]** <put parameter description here>

Options:

- 0 — vector

Default: *0*

`Writing mode for the output vector file` **[selection]** <put parameter description here>

Options:

- 0 — ulco
- 1 — ovw
- 2 — ulovw
- 3 — ulu

Default: *0*

`Mask Image` **[raster]** Optional.

<put parameter description here>

`8-neighbor connectivity` **[boolean]** <put parameter description here>

Default: *True*

`Stitch polygons` **[boolean]** <put parameter description here>

Default: *True*

`Minimum object size` **[number]** <put parameter description here>

Default: *1*

`Simplify polygons` **[number]** <put parameter description here>

Default: *0.1*

`Layer name` **[string]** <put parameter description here>

Default: *layer*

`Geometry index field name` **[string]** <put parameter description here>

Default: *DN*

`Tiles size` **[number]** <put parameter description here>

Default: *1024*

`Starting geometry index` **[number]** <put parameter description here>

Default: *1*

`OGR options for layer creation` **[string]** Optional.

<put parameter description here>

Default: *None*

Outputs

`Output vector file` [vector] <put output description here>

Console usage

```
processing.runalg('otb:segmentationedison', -in, -filter, -filter.edison.spatialr, -filter.edison
```

See also

Segmentation (meanshift)

Description

<put algortithm description here>

Parameters

`Input Image` [raster] <put parameter description here>

`Segmentation algorithm` [selection] <put parameter description here>

Options:

- 0 — meanshift

Default: *0*

`Spatial radius` [number] <put parameter description here>

Default: *5*

`Range radius` [number] <put parameter description here>

Default: *15*

`Mode convergence threshold` [number] <put parameter description here>

Default: *0.1*

`Maximum number of iterations` [number] <put parameter description here>

Default: *100*

`Minimum region size` [number] <put parameter description here>

Default: *100*

`Processing mode` [selection] <put parameter description here>

Options:

- 0 — vector

Default: *0*

`Writing mode for the output vector file` [selection] <put parameter description here>

Options:

- 0 — ulco
- 1 — ovw
- 2 — ulovw

- 3 — ulu

Default: *0*

`Mask Image` [raster] Optional.

<put parameter description here>

`8-neighbor connectivity` [boolean] <put parameter description here>

Default: *True*

`Stitch polygons` [boolean] <put parameter description here>

Default: *True*

`Minimum object size` [number] <put parameter description here>

Default: *1*

`Simplify polygons` [number] <put parameter description here>

Default: *0.1*

`Layer name` [string] <put parameter description here>

Default: *layer*

`Geometry index field name` [string] <put parameter description here>

Default: *DN*

`Tiles size` [number] <put parameter description here>

Default: *1024*

`Starting geometry index` [number] <put parameter description here>

Default: *1*

`OGR options for layer creation` [string] Optional.

<put parameter description here>

Default: *None*

Outputs

`Output vector file` [vector] <put output description here>

Console usage

```
processing.runalg('otb:segmentationmeanshift', -in, -filter, -filter.meanshift.spatialr, -filter.m
```

See also

Segmentation (mprofiles)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Segmentation algorithm` **[selection]** <put parameter description here>

Options:

- 0 — mprofiles

Default: *0*

`Profile Size` **[number]** <put parameter description here>

Default: *5*

`Initial radius` **[number]** <put parameter description here>

Default: *1*

`Radius step.` **[number]** <put parameter description here>

Default: *1*

`Threshold of the final decision rule` **[number]** <put parameter description here>

Default: *1*

`Processing mode` **[selection]** <put parameter description here>

Options:

- 0 — vector

Default: *0*

`Writing mode for the output vector file` **[selection]** <put parameter description here>

Options:

- 0 — ulco
- 1 — ovw
- 2 — ulovw
- 3 — ulu

Default: *0*

`Mask Image` **[raster]** Optional.

<put parameter description here>

`8-neighbor connectivity` **[boolean]** <put parameter description here>

Default: *True*

`Stitch polygons` **[boolean]** <put parameter description here>

Default: *True*

`Minimum object size` **[number]** <put parameter description here>

Default: *1*

`Simplify polygons` **[number]** <put parameter description here>

Default: *0.1*

`Layer name` **[string]** <put parameter description here>

Default: *layer*

`Geometry index field name` **[string]** <put parameter description here>

Default: *DN*

`Tiles size` **[number]** <put parameter description here>

Default: *1024*

`Starting geometry index` **[number]** <put parameter description here>

Default: *1*

`OGR options for layer creation` **[string]** Optional.

<put parameter description here>

Default: *None*

Outputs

`Output vector file` **[vector]** <put output description here>

Console usage

```
processing.runalg('otb:segmentationmprofiles', -in, -filter, -filter.mprofiles.size, -filter.mpro
```

See also

Segmentation (watershed)

Description

<put algortithm description here>

Parameters

`Input Image` **[raster]** <put parameter description here>

`Segmentation algorithm` **[selection]** <put parameter description here>

Options:

- 0 — watershed

Default: *0*

`Depth Threshold` **[number]** <put parameter description here>

Default: *0.01*

`Flood Level` **[number]** <put parameter description here>

Default: *0.1*

`Processing mode` **[selection]** <put parameter description here>

Options:

- 0 — vector

Default: *0*

`Writing mode for the output vector file` **[selection]** <put parameter description here>

Options:

- 0 — ulco
- 1 — ovw
- 2 — ulovw
- 3 — ulu

Default: *0*

Mask Image [raster] Optional.

<put parameter description here>

8-neighbor connectivity [boolean] <put parameter description here>

Default: *True*

Stitch polygons [boolean] <put parameter description here>

Default: *True*

Minimum object size [number] <put parameter description here>

Default: *1*

Simplify polygons [number] <put parameter description here>

Default: *0.1*

Layer name [string] <put parameter description here>

Default: *layer*

Geometry index field name [string] <put parameter description here>

Default: *DN*

Tiles size [number] <put parameter description here>

Default: *1024*

Starting geometry index [number] <put parameter description here>

Default: *1*

OGR options for layer creation [string] Optional.

<put parameter description here>

Default: *None*

Outputs

Output vector file [vector] <put output description here>

Console usage

```
processing.runalg('otb:segmentationwatershed', -in, -filter, -filter.watershed.threshold, -filter
```

See also

.

18.4.9 Stereo

Stereo Framework

Description

<put algortithm description here>

Parameters

`Input images list` **[multipleinput: rasters]** <put parameter description here>

`Couples list` **[string]** Optional.

<put parameter description here>

Default: *None*

`Image channel used for the block matching` **[number]** <put parameter description here>

Default: *1*

`Default elevation` **[number]** <put parameter description here>

Default: *0*

`Output resolution` **[number]** <put parameter description here>

Default: *1*

`NoData value` **[number]** <put parameter description here>

Default: *-32768*

`Method to fuse measures in each DSM cell` **[selection]** <put parameter description here>

Options:

- 0 — max
- 1 — min
- 2 — mean
- 3 — acc

Default: *0*

`Parameters estimation modes` **[selection]** <put parameter description here>

Options:

- 0 — fit
- 1 — user

Default: *0*

`Upper Left X` **[number]** <put parameter description here>

Default: *0.0*

`Upper Left Y` **[number]** <put parameter description here>

Default: *0.0*

`Size X` **[number]** <put parameter description here>

Default: *0*

`Size Y` **[number]** <put parameter description here>

Default: *0*

`Pixel Size X` **[number]** <put parameter description here>

Default: *0.0*

`Pixel Size Y` **[number]** <put parameter description here>

Default: *0.0*

`Output Cartographic Map Projection` **[selection]** <put parameter description here>

Options:

- 0 — utm
- 1 — lambert2
- 2 — lambert93
- 3 — wgs
- 4 — epsg

Default: *3*

`Zone number` **[number]** <put parameter description here>

Default: *31*

`Northern Hemisphere` **[boolean]** <put parameter description here>

Default: *True*

`EPSG Code` **[number]** <put parameter description here>

Default: *4326*

`Step of the deformation grid (in pixels)` **[number]** <put parameter description here>

Default: *16*

`Sub-sampling rate for epipolar grid inversion` **[number]** <put parameter description here>

Default: *10*

`Block-matching metric` **[selection]** <put parameter description here>

Options:

- 0 — ssdmean
- 1 — ssd
- 2 — ncc
- 3 — lp

Default: *0*

`p value` **[number]** <put parameter description here>

Default: *1*

`Radius of blocks for matching filter (in pixels)` **[number]** <put parameter description here>

Default: *2*

`Minimum altitude offset (in meters)` **[number]** <put parameter description here>

Default: *-20*

`Maximum altitude offset (in meters)` [number] <put parameter description here>

Default: *20*

`Use bijection consistency in block matching strategy` [boolean] <put parameter description here>

Default: *True*

`Use median disparities filtering` [boolean] <put parameter description here>

Default: *True*

`Correlation metric threshold` [number] <put parameter description here>

Default: *0.6*

`Input left mask` [raster] Optional.

<put parameter description here>

`Input right mask` [raster] Optional.

<put parameter description here>

`Discard pixels with low local variance` [number] <put parameter description here>

Default: *50*

`Available RAM (Mb)` [number] <put parameter description here>

Default: *128*

Outputs

`Output DSM` [raster] <put output description here>

Console usage

```
processing.runalg('otb:stereoframework', -input.il, -input.co, -input.channel, -elev.default, -out
```

See also

.

18.4.10 Vector

Concatenate

Description

<put algortithm description here>

Parameters

`Input VectorDatas to concatenate` [multipleinput: any vectors] <put parameter description here>

Outputs

Concatenated VectorData [vector] <put output description here>

Console usage

```
processing.runalg('otb:concatenate', -vd, -out)
```

See also

.

18.5 Proveedor de algoritmos QGIS

El proveedor de algoritmos QGIS implementa varios análisis y operaciones de geoprocesamiento utilizando en su mayoría sólo API QGIS. Así que casi todos los algoritmos de este proveedor trabajarán "fuera de caja" sin ninguna configuración adicional.

Este proveedor incorpora funcionalidad fTools, algunos algoritmos del complemento mmQGIS y también añade su propios algoritmos.

.

18.5.1 Base de datos

Import into PostGIS

Description

<put algortithm description here>

Parameters

Layer to import [vector: any] <put parameter description here>

Database (connection name) [selection] <put parameter description here>

Options:

- 0 — local

Default: *0*

Schema (schema name) [string] <put parameter description here>

Default: *public*

Table to import to (leave blank to use layer name) [string] <put parameter description here>

Default: *(not set)*

Primary key field [tablefield: any] Optional.

<put parameter description here>

Geometry column [string] <put parameter description here>

Default: *geom*

`Overwrite` **[boolean]** <put parameter description here>

Default: *True*

`Create spatial index` **[boolean]** <put parameter description here>

Default: *True*

`Convert field names to lowercase` **[boolean]** <put parameter description here>

Default: *True*

`Drop length constraints on character fields` **[boolean]** <put parameter description here>

Default: *False*

Outputs

Console usage

```
processing.runalg('qgis:importintopostgis', input, database, schema, tablename, primary_key, geome
```

See also

PostGIS execute SQL

Description

<put algortithm description here>

Parameters

`Database` **[string]** <put parameter description here>

Default: *(not set)*

`SQL query` **[string]** <put parameter description here>

Default: *(not set)*

Outputs

Console usage

```
processing.runalg('qgis:postgisexecutesql', database, sql)
```

See also

.

18.5.2 Ráster general

Set style for raster layer

Description

<put algortithm description here>

Parameters

`Raster layer` [raster] <put parameter description here>

`Style file` [file] <put parameter description here>

Outputs

`Styled layer` [raster] <put output description here>

Console usage

```
processing.runalg('qgis:setstyleforrasterlayer', input, style)
```

See also

.

18.5.3 Ráster

Hypsometric curves

Description

Calculate hypsometric curves for features of polygon layer and save them as CSV file for further processing.

Parameters

`DEM to analyze` [raster] DEM to use for calculating altitudes.

`Boundary layer` [vector: polygon] Polygonal vector layer with boundaries of areas used to calculate hypsometric curves.

`Step` [number] Distanse between curves.

Default: *100.0*

`Use % of area instead of absolute value` [boolean] Write area percentage to "Area" field of the CSV file instead of absolute area value.

Default: *False*

Outputs

`Output directory` [directory] Directory where output will be saved. For each feature from input vector layer CSV file with area and altitude values will be created.

File name consists of prefix `hystogram_` followed by layer name and feature ID.

Console usage

```
processing.runalg('qgis:hypsometriccurves', input_dem, boundary_layer, step, use_percentage, outpu
```

See also

Raster layer statistics

Description

Calculates basic statistics of the raster layer.

Parameters

`Input layer` [raster] Raster to analyze.

Outputs

`Statistics` [html] Analysis results in HTML format.

`Minimum value` [number] Minimum cell value.

`Maximum value` [number] Maximum cell value.

`Sum` [number] Sum of all cells values.

`Mean value` [number] Mean cell value.

`valid cells count` [number] Number of cell with data.

`No-data cells count` [number] Number of NODATA cells.

`Standard deviation` [number] Standard deviation of cells values.

Console usage

```
processing.runalg('qgis:rasterlayerstatistics', input, output_html_file)
```

See also

Zonal Statistics

Description

Calculates some statistics values for pixels of input raster inside certain zones, defined as polygon layer.

Following values calculated for each zone:

- minimum

- maximum
- sum
- count
- mean
- standard deviation
- number of unique values
- range
- variance

Parameters

`Raster layer` [raster] Raster to analyze.

`Raster band` [number] Number of raster band to analyze.

Default: *1*

`Vector layer containing zones` [vector: polygon] Layer with zones boundaries.

`Output column prefix` [string] Prefix for output fields.

Default: _

`Load whole raster in memory` [boolean] Determines if raster band will be loaded in memory (`True`) or readed by chunks (`False`). Useful only when disk IO or raster scanning inefficiencies are your limiting factor.

Default: *True*

Outputs

`Output layer` [vector] The resulting layer. Basically this is same layer as zones layer with new columns containing statistics added.

Console usage

```
processing.runalg('qgis:zonalstatistics', input_raster, raster_band, input_vector, column_prefix,
```

See also

.

18.5.4 Tabla

Frequency analysis

Description

<put algortithm description here>

Parameters

`input` [vector: any] <put parameter description here>

`fields` [string] <put parameter description here>

Default: *(not set)*

Outputs

`output` [table] <put output description here>

Console usage

```
processing.runalg('qgis:frequencyanalysis', input, fields, output)
```

See also

.

18.5.5 Vector analysis

Count points in polygon

Description

Counts the number of points present in each feature of a polygon layer.

Parameters

`Polygons` [vector: polygon] Polygons layer.

`Points` [vector: point] Points layer.

`Count field name` [string] The name of the attribute table column containing the points number.

Default: *NUMPOINTS*

Outputs

`Result` [vector] Resulting layer with the attribute table containing the new column of the points count.

Console usage

```
processing.runalg('qgis:countpointsinpolygon', polygons, points, field, output)
```

See also

Count points in polygon (weighted)

Description

Counts the number of points in each feature of a polygon layer and calculates the mean of the selected field for each feature of the polygon layer. These values will be added to the attribute table of the resulting polygon layer.

Parameters

`Polygons` [vector: polygon] Polygons layer.

`Points` [vector: point] Points layer.

`Weight field` [tablefield: any] Weight field of the points attribute table.

`Count field name` [string] Name of the column for the new weighted field.

Default: *NUMPOINTS*

Outputs

`Result` [vector] The resulting polygons layer.

Console usage

```
processing.runalg('qgis:countpointsinpolygonweighted', polygons, points, weight, field, output)
```

See also

Count unique points in polygon

Description

Counts the number of unique values of a points in a polygons layer. Creates a new polygons layer with an extra column in the attribute table containing the count of unique values for each feature.

Parameters

`Polygons` [vector: polygon] Polygons layer.

`Points` [vector: point] Points layer.

`Class field` [tablefield: any] Points layer column name of the unique value chosen.

`Count field name` [string] Column name containing the count of unique values in the resulting polygons layer.

Default: *NUMPOINTS*

Outputs

`Result` [vector] The resulting polygons layer.

Console usage

```
processing.runalg('qgis:countuniquepointsinpolygon', polygons, points, classfield, field, output)
```

See also

Distance matrix

Description

<put algortithm description here>

Parameters

`Input point layer` [vector: point] <put parameter description here>

`Input unique ID field` [tablefield: any] <put parameter description here>

`Target point layer` [vector: point] <put parameter description here>

`Target unique ID field` [tablefield: any] <put parameter description here>

`Output matrix type` [selection] <put parameter description here>

Options:

- 0 — Linear (N*k x 3) distance matrix
- 1 — Standard (N x T) distance matrix
- 2 — Summary distance matrix (mean, std. dev., min, max)

Default: *0*

`Use only the nearest (k) target points` [number] <put parameter description here>

Default: *0*

Outputs

`Distance matrix` [table] <put output description here>

Console usage

```
processing.runalg('qgis:distancematrix', input_layer, input_field, target_layer, target_field, ma
```

See also

Distance to nearest hub

Description

<put algortithm description here>

Parameters

`Source points layer` **[vector: any]** <put parameter description here>

`Destination hubs layer` **[vector: any]** <put parameter description here>

`Hub layer name attribute` **[tablefield: any]** <put parameter description here>

`Output shape type` **[selection]** <put parameter description here>

Options:

- 0 — Point
- 1 — Line to hub

Default: *0*

`Measurement unit` **[selection]** <put parameter description here>

Options:

- 0 — Meters
- 1 — Feet
- 2 — Miles
- 3 — Kilometers
- 4 — Layer units

Default: *0*

Outputs

`Output` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:distancetonearesthub', points, hubs, field, geometry, unit, output)
```

See also

Generate points (pixel centroids) along line

Description

<put algortithm description here>

Parameters

`Raster layer` **[raster]** <put parameter description here>

`Vector layer` **[vector: line]** <put parameter description here>

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:generatepointspixelcentroidsalongline', input_raster, input_vector, outpu
```

See also

Generate points (pixel centroids) inside polygons

Description

<put algortithm description here>

Parameters

`Raster layer` [raster] <put parameter description here>

`Vector layer` [vector: polygon] <put parameter description here>

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:generatepointspixelcentroidsinsidepolygons', input_raster, input_vector, 
```

See also

Hub lines

Description

Creates hub and spoke diagrams with lines drawn from points on the `Spoke Point` layer to matching points in the `Hub Point` layer. Determination of which hub goes with each point is based on a match between the `Hub ID field` on the hub points and the `Spoke ID field` on the spoke points.

Parameters

`Hub point layer` [vector: any] <put parameter description here>

`Hub ID field` [tablefield: any] <put parameter description here>

`Spoke point layer` [vector: any] <put parameter description here>

`Spoke ID field` [tablefield: any] <put parameter description here>

Outputs

`Output` [vector] The resulting layer.

Console usage

```
processing.runalg('qgis:hublines', hubs, hub_field, spokes, spoke_field, output)
```

See also

Mean coordinate(s)

Description

Calculates the mean of the coordinates of a layer starting from a field of the attribute table.

Parameters

`Input layer` [vector: any] <put parameter description here>

`Weight field` [tablefield: numeric] Optional.

Field to use if you want to perform a weighted mean.

`Unique ID field` [tablefield: numeric] Optional.

Unique field on which the calculation of the mean will be made.

Outputs

`Result` [vector] The resulting points layer.

Console usage

```
processing.runalg('qgis:meancoordinates', points, weight, uid, output)
```

See also

Nearest neighbour analysis

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

Outputs

`Result` [html] <put output description here>

`Observed mean distance` [number] <put output description here>

`Expected mean distance` [number] <put output description here>

`Nearest neighbour index` [number] <put output description here>

`Number of points` [number] <put output description here>

`Z-Score` [number] <put output description here>

Console usage

```
processing.runalg('qgis:nearestneighbouranalysis', points, output)
```

See also

Sum line lengths

Description

<put algortithm description here>

Parameters

`Lines` [vector: line] <put parameter description here>

`Polygons` [vector: polygon] <put parameter description here>

`Lines length field name` [string] <put parameter description here>

Default: *LENGTH*

`Lines count field name` [string] <put parameter description here>

Default: *COUNT*

Outputs

`Result` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:sumlinelengths', lines, polygons, len_field, count_field, output)
```

See also

.

18.5.6 Creación de vectores

Create grid

Description

Creates a grid.

Parameters

`Grid type` [selection] Grid type.

Options:

- 0 — Rectangle (line)
- 1 — Rectangle (polygon)
- 2 — Diamond (polygon)
- 3 — Hexagon (polygon)

Default: *0*

`Width` [number] Horizontal extent of the grid.

Default: *360.0*

`Height` [number] Vertical extent of the grid.

Default: *180.0*

`Horizontal spacing` [number] X-axes spacing between the lines.

Default: *10.0*

`Vertical spacing` [number] Y-axes spacing between the lines.

Default: *10.0*

`Center X` [number] X-coordinate of the grid center.

Default: *0.0*

`Center Y` [number] Y-coordinate of the grid center.

Default: *0.0*

`Output CRS` [crs] Coordinate reference system for grid.

Default: *EPSG:4326*

Outputs

`Output` [vector] The resulting grid layer (lines or polygons).

Console usage

```
processing.runalg('qgis:creategrid', type, width, height, hspacing, vspacing, centerx, centery, c
```

See also

Points layer from table

Description

Creates points layer from geometryless table with columns that contain point coordinates.

Parameters

`Input layer` [table] Input table

`X field` [tablefield: any] Table column containing the X coordinate.

`Y field` [tablefield: any] Table column containing the Y coordinate.

`Target CRS` [crs] Coordinate reference system to use for layer.

Default: *EPSG:4326*

Outputs

`Output layer` [vector] The resulting layer.

Console usage

```
processing.runalg('qgis:pointslayerfromtable', input, xfield, yfield, target_crs, output)
```

See also

Points to path

Description

<put algortithm description here>

Parameters

`Input point layer` [vector: point] <put parameter description here>

`Group field` [tablefield: any] <put parameter description here>

`Order field` [tablefield: any] <put parameter description here>

`Date format (if order field is DateTime)` [string] Optional.

<put parameter description here>

Default: *(not set)*

Outputs

`Paths` [vector] <put output description here>

`Directory` [directory] <put output description here>

Console usage

```
processing.runalg('qgis:pointstopath', vector, group_field, order_field, date_format, output_line
```

See also

Random points along line

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: line]** <put parameter description here>

`Number of points` **[number]** <put parameter description here>

Default: *1*

`Minimum distance` **[number]** <put parameter description here>

Default: *0.0*

Outputs

`Random points` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:randompointsalongline', vector, point_number, min_distance, output)
```

See also

Random points in extent

Description

<put algortithm description here>

Parameters

`Input extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Points number` **[number]** <put parameter description here>

Default: *1*

`Minimum distance` **[number]** <put parameter description here>

Default: *0.0*

Outputs

`Random points` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:randompointsinextent', extent, point_number, min_distance, output)
```

See also

Random points in layer bounds

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon] <put parameter description here>

`Points number` [number] <put parameter description here>

Default: *1*

`Minimum distance` [number] <put parameter description here>

Default: *0.0*

Outputs

`Random points` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randompointsinlayerbounds', vector, point_number, min_distance, output)
```

See also

Random points inside polygons (fixed)

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon] <put parameter description here>

`Sampling strategy` [selection] <put parameter description here>

Options:

- 0 — Points count
- 1 — Points density

Default: *0*

`Number or density of points` [number] <put parameter description here>

Default: *1.0*

`Minimum distance` [number] <put parameter description here>

Default: *0.0*

Outputs

`Random points` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randompointsinsidepolygonsfixed', vector, strategy, value, min_distance, o
```

See also

Random points inside polygons (variable)

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon] <put parameter description here>

`Sampling strategy` [selection] <put parameter description here>

Options:

- 0 — Points count
- 1 — Points density

Default: *0*

`Number field` [tablefield: numeric] <put parameter description here>

`Minimum distance` [number] <put parameter description here>

Default: *0.0*

Outputs

`Random points` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randompointsinsidepolygonsvariable', vector, strategy, field, min_distance
```

See also

Regular points

Description

<put algortithm description here>

Parameters

`Input extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Point spacing/count` [number] <put parameter description here>

Default: *0.0001*

`Initial inset from corner (LH side)` [number] <put parameter description here>

Default: *0.0*

`Apply random offset to point spacing` [boolean] <put parameter description here>

Default: *False*

`Use point spacing` [boolean] <put parameter description here>

Default: *True*

Outputs

`Regular points` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:regularpoints', extent, spacing, inset, randomize, is_spacing, output)
```

See also

Vector grid

Description

<put algortithm description here>

Parameters

`Grid extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`X spacing` [number] <put parameter description here>

Default: *0.0001*

`Y spacing` [number] <put parameter description here>

Default: *0.0001*

`Grid type` [selection] <put parameter description here>

Options:

- 0 — Output grid as polygons
- 1 — Output grid as lines

Default: *0*

Outputs

`Grid` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:vectorgrid', extent, step_x, step_y, type, output)
```

See also

.

18.5.7 Vector general

Delete duplicate geometries

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:deleteduplicategeometries', input, output)
```

See also

Join atributes by location

Description

<put algortithm description here>

Parameters

`Target vector layer` **[vector: any]** <put parameter description here>

`Join vector layer` **[vector: any]** <put parameter description here>

`Attribute summary` **[selection]** <put parameter description here>

Options:

- 0 — Take attributes of the first located feature
- 1 — Take summary of intersecting features

Default: *0*

`Statistics for summary (comma separated)` **[string]** <put parameter description here>

Default: *sum,mean,min,max,median*

`Output table` **[selection]** <put parameter description here>

Options:

- 0 — Only keep matching records
- 1 — Keep all records (including non-matching target records)

Default: *0*

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:joinatributesbylocation', target, join, summary, stats, keep, output)
```

See also

Join attributes table

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Input layer 2` **[table]** <put parameter description here>

`Table field` **[tablefield: any]** <put parameter description here>

`Table field 2` **[tablefield: any]** <put parameter description here>

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:joinattributestable', input_layer, input_layer_2, table_field, table_fiel
```

See also

Merge vector layers

Description

<put algortithm description here>

Parameters

`Input layer 1` [vector: any] <put parameter description here>

`Input layer 2` [vector: any] <put parameter description here>

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:mergevectorlayers', layer1, layer2, output)
```

See also

Polygon from layer extent

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Calculate extent for each feature separately` [boolean] <put parameter description here>

Default: *False*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:polygonfromlayerextent', input_layer, by_feature, output)
```

See also

Reproject layer

Description

Reprojects a vector layer in a different CRS.

Parameters

Input layer [vector: any] Layer to reproject.

Target CRS [crs] Destination coordinate reference system.

Default: *EPSG:4326*

Outputs

Reprojected layer [vector] The resulting layer.

Console usage

```
processing.runalg('qgis:reprojectlayer', input, target_crs, output)
```

See also

Guardar elementos seleccionados

Descripción

Guardar objetos espaciales seleccionados como nueva capa

Parámetros

Capa de entrada [vector: cualquiera] Capa para procesar.

Salidas

Capa de salida con objetos espaciales seleccionados [vector] La capa resultante.

Uso de la consola

```
processing.runalg('qgis:saveselectedfeatures', input_layer, output_layer)
```

Ver también

Set style for vector layer

Description

<put algortithm description here>

Parameters

`Vector layer` [vector: any] <put parameter description here>

`Style file` [file] <put parameter description here>

Outputs

`Styled layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:setstyleforvectorlayer', input, style)
```

See also

Snap points to grid

Description

<put algortithm description here>

Parameters

`Input Layer` [vector: any] <put parameter description here>

`Horizontal spacing` [number] <put parameter description here>

Default: *0.1*

`Vertical spacing` [number] <put parameter description here>

Default: *0.1*

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:snappointstogrid', input, hspacing, vspacing, output)
```

See also

Split vector layer

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Unique ID field` [tablefield: any] <put parameter description here>

Outputs

`Output directory` [directory] <put output description here>

Console usage

```
processing.runalg('qgis:splitvectorlayer', input, field, output)
```

See also

.

18.5.8 Geometría vectorial

Concave hull

Description

<put algortithm description here>

Parameters

`Input point layer` [vector: point] <put parameter description here>

`Threshold (0-1, where 1 is equivalent with Convex Hull)` [number] <put parameter description here>

Default: *0.3*

`Allow holes` [boolean] <put parameter description here>

Default: *True*

`Split multipart geometry into singleparts geometries` [boolean] <put parameter description here>

Default: *False*

Outputs

`Concave hull` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:concavehull', input, alpha, holes, no_multigeometry, output)
```

See also

Convert geometry type

Description

Converts a geometry type to another one.

Parameters

`Input layer` [vector: any] Layer in input.

`New geometry type` [selection] Type of conversion to perform.

Options:

- 0 — Centroids
- 1 — Nodes
- 2 — Linestrings
- 3 — Multilinestrings
- 4 — Polygons

Default: *0*

Outputs

`Output` [vector] The resulting layer.

Console usage

```
processing.runalg('qgis:convertgeometrytype', input, type, output)
```

See also

Convex hull

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Field (optional, only used if creating convex hulls by classes)` [tablefield: any]
Optional.

<put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — Create single minimum convex hull
- 1 — Create convex hulls based on field

Default: *0*

Outputs

`Convex hull` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:convexhull', input, field, method, output)
```

See also

Create points along lines

Description

<put algortithm description here>

Parameters

`lines` [vector: any] <put parameter description here>

`distance` [number] <put parameter description here>

Default: *1*

`startpoint` [number] <put parameter description here>

Default: *0*

`endpoint` [number] <put parameter description here>

Default: *0*

Outputs

`output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:createpointsalonglines', lines, distance, startpoint, endpoint, output)
```

See also

Delaunay triangulation

Description

<put algortithm description here>

Parameters

`Input layer` [vector: point] <put parameter description here>

Outputs

`Delaunay triangulation` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:delaunaytriangulation', input, output)
```

See also

Densify geometries given an interval

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon, line] <put parameter description here>

`Interval between Vertices to add` [number] <put parameter description here>

Default: *1.0*

Outputs

`Densified layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:densifygeometriesgivenaninterval', input, interval, output)
```

See also

Densify geometries

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon, line] <put parameter description here>

`Vertices to add` [number] <put parameter description here>

Default: *1*

Outputs

`Densified layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:densifygeometries', input, vertices, output)
```

See also

Dissolve

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon, line] <put parameter description here>

`Dissolve all (do not use field)` [boolean] <put parameter description here>

Default: *True*

`Unique ID field` [tablefield: any] Optional.

<put parameter description here>

Outputs

`Dissolved` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:dissolve', input, dissolve_all, field, output)
```

See also

Eliminate sliver polygons

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: polygon]** <put parameter description here>

`Use current selection in input layer (works only if called from toolbox)` **[boolean]**
<put parameter description here>

Default: *False*

`Selection attribute` **[tablefield: any]** <put parameter description here>

`Comparison` **[selection]** <put parameter description here>

Options:

- 0 — ==
- 1 — !=
- 2 — >
- 3 — >=
- 4 — <
- 5 — <=
- 6 — begins with
- 7 — contains

Default: *0*

`Value` **[string]** <put parameter description here>

Default: *0*

`Merge selection with the neighbouring polygon with the` **[selection]** <put parameter description here>

Options:

- 0 — Largest area
- 1 — Smallest Area
- 2 — Largest common boundary

Default: *0*

Outputs

`Cleaned layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:eliminatesliverpolygons', input, keepselection, attribute, comparison, co
```

See also

Explode lines

Description

<put algortithm description here>

Parameters

`Input layer` [vector: line] <put parameter description here>

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:explodelines', input, output)
```

See also

Extract nodes

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon, line] <put parameter description here>

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:extractnodes', input, output)
```

See also

Fill holes

Description

<put algortithm description here>

Parameters

`Polygons` [vector: any] <put parameter description here>

`Max area` [number] <put parameter description here>

Default: *100000*

Outputs

`Results` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:fillholes', polygons, max_area, results)
```

See also

Fixed distance buffer

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Distance` [number] <put parameter description here>

Default: *10.0*

`Segments` [number] <put parameter description here>

Default: *5*

`Dissolve result` [boolean] <put parameter description here>

Default: *False*

Outputs

`Buffer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:fixeddistancebuffer', input, distance, segments, dissolve, output)
```

See also

Keep n biggest parts

Description

<put algortithm description here>

Parameters

Polygons [vector: polygon] <put parameter description here>

To keep [number] <put parameter description here>

Default: *1*

Outputs

Results [vector] <put output description here>

Console usage

```
processing.runalg('qgis:keepnbiggestparts', polygons, to_keep, results)
```

See also

Lines to polygons

Description

<put algortithm description here>

Parameters

Input layer [vector: line] <put parameter description here>

Outputs

Output layer [vector] <put output description here>

Console usage

```
processing.runalg('qgis:linestopolygons', input, output)
```

See also

Multipart to singleparts

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:multiparttosingleparts', input, output)
```

See also

Points displacement

Description

Moves overlapped points at small distance, that they all become visible. The result is very similar to the output of the "Point displacement" renderer but it is permanent.

Parameters

`Input layer` [vector: point] Layer with overlapped points.

`Displacement distance` [number] Desired displacement distance **NOTE**: displacement distance should be in same units as layer.

Default: *0.00015*

`Horizontal distribution for two point case` [boolean] Controls distrobution direction in case of two overlapped points. If *True* points wwill be distributed horizontally, otherwise they will be distributed vertically.

Default: *True*

Outputs

`Output layer` [vector] The resulting layer with shifted overlapped points.

Console usage

```
processing.runalg('qgis:pointsdisplacement', input_layer, distance, horizontal, output_layer)
```

See also

Polygon centroids

Description

<put algortithm description here>

Parameters

Input layer [vector: polygon] <put parameter description here>

Outputs

Output layer [vector] <put output description here>

Console usage

```
processing.runalg('qgis:polygoncentroids', input_layer, output_layer)
```

See also

Polygonize

Description

<put algortithm description here>

Parameters

Input layer [vector: line] <put parameter description here>

Keep table structure of line layer [boolean] <put parameter description here>

Default: *False*

Create geometry columns [boolean] <put parameter description here>

Default: *True*

Outputs

Output layer [vector] <put output description here>

Console usage

```
processing.runalg('qgis:polygonize', input, fields, geometry, output)
```

See also

Polygons to lines

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon] <put parameter description here>

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:polygonstolines', input, output)
```

See also

Simplify geometries

Description

<put algortithm description here>

Parameters

`Input layer` [vector: polygon, line] <put parameter description here>

`Tolerance` [number] <put parameter description here>

Default: *1.0*

Outputs

`Simplified layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:simplifygeometries', input, tolerance, output)
```

See also

Singleparts to multipart

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Unique ID field` **[tablefield: any]** <put parameter description here>

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:singlepartstomultipart', input, field, output)
```

See also

Variable distance buffer

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Distance field` **[tablefield: any]** <put parameter description here>

`Segments` **[number]** <put parameter description here>

Default: *5*

`Dissolve result` **[boolean]** <put parameter description here>

Default: *False*

Outputs

`Buffer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:variabledistancebuffer', input, field, segments, dissolve, output)
```

See also

Voronoi polygons

Description

<put algortithm description here>

Parameters

`Input layer` [vector: point] <put parameter description here>

`Buffer region` [number] <put parameter description here>

Default: *0.0*

Outputs

`Voronoi polygons` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:voronoipolygons', input, buffer, output)
```

See also

.

18.5.9 Superposición vectorial

Clip

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Clip layer` [vector: any] <put parameter description here>

Outputs

`Clipped` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:clip', input, overlay, output)
```

See also

Difference

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Difference layer` [vector: any] <put parameter description here>

Outputs

`Difference` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:difference', input, overlay, output)
```

See also

Intersection

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Intersect layer` [vector: any] <put parameter description here>

Outputs

`Intersection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:intersection', input, input2, output)
```

See also

Line intersections

Description

<put algortithm description here>

Parameters

Input layer [vector: line] <put parameter description here>

Intersect layer [vector: line] <put parameter description here>

Input unique ID field [tablefield: any] <put parameter description here>

Intersect unique ID field [tablefield: any] <put parameter description here>

Outputs

Output layer [vector] <put output description here>

Console usage

```
processing.runalg('qgis:lineintersections', input_a, input_b, field_a, field_b, output)
```

See also

Symetrical difference

Description

<put algortithm description here>

Parameters

Input layer [vector: any] <put parameter description here>

Difference layer [vector: any] <put parameter description here>

Outputs

Symetrical difference [vector] <put output description here>

Console usage

```
processing.runalg('qgis:symetricaldifference', input, overlay, output)
```

See also

Union

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Input layer 2` [vector: any] <put parameter description here>

Outputs

`Union` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:union', input, input2, output)
```

See also

.

18.5.10 Selección vectorial

Extract by attribute

Description

<put algortithm description here>

Parameters

`Input Layer` [vector: any] <put parameter description here>

`Selection attribute` [tablefield: any] <put parameter description here>

`Operator` [selection] <put parameter description here>

Options:

- 0 — =
- 1 — !=
- 2 — >
- 3 — >=
- 4 — <
- 5 — <=
- 6 — begins with

- 7 — contains

Default: *0*

`Value` [string] <put parameter description here>

Default: *(not set)*

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:extractbyattribute', input, field, operator, value, output)
```

See also

Extract by location

Description

<put algortithm description here>

Parameters

`Layer to select from` [vector: any] <put parameter description here>

`Additional layer (intersection layer)` [vector: any] <put parameter description here>

`Include input features that touch the selection features` [boolean] <put parameter description here>

Default: *False*

`Include input features that overlap/cross the selection features` [boolean] <put parameter description here>

Default: *False*

`Include input features completely within the selection features` [boolean] <put parameter description here>

Default: *False*

Outputs

`Selection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:extractbylocation', input, intersect, touches, overlaps, within, output)
```

See also

Random extract

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — Number of selected features
- 1 — Percentage of selected features

Default: *0*

`Number/percentage of selected features` [number] <put parameter description here>

Default: *10*

Outputs

`Selection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randomextract', input, method, number, output)
```

See also

Random extract within subsets

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`ID Field` [tablefield: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — Number of selected features
- 1 — Percentage of selected features

Default: *0*

`Number/percentage of selected features` [number] <put parameter description here>

Default: *10*

Outputs

`Selection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randomextractwithinsubsets', input, field, method, number, output)
```

See also

Random selection

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — Number of selected features
- 1 — Percentage of selected features

Default: *0*

`Number/percentage of selected features` [number] <put parameter description here>

Default: *10*

Outputs

`Selection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randomselection', input, method, number)
```

See also

Random selection within subsets

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`ID Field` [tablefield: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — Number of selected features
- 1 — Percentage of selected features

Default: *0*

`Number/percentage of selected features` [number] <put parameter description here>

Default: *10*

Outputs

`Selection` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:randomselectionwithinsubsets', input, field, method, number)
```

See also

Select by attribute

Description

Selects and saves as new layer all features from input layer that satisfy condition.

NOTE: algorithm is case-sensitive ("qgis" is different from "Qgis" and "QGIS")

Parameters

`Input Layer` [vector: any] Layer to process.

`Selection attribute` [tablefield: any] Field on which perform the selection.

`Operator` [selection] Comparison operator.

Options:

- 0 — =
- 1 — !=
- 2 — >
- 3 — >=
- 4 — <
- 5 — <=
- 6 — begins with
- 7 — contains

Default: *0*

`Value` [string] Value to compare.

Default: *(not set)*

Outputs

`Output` [vector] The resulting layer.

Console usage

```
processing.runalg('qgis:selectbyattribute', input, field, operator, value, output)
```

See also

Select by expression

Description

<put algortithm description here>

Parameters

`Input Layer` [vector: any] <put parameter description here>

`Expression` [string] <put parameter description here>

Default: *(not set)*

`Modify current selection by` [selection] <put parameter description here>

Options:

- 0 — creating new selection
- 1 — adding to current selection
- 2 — removing from current selection

Default: *0*

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:selectbyexpression', layername, expression, method)
```

See also

Select by location

Description

<put algortithm description here>

Parameters

`Layer to select from` **[vector: any]** <put parameter description here>

`Additional layer (intersection layer)` **[vector: any]** <put parameter description here>

`Include input features that touch the selection features` **[boolean]** <put parameter description here>

Default: *False*

`Include input features that overlap/cross the selection features` **[boolean]** <put parameter description here>

Default: *False*

`Include input features completely within the selection features` **[boolean]** <put parameter description here>

Default: *False*

`Modify current selection by` **[selection]** <put parameter description here>

Options:

- 0 — creating new selection
- 1 — adding to current selection
- 2 — removing from current selection

Default: *0*

Outputs

`Selection` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:selectbylocation', input, intersect, touches, overlaps, within, method)
```

See also

.

18.5.11 Tabla vectorial

Add autoincremental field

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:addautoincrementalfield', input, output)
```

See also

Add field to attributes table

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Field name` **[string]** <put parameter description here>

Default: *(not set)*

`Field type` **[selection]** <put parameter description here>

Options:

- 0 — Integer
- 1 — Float
- 2 — String

Default: *0*

`Field length` **[number]** <put parameter description here>

Default: *10*

`Field precision` **[number]** <put parameter description here>

Default: *0*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:addfieldtoattributestable', input_layer, field_name, field_type, field_le
```

See also

Advanced Python field calculator

Description

<put algorithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Result field name` [string] <put parameter description here>

Default: *NewField*

`Field type` [selection] <put parameter description here>

Options:

- 0 — Integer
- 1 — Float
- 2 — String

Default: *0*

`Field length` [number] <put parameter description here>

Default: *10*

`Field precision` [number] <put parameter description here>

Default: *0*

`Global expression` [string] Optional.

<put parameter description here>

Default: *(not set)*

`Formula` [string] <put parameter description here>

Default: *value =*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:advancedpythonfieldcalculator', input_layer, field_name, field_type, fiel
```

See also

Basic statistics for numeric fields

Description

<put algortithm description here>

Parameters

Input vector layer [vector: any] <put parameter description here>

Field to calculate statistics on [tablefield: numeric] <put parameter description here>

Outputs

Statistics for numeric field [html] <put output description here>

Coefficient of Variation [number] <put output description here>

Minimum value [number] <put output description here>

Maximum value [number] <put output description here>

Sum [number] <put output description here>

Mean value [number] <put output description here>

Count [number] <put output description here>

Range [number] <put output description here>

Median [number] <put output description here>

Number of unique values [number] <put output description here>

Standard deviation [number] <put output description here>

Console usage

```
processing.runalg('qgis:basicstatisticsfornumericfields', input_layer, field_name, output_html_fi
```

See also

Basic statistics for text fields

Description

<put algortithm description here>

Parameters

`Input vector layer` **[vector: any]** <put parameter description here>

`Field to calculate statistics on` **[tablefield: string]** <put parameter description here>

Outputs

`Statistics for text field` **[html]** <put output description here>

`Minimum length` **[number]** <put output description here>

`Maximum length` **[number]** <put output description here>

`Mean length` **[number]** <put output description here>

`Count` **[number]** <put output description here>

`Number of empty values` **[number]** <put output description here>

`Number of non-empty values` **[number]** <put output description here>

`Number of unique values` **[number]** <put output description here>

Console usage

```
processing.runalg('qgis:basicstatisticsfortextfields', input_layer, field_name, output_html_file)
```

See also

Create equivalent numerical field

Description

<put algortithm description here>

Parameters

`Input layer` **[vector: any]** <put parameter description here>

`Class field` **[tablefield: any]** <put parameter description here>

Outputs

`Output layer` **[vector]** <put output description here>

Console usage

```
processing.runalg('qgis:createequivalentnumericalfield', input, field, output)
```

See also

Delete column

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Field to delete` [tablefield: any] <put parameter description here>

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:deletecolumn', input, column, output)
```

See also

Export/Add geometry columns

Description

<put algortithm description here>

Parameters

`Input layer` [vector: any] <put parameter description here>

`Calculate using` [selection] <put parameter description here>

Options:

- 0 — Layer CRS
- 1 — Project CRS
- 2 — Ellipsoidal

Default: *0*

Outputs

`Output layer` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:exportaddgeometrycolumns', input, calc_method, output)
```

See also

Field calculator

Description

<put algortithm description here>

Parameters

Input layer [vector: any] <put parameter description here>

Result field name [string] <put parameter description here>

Default: *(not set)*

Field type [selection] <put parameter description here>

Options:

- 0 — Float
- 1 — Integer
- 2 — String
- 3 — Date

Default: *0*

Field length [number] <put parameter description here>

Default: *10*

Field precision [number] <put parameter description here>

Default: *3*

Create new field [boolean] <put parameter description here>

Default: *True*

Formula [string] <put parameter description here>

Default: *(not set)*

Outputs

Output layer [vector] <put output description here>

Console usage

```
processing.runalg('qgis:fieldcalculator', input_layer, field_name, field_type, field_length, fiel
```

See also

List unique values

Description

Lists unique values of an attribute table field and counts their number.

Parameters

`Input layer` [vector: any] Layer to analyze.

`Target field` [tablefield: any] Field to analyze.

Outputs

`Unique values` [html] Analysis results in HTML format.

`Total unique values` [number] Total number of unique values in given field.

`Unique values` [string] List of all unique values in given field.

Console usage

```
processing.runalg('qgis:listuniquevalues', input_layer, field_name, output)
```

See also

Number of unique values in classes

Description

<put algortithm description here>

Parameters

`input` [vector: any] <put parameter description here>

`class field` [tablefield: any] <put parameter description here>

`value field` [tablefield: any] <put parameter description here>

Outputs

`output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:numberofuniquevaluesinclasses', input, class_field, value_field, output)
```

See also

Statistics by categories

Description

<put algortithm description here>

Parameters

`Input vector layer` [vector: any] <put parameter description here>

`Field to calculate statistics on` [tablefield: numeric] <put parameter description here>

`Field with categories` [tablefield: any] <put parameter description here>

Outputs

`Statistics` [table] <put output description here>

Console usage

```
processing.runalg('qgis:statisticsbycategories', input_layer, values_field_name, categories_field_
```

See also

Text to float

Description

<put algortithm description here>

Parameters

`Input Layer` [vector: any] <put parameter description here>

`Text attribute to convert to float` [tablefield: string] <put parameter description here>

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('qgis:texttofloat', input, field, output)
```

See also

.

18.6 R algorithm provider

R also called GNU S, is a strongly functional language and environment to statistically explore data sets, make many graphical displays of data from custom data sets

Nota: Please remember that Processing contains only R scripts, so you need to install R by yourself and configure Processing properly.

.

18.6.1 Estadísticas básicas

Frequency table

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Field` [tablefield: any] <put parameter description here>

Outputs

`R Console Output` [html] <put output description here>

Console usage

```
processing.runalg('r:frequencytable', layer, field, r_console_output)
```

See also

Kolmogrov-Smirnov test

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Field` [tablefield: any] <put parameter description here>

Outputs

`R Console Output` [html] <put output description here>

Console usage

```
processing.runalg('r:kolmogrovsmirnovtest', layer, field, r_console_output)
```

See also

Summary statistics

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Field [tablefield: any] <put parameter description here>

Outputs

R Console Output [html] <put output description here>

Console usage

```
processing.runalg('r:summarystatistics', layer, field, r_console_output)
```

See also

.

18.6.2 Alcance de casa

Characteristic hull method

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Field [tablefield: any] <put parameter description here>

Outputs

Home_ranges [vector] <put output description here>

Console usage

```
processing.runalg('r:characteristichullmethod', layer, field, home_ranges)
```

See also

Kernel h ref

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Field` [tablefield: any] <put parameter description here>

`Grid` [number] <put parameter description here>

Default: *10.0*

`Percentage` [number] <put parameter description here>

Default: *10.0*

`Folder` [directory] Optional.

<put parameter description here>

Outputs

`Home_ranges` [vector] <put output description here>

Console usage

```
processing.runalg('r:kernelhref', layer, field, grid, percentage, folder, home_ranges)
```

See also

Minimum convex polygon

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Percentage` [number] <put parameter description here>

Default: *10.0*

`Field` [tablefield: any] <put parameter description here>

Outputs

`Home_ranges` [vector] <put output description here>

Console usage

```
processing.runalg('r:minimumconvexpolygon', layer, percentage, field, home_ranges)
```

See also

Single-linkage cluster analysis

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Field` [tablefield: any] <put parameter description here>

`Percentage` [number] <put parameter description here>

Default: *10.0*

Outputs

`R Plots` [html] <put output description here>

`Home_ranges` [vector] <put output description here>

Console usage

```
processing.runalg('r:singlelinkageclusteranalysis', layer, field, percentage, rplots, home_ranges
```

See also

.

18.6.3 Patrón de puntos

F function

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Nsim` [number] <put parameter description here>

Default: *10.0*

Outputs

`R Plots` [html] <put output description here>

Console usage

```
processing.runalg('r:ffunction', layer, nsim, rplots)
```

See also

G function

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Nsim` [number] <put parameter description here>

Default: *10.0*

Outputs

`R Plots` [html] <put output description here>

Console usage

```
processing.runalg('r:gfunction', layer, nsim, rplots)
```

See also

Monte-Carlo spatial randomness

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Simulations` [number] <put parameter description here>

Default: *100.0*

`Optional plot name` [string] <put parameter description here>

Default: *(not set)*

Outputs

`R Plots` [html] <put output description here>

`R Console Output` [html] <put output description here>

Console usage

```
processing.runalg('r:montecarlospatialrandomness', layer, simulations, optional_plot_name, rplots,
```

See also

Quadrat analysis

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

Outputs

`R Plots` [html] <put output description here>

`R Console Output` [html] <put output description here>

Console usage

```
processing.runalg('r:quadratanalysis', layer, rplots, r_console_output)
```

See also

Random sampling grid

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Size [number] <put parameter description here>

Default: *10.0*

Outputs

Output [vector] <put output description here>

Console usage

```
processing.runalg('r:randomsamplinggrid', layer, size, output)
```

See also

Regular sampling grid

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Size [number] <put parameter description here>

Default: *10.0*

Outputs

Output [vector] <put output description here>

Console usage

```
processing.runalg('r:regularsamplinggrid', layer, size, output)
```

See also

Relative distribution (distance covariate)

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

`Covariate` [vector: any] <put parameter description here>

`Covariate name` [string] <put parameter description here>

Default: *mandatory_covariate_name_(no_spaces)*

`x label` [string] <put parameter description here>

Default: *(not set)*

`Plot name` [string] <put parameter description here>

Default: *(not set)*

`Legend position` [string] <put parameter description here>

Default: *float*

Outputs

`R Plots` [html] <put output description here>

Console usage

```
processing.runalg('r:relativedistributiondistancecovariate', layer, covariate, covariate_name, x_
```

See also

Relative distribution (raster covariate)

Description

<put algortithm description here>

Parameters

`points` [vector: any] <put parameter description here>

`covariate` [raster] <put parameter description here>

`covariate name` [string] <put parameter description here>

Default: *mandatory_covariate_name_(no_spaces)*

`x label` [string] <put parameter description here>

Default: *(not set)*

`plot name` [string] <put parameter description here>

Default: *(not set)*

`legend position` [string] <put parameter description here>

Default: *float*

Outputs

`R Plots` [html] <put output description here>

Console usage

```
processing.runalg('r:relativedistributionrastercovariate', points, covariate, covariate_name, x_l
```

See also

Ripley - Rasson spatial domain

Description

<put algortithm description here>

Parameters

`Layer` [vector: any] <put parameter description here>

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('r:ripleyrassonspatialdomain', layer, output)
```

See also

.

18.6.4 Procesamiento ráster

Advanced raster histogram

Description

<put algortithm description here>

Parameters

`Layer` [raster] <put parameter description here>

`Dens or Hist` [string] <put parameter description here>

Default: *Hist*

Outputs

R Plots [html] <put output description here>

Console usage

```
processing.runalg('r:advancedrasterhistogram', layer, dens_or_hist, rplots)
```

See also

Raster histogram

Description

<put algortithm description here>

Parameters

Layer [raster] <put parameter description here>

Outputs

R Plots [html] <put output description here>

Console usage

```
processing.runalg('r:rasterhistogram', layer, rplots)
```

See also

.

18.6.5 Procesamiento vectorial

Histogram

Description

<put algortithm description here>

Parameters

Layer [vector: any] <put parameter description here>

Field [tablefield: any] <put parameter description here>

Outputs

R Plots [html] <put output description here>

Console usage

```
processing.runalg('r:histogram', layer, field, rplots)
```

See also

.

18.7 SAGA algorithm provider

SAGA (System for Automated Geoscientific Analyses) is a free, hybrid, cross-platform GIS software. SAGA provides many geoscientific methods which are bundled in so-called module libraries.

Nota: Please remember that Processing contains only the interface description, so you need to install SAGA by yourself and configure Processing properly.

.

18.7.1 Geostatistics

Directional statistics for single grid

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Points` **[vector: any]** Optional.

<put parameter description here>

`Direction [Degree]` **[number]** <put parameter description here>

Default: *0.0*

`Tolerance [Degree]` **[number]** <put parameter description here>

Default: *0.0*

`Maximum Distance [Cells]` **[number]** <put parameter description here>

Default: *0*

`Distance Weighting` **[selection]** <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` [number] <put parameter description here>

Default: *1*

`Inverse Distance Offset` [boolean] <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` [number] <put parameter description here>

Default: *1.0*

Outputs

`Arithmetic Mean` [raster] <put output description here>

`Difference from Arithmetic Mean` [raster] <put output description here>

`Minimum` [raster] <put output description here>

`Maximum` [raster] <put output description here>

`Range` [raster] <put output description here>

`Variance` [raster] <put output description here>

`Standard Deviation` [raster] <put output description here>

`Mean less Standard Deviation` [raster] <put output description here>

`Mean plus Standard Deviation` [raster] <put output description here>

`Deviation from Arithmetic Mean` [raster] <put output description here>

`Percentile` [raster] <put output description here>

`Directional Statistics for Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:directionalstatisticsforsinglegrid', grid, points, direction, tolerance, r
```

See also

Fast representativeness

Description

<put algortithm description here>

Parameters

`Input` [raster] <put parameter description here>

`Level of Generalisation` [number] <put parameter description here>

Default: *16*

Outputs

`Output` [raster] <put output description here>

`Output Lod` [raster] <put output description here>

`Output Seeds` [raster] <put output description here>

Console usage

```
processing.runalg('saga:fastrepresentativeness', input, lod, result, result_lod, seeds)
```

See also

Geographically weighted multiple regression (points/grids)

Description

<put algortithm description here>

Parameters

`Predictors` [multipleinput: rasters] <put parameter description here>

`Output of Regression Parameters` [boolean] <put parameter description here>

Default: *True*

`Points` [vector: point] <put parameter description here>

`Dependent Variable` [tablefield: any] <put parameter description here>

`Distance Weighting` [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` [number] <put parameter description here>

Default: *1*

`Inverse Distance Offset` [boolean] <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` [number] <put parameter description here>

Default: *1.0*

`Search Range` [selection] <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

Search Radius [number] <put parameter description here>

Default: *100*

Search Mode [selection] <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

Number of Points [selection] <put parameter description here>

Options:

- 0 — [0] maximum number of observations
- 1 — [1] all points

Default: *0*

Maximum Number of Observations [number] <put parameter description here>

Default: *10*

Minimum Number of Observations [number] <put parameter description here>

Default: *4*

Outputs

Regression [raster] <put output description here>

Coefficient of Determination [raster] <put output description here>

Regression Parameters [raster] <put output description here>

Residuals [vector] <put output description here>

Console usage

```
processing.runalg('saga:geographicallyweightedmultipleregressionpointsgrids', predictors, paramete
```

See also

Geographically weighted multiple regression (points)

Description

<put algortithm description here>

Parameters

Points [vector: any] <put parameter description here>

Dependent Variable [tablefield: any] <put parameter description here>

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` [number] <put parameter description here>

Default: *1*

`Inverse Distance Offset` [boolean] <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` [number] <put parameter description here>

Default: *1.0*

`Search Range` [selection] <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

`Search Radius` [number] <put parameter description here>

Default: *100*

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Number of Points` [selection] <put parameter description here>

Options:

- 0 — [0] maximum number of observations
- 1 — [1] all points

Default: *0*

`Maximum Number of Observations` [number] <put parameter description here>

Default: *10*

`Minimum Number of Observations` [number] <put parameter description here>

Default: *4*

Outputs

`Regression` [vector] <put output description here>

Console usage

```
processing.runalg('saga:geographicallyweightedmultipleregressionpoints', points, dependent, dista
```

See also

Geographically weighted multiple regression

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Dependent Variable` [tablefield: any] <put parameter description here>

`Target Grids` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Distance Weighting` [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` [number] <put parameter description here>

Default: *1*

`Inverse Distance Offset` [boolean] <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` [number] <put parameter description here>

Default: *1*

`Search Range` [selection] <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

`Search Radius` [number] <put parameter description here>

Default: *100*

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Number of Points` [selection] <put parameter description here>

Options:

- 0 — [0] maximum number of observations
- 1 — [1] all points

Default: *0*

`Maximum Number of Observations` [number] <put parameter description here>

Default: *10*

`Minimum Number of Observations` [number] <put parameter description here>

Default: *4*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Quality` [raster] <put output description here>

`Intercept` [raster] <put output description here>

`Quality` [raster] <put output description here>

`Intercept` [raster] <put output description here>

Console usage

```
processing.runalg('saga:geographicallyweightedmultipleregression', points, dependent, target, dis
```

See also

Geographically weighted regression (points/grid)

Description

<put algortithm description here>

Parameters

`Predictor` [raster] <put parameter description here>

`Points` [vector: point] <put parameter description here>

`Dependent Variable` [tablefield: any] <put parameter description here>

`Distance Weighting` [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` **[number]** <put parameter description here>

Default: *1*

`Inverse Distance Offset` **[boolean]** <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` **[number]** <put parameter description here>

Default: *1.0*

`Search Range` **[selection]** <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

`Search Radius` **[number]** <put parameter description here>

Default: *0*

`Search Mode` **[selection]** <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Number of Points` **[selection]** <put parameter description here>

Options:

- 0 — [0] maximum number of observations
- 1 — [1] all points

Default: *0*

`Maximum Number of Observations` **[number]** <put parameter description here>

Default: *10*

`Minimum Number of Observations` **[number]** <put parameter description here>

Default: *4*

Outputs

`Regression` **[raster]** <put output description here>

`Coefficient of Determination` **[raster]** <put output description here>

`Intercept` **[raster]** <put output description here>

`Slope` **[raster]** <put output description here>

`Residuals` **[vector]** <put output description here>

Console usage

```
processing.runalg('saga:geographicallyweightedregressionpointsgrid', predictor, points, dependent
```

See also

Geographically weighted regression

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Dependent Variable` [tablefield: any] <put parameter description here>

`Predictor` [tablefield: any] <put parameter description here>

`Target Grids` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Distance Weighting` [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` [number] <put parameter description here>

Default: *0*

`Inverse Distance Offset` [boolean] <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` [number] <put parameter description here>

Default: *0.0*

`Search Range` [selection] <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

`Search Radius` [number] <put parameter description here>

Default: *100*

`Search Mode` **[selection]** <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Number of Points` **[selection]** <put parameter description here>

Options:

- 0 — [0] maximum number of observations
- 1 — [1] all points

Default: *0*

`Maximum Number of Observations` **[number]** <put parameter description here>

Default: *10*

`Minimum Number of Observations` **[number]** <put parameter description here>

Default: *4*

`Output extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

`Quality` **[raster]** <put output description here>

`Intercept` **[raster]** <put output description here>

`Slope` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:geographicallyweightedregression', points, dependent, predictor, target, d
```

See also

Global moran's i for grids

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Case of contiguity` **[selection]** <put parameter description here>

Options:

- 0 — [0] Rook
- 1 — [1] Queen

Default: *0*

Outputs

`Result` [table] <put output description here>

Console usage

```
processing.runalg('saga:globalmoransiforgrids', grid, contiguity, result)
```

See also

Minimum distance analysis

Description

Performs a complete distance analysis of a point layer:

- minimum distance of points
- maximum distance of points
- average distance of all the points
- standard deviation of the distance
- duplicated points

Parameters

`Points` [vector: point] Layer to analyze.

Outputs

`Minimum Distance Analysis` [table] The resulting table.

Console usage

```
processing.runalg('saga:minimumdistanceanalysis', points, table)
```

See also

Multi-band variation

Description

<put algortithm description here>

Parameters

`Grids` **[multipleinput: rasters]** <put parameter description here>

`Radius [Cells]` **[number]** <put parameter description here>

Default: *1*

`Distance Weighting` **[selection]** <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` **[number]** <put parameter description here>

Default: *1*

`Inverse Distance Offset` **[boolean]** <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` **[number]** <put parameter description here>

Default: *1.0*

Outputs

`Mean Distance` **[raster]** <put output description here>

`Standard Deviation` **[raster]** <put output description here>

`Distance` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:multibandvariation', bands, radius, distance_weighting_weighting, distanc
```

See also

Multiple regression analysis (grid/grids)

Description

<put algortithm description here>

Parameters

`Dependent` **[raster]** <put parameter description here>

`Grids` **[multipleinput: rasters]** <put parameter description here>

`Grid Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Include X Coordinate` [boolean] <put parameter description here>

Default: *True*

`Include Y Coordinate` [boolean] <put parameter description here>

Default: *True*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] include all
- 1 — [1] forward
- 2 — [2] backward
- 3 — [3] stepwise

Default: *0*

`P in` [number] <put parameter description here>

Default: *5*

`P out` [number] <put parameter description here>

Default: *5*

Outputs

`Regression` [raster] <put output description here>

`Residuals` [raster] <put output description here>

`Details: Coefficients` [table] <put output description here>

`Details: Model` [table] <put output description here>

`Details: Steps` [table] <put output description here>

Console usage

```
processing.runalg('saga:multipleregressionanalysisgridgrids', dependent, grids, interpol, coord_x,
```

See also

Multiple regression analysis (points/grids)

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Shapes` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Grid Interpolation` [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Include X Coordinate` [boolean] <put parameter description here>

Default: *True*

`Include Y Coordinate` [boolean] <put parameter description here>

Default: *True*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] include all
- 1 — [1] forward
- 2 — [2] backward
- 3 — [3] stepwise

Default: *0*

`P in` [number] <put parameter description here>

Default: *5*

`P out` [number] <put parameter description here>

Default: *5*

Outputs

`Details: Coefficients` [table] <put output description here>

`Details: Model` [table] <put output description here>

`Details: Steps` [table] <put output description here>

`Residuals` [vector] <put output description here>

`Regression` [raster] <put output description here>

Console usage

```
processing.runalg('saga:multipleregressionanalysispointsgrids', grids, shapes, attribute, interpol
```

See also

Polynomial regression

Description

<put algortithm description here>

Parameters

`Points` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Polynom` [selection] <put parameter description here>

Options:

- 0 — [0] simple planar surface
- 1 — [1] bi-linear saddle
- 2 — [2] quadratic surface
- 3 — [3] cubic surface
- 4 — [4] user defined

Default: *0*

`Maximum X Order` [number] <put parameter description here>

Default: *4*

`Maximum Y Order` [number] <put parameter description here>

Default: *4*

`Maximum Total Order` [number] <put parameter description here>

Default: *4*

`Trend Surface` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Residuals` [vector] <put output description here>

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:polynomialregression', points, attribute, polynom, xorder, yorder, torder
```

See also

Radius of variance (grid)

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Standard Deviation [number] <put parameter description here>

Default: *1.0*

Maximum Search Radius (cells) [number] <put parameter description here>

Default: *20*

Type of Output [selection] <put parameter description here>

Options:

- 0 — [0] Cells
- 1 — [1] Map Units

Default: *0*

Outputs

Variance Radius [raster] <put output description here>

Console usage

```
processing.runalg('saga:radiusofvariancegrid', input, variance, radius, output, result)
```

See also

Regression analysis

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Shapes` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Grid Interpolation` [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Regression Function` [selection] <put parameter description here>

Options:

- 0 — [0] Y = a + b * X (linear)
- 1 — [1] Y = a + b / X
- 2 — [2] Y = a / (b - X)
- 3 — [3] Y = a * X^b (power)
- 4 — [4] Y = a e^(b * X) (exponential)
- 5 — [5] Y = a + b * ln(X) (logarithmic)

Default: *0*

Outputs

`Regression` [raster] <put output description here>

`Residuals` [vector] <put output description here>

Console usage

```
processing.runalg('saga:regressionanalysis', grid, shapes, attribute, interpol, method, regressio
```

See also

Representativeness

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Radius (Cells)` **[number]** <put parameter description here>

Default: *10*

`Exponent` **[number]** <put parameter description here>

Default: *1*

Outputs

`Representativeness` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:representativeness', input, radius, exponent, result)
```

See also

Residual analysis

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Radius (Cells)` **[number]** <put parameter description here>

Default: *7*

`Distance Weighting` **[selection]** <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

`Inverse Distance Weighting Power` **[number]** <put parameter description here>

Default: *1*

`Inverse Distance Offset` **[boolean]** <put parameter description here>

Default: *True*

`Gaussian and Exponential Weighting Bandwidth` **[number]** <put parameter description here>

Default: *1.0*

Outputs

`Mean Value` [raster] <put output description here>

`Difference from Mean Value` [raster] <put output description here>

`Standard Deviation` [raster] <put output description here>

`Value Range` [raster] <put output description here>

`Minimum Value` [raster] <put output description here>

`Maximum Value` [raster] <put output description here>

`Deviation from Mean Value` [raster] <put output description here>

`Percentile` [raster] <put output description here>

Console usage

```
processing.runalg('saga:residualanalysis', grid, radius, distance_weighting_weighting, distance_w
```

See also

Spatial point pattern analysis

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Vertex Distance [Degree]` [number] <put parameter description here>

Default: *5*

Outputs

`Mean Centre` [vector] <put output description here>

`Standard Distance` [vector] <put output description here>

`Bounding Box` [vector] <put output description here>

Console usage

```
processing.runalg('saga:spatialpointpatternanalysis', points, step, centre, stddist, bbox)
```

See also

Statistics for grids

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

Outputs

`Arithmetic Mean` [raster] <put output description here>

`Minimum` [raster] <put output description here>

`Maximum` [raster] <put output description here>

`Variance` [raster] <put output description here>

`Standard Deviation` [raster] <put output description here>

`Mean less Standard Deviation` [raster] <put output description here>

`Mean plus Standard Deviation` [raster] <put output description here>

Console usage

```
processing.runalg('saga:statisticsforgrids', grids, mean, min, max, var, stddev, stddevlo, stddevh
```

See also

Variogram cloud

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Maximum Distance` [number] <put parameter description here>

Default: *0.0*

`Skip Number` [number] <put parameter description here>

Default: *1*

Outputs

`Variogram Cloud` [table] <put output description here>

Console usage

```
processing.runalg('saga:variogramcloud', points, field, distmax, nskip, result)
```

See also

Variogram surface

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Number of Distance Classes` [number] <put parameter description here>

Default: *10*

`Skip Number` [number] <put parameter description here>

Default: *1*

Outputs

`Number of Pairs` [raster] <put output description here>

`Variogram Surface` [raster] <put output description here>

`Covariance Surface` [raster] <put output description here>

Console usage

```
processing.runalg('saga:variogramsurface', points, field, distcount, nskip, count, variance, cova
```

See also

Zonal grid statistics

Description

<put algortithm description here>

Parameters

`Zone Grid` [raster] <put parameter description here>

`Categorial Grids` [multipleinput: rasters] Optional.

<put parameter description here>

`Grids to analyse` [multipleinput: rasters] Optional.

<put parameter description here>

`Aspect` [raster] Optional.

<put parameter description here>

Short Field Names [boolean] <put parameter description here>

Default: *True*

Outputs

Zonal Statistics [table] <put output description here>

Console usage

```
processing.runalg('saga:zonalgridstatistics', zones, catlist, statlist, aspect, shortnames, outtal
```

See also

.

18.7.2 Análsis de cuadrícula

Accumulated cost (anisotropic)

Description

<put algortithm description here>

Parameters

Cost Grid [raster] <put parameter description here>

Direction of max cost [raster] <put parameter description here>

Destination Points [raster] <put parameter description here>

k factor [number] <put parameter description here>

Default: *1*

Threshold for different route [number] <put parameter description here>

Default: *0*

Outputs

Accumulated Cost [raster] <put output description here>

Console usage

```
processing.runalg('saga:accumulatedcostanisotropic', cost, direction, points, k, threshold, accco
```

See also

Accumulated cost (isotropic)

Description

<put algortithm description here>

Parameters

Cost Grid [raster] <put parameter description here>

Destination Points [raster] <put parameter description here>

Threshold for different route [number] <put parameter description here>

Default: *0.0*

Outputs

Accumulated Cost [raster] <put output description here>

Closest Point [raster] <put output description here>

Console usage

```
processing.runalg('saga:accumulatedcostisotropic', cost, points, threshold, acccost, closestpt)
```

See also

Aggregation index

Description

<put algortithm description here>

Parameters

Input Grid [raster] <put parameter description here>

Max. Number of Classes [number] <put parameter description here>

Default: *5*

Outputs

Result [table] <put output description here>

Console usage

```
processing.runalg('saga:aggregationindex', input, maxnumclass, result)
```

See also

Analytical hierarchy process

Description

<put algortithm description here>

Parameters

`Input Grids` [multipleinput: rasters] <put parameter description here>

`Pairwise Comparisons Table` [table] <put parameter description here>

Outputs

`Output Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:analyticalhierarchyprocess', grids, table, output)
```

See also

Cross-classification and tabulation

Description

<put algortithm description here>

Parameters

`Input Grid 1` [raster] <put parameter description here>

`Input Grid 2` [raster] <put parameter description here>

`Max. Number of Classes` [number] <put parameter description here>

Default: *5*

Outputs

`Cross-Classification Grid` [raster] <put output description here>

`Cross-Tabulation Table` [table] <put output description here>

Console usage

```
processing.runalg('saga:crossclassificationandtabulation', input, input2, maxnumclass, resultgrid,
```

See also

Fragmentation (alternative)

Description

<put algortithm description here>

Parameters

Classification [raster] <put parameter description here>

Class Identifier [number] <put parameter description here>

Default: *1*

Neighborhood Min [number] <put parameter description here>

Default: *1*

Neighborhood Max [number] <put parameter description here>

Default: *1*

Level Aggregation [selection] <put parameter description here>

Options:

- 0 — [0] average
- 1 — [1] multiplicative

Default: *0*

Add Border [boolean] <put parameter description here>

Default: *True*

Connectivity Weighting [number] <put parameter description here>

Default: *1.1*

Minimum Density [Percent] [number] <put parameter description here>

Default: *10*

Minimum Density for Interior Forest [Percent] [number] <put parameter description here>

Default: *99*

Search Distance Increment [number] <put parameter description here>

Default: *0.0*

Density from Neighbourhood [boolean] <put parameter description here>

Default: *True*

Outputs

Density [Percent] [raster] <put output description here>

Connectivity [Percent] [raster] <put output description here>

Fragmentation [raster] <put output description here>

Summary [table] <put output description here>

Console usage

```
processing.runalg('saga:fragmentationalternative', classes, class, neighborhood_min, neighborhood_
```

See also

Fragmentation classes from density and connectivity

Description

<put algortithm description here>

Parameters

Density [Percent] [raster] <put parameter description here>

Connectivity [Percent] [raster] <put parameter description here>

Add Border [boolean] <put parameter description here>

Default: *True*

Connectivity Weighting [number] <put parameter description here>

Default: *0*

Minimum Density [Percent] [number] <put parameter description here>

Default: *10*

Minimum Density for Interior Forest [Percent] [number] <put parameter description here>

Default: *99*

Outputs

Fragmentation [raster] <put output description here>

Console usage

```
processing.runalg('saga:fragmentationclassesfromdensityandconnectivity', density, connectivity, bo
```

See also

Fragmentation (standard)

Description

<put algortithm description here>

Parameters

`Classification` [raster] <put parameter description here>

`Class Identifier` [number] <put parameter description here>

Default: *1*

`Neighborhood Min` [number] <put parameter description here>

Default: *1*

`Neighborhood Max` [number] <put parameter description here>

Default: *3*

`Level Aggregation` [selection] <put parameter description here>

Options:

- 0 — [0] average
- 1 — [1] multiplicative

Default: *0*

`Add Border` [boolean] <put parameter description here>

Default: *True*

`Connectivity Weighting` [number] <put parameter description here>

Default: *1.1*

`Minimum Density [Percent]` [number] <put parameter description here>

Default: *10*

`Minimum Density for Interior Forest [Percent]` [number] <put parameter description here>

Default: *99*

`Neighborhood Type` [selection] <put parameter description here>

Options:

- 0 — [0] square
- 1 — [1] circle

Default: *0*

`Include diagonal neighbour relations` [boolean] <put parameter description here>

Default: *True*

Outputs

`Density [Percent]` [raster] <put output description here>

`Connectivity [Percent]` [raster] <put output description here>

`Fragmentation` [raster] <put output description here>

`Summary` [table] <put output description here>

Console usage

```
processing.runalg('saga:fragmentationstandard', classes, class, neighborhood_min, neighborhood_ma
```

See also

Layer of extreme value

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Maximum
- 1 — [1] Minimum

Default: *0*

Outputs

`Result` [raster] <put output description here>

Console usage

```
processing.runalg('saga:layerofextremevalue', grids, criteria, result)
```

See also

Least cost paths

Description

<put algortithm description here>

Parameters

`Source Point(s)` [vector: point] <put parameter description here>

`Accumulated cost` [raster] <put parameter description here>

`Values` [multipleinput: rasters] Optional.

<put parameter description here>

Outputs

`Profile (points)` [vector] <put output description here>

`Profile (lines)` [vector] <put output description here>

Console usage

```
processing.runalg('saga:leastcostpaths', source, dem, values, points, line)
```

See also

Ordered Weighted Averaging

Description

<put algortithm description here>

Parameters

`Input Grids` **[multipleinput: rasters]** <put parameter description here>

`Weights` **[fixedtable]** <put parameter description here>

Outputs

`Output Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:orderedweightedaveraging', grids, weights, output)
```

See also

Pattern analysis

Description

<put algortithm description here>

Parameters

`Input Grid` **[raster]** <put parameter description here>

`Size of Analysis Window` **[selection]** <put parameter description here>

Options:

- 0 — [0] 3 X 3
- 1 — [1] 5 X 5
- 2 — [2] 7 X 7

Default: *0*

`Max. Number of Classes` **[number]** <put parameter description here>

Default: *0*

Outputs

Relative Richness [raster] <put output description here>

Diversity [raster] <put output description here>

Dominance [raster] <put output description here>

Fragmentation [raster] <put output description here>

Number of Different Classes [raster] <put output description here>

Center Versus Neighbours [raster] <put output description here>

Console usage

```
processing.runalg('saga:patternanalysis', input, winsize, maxnumclass, relative, diversity, domina
```

See also

Soil texture classification

Description

<put algortithm description here>

Parameters

Sand [raster] Optional.

<put parameter description here>

Silt [raster] Optional.

<put parameter description here>

Clay [raster] Optional.

<put parameter description here>

Outputs

Soil Texture [raster] <put output description here>

Sum [raster] <put output description here>

Console usage

```
processing.runalg('saga:soiltextureclassification', sand, silt, clay, texture, sum)
```

See also

.

18.7.3 Grid calculus

Function

Description

<put algortithm description here>

Parameters

`xmin` [number] <put parameter description here>

Default: *0.0*

`xmax` [number] <put parameter description here>

Default: *0.0*

`ymin` [number] <put parameter description here>

Default: *0.0*

`ymax` [number] <put parameter description here>

Default: *0.0*

`Formula` [string] <put parameter description here>

Default: *(not set)*

Outputs

`Function` [raster] <put output description here>

Console usage

```
processing.runalg('saga:function', xmin, xmax, ymin, ymax, formul, result)
```

See also

Fuzzify

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`A` [number] <put parameter description here>

Default: *0.0*

`B` [number] <put parameter description here>

Default: *0.0*

`C` **[number]** <put parameter description here>

Default: *0.0*

`D` **[number]** <put parameter description here>

Default: *0.0*

`Membership Function Type` **[selection]** <put parameter description here>

Options:

- 0 — [0] linear
- 1 — [1] sigmoidal
- 2 — [2] j-shaped

Default: *0*

`Adjust to Grid` **[boolean]** <put parameter description here>

Default: *True*

Outputs

`Fuzzified Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:fuzzify', input, a, b, c, d, type, autofit, output)
```

See also

Fuzzy intersection (and)

Description

<put algortithm description here>

Parameters

`Grids` **[multipleinput: rasters]** <put parameter description here>

`Operator Type` **[selection]** <put parameter description here>

Options:

- 0 — [0] min(a, b) (non-interactive)
- 1 — [1] a * b
- 2 — [2] max(0, a + b - 1)

Default: *0*

Outputs

`Intersection` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:fuzzyintersectionand', grids, type, and)
```

See also

Fuzzy union (or)

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Operator Type` [selection] <put parameter description here>

Options:

- 0 — [0] max(a, b) (non-interactive)
- 1 — [1] a + b - a * b
- 2 — [2] min(1, a + b)

Default: *0*

Outputs

`Union` [raster] <put output description here>

Console usage

```
processing.runalg('saga:fuzzyunionor', grids, type, or)
```

See also

Geometric figures

Description

Draws simple geometric figures.

Parameters

`Cell Count` [number] Number of cells to use.

Default: *0*

`Cell Size` [number] Size of the single cell.

Default: *0*

`Figure` [selection] Type of the figure.

Options:

- 0 — [0] Cone (up)
- 1 — [1] Cone (down)
- 2 — [2] Plane

Default: *0*

`Direction of Plane [Degree]` [number] Rotation factor in degrees.

Default: *0*

Outputs

`Result` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:geometricfigures', cell_count, cell_size, figure, plane, result)
```

See also

Gradient vector from cartesian to polar coordinates

Description

<put algortithm description here>

Parameters

`X Component` [raster] <put parameter description here>

`Y Component` [raster] <put parameter description here>

`Polar Angle Units` [selection] <put parameter description here>

Options:

- 0 — [0] radians
- 1 — [1] degree

Default: *0*

`Polar Coordinate System` [selection] <put parameter description here>

Options:

- 0 — [0] mathematical
- 1 — [1] geographical
- 2 — [2] user defined

Default: *0*

`User defined Zero Direction` [number] <put parameter description here>

Default: *0.0*

User defined Orientation [selection] <put parameter description here>

Options:

- 0 — [0] clockwise
- 1 — [1] counterclockwise

Default: *0*

Outputs

Direction [raster] <put output description here>

Length [raster] <put output description here>

Console usage

```
processing.runalg('saga:gradientvectorfromcartesiantopolarcoordinates', dx, dy, units, system, sy
```

See also

Gradient vector from polar to cartesian coordinates

Description

<put algortithm description here>

Parameters

Direction [raster] <put parameter description here>

Length [raster] <put parameter description here>

Polar Angle Units [selection] <put parameter description here>

Options:

- 0 — [0] radians
- 1 — [1] degree

Default: *0*

Polar Coordinate System [selection] <put parameter description here>

Options:

- 0 — [0] mathematical
- 1 — [1] geographical
- 2 — [2] user defined

Default: *0*

User defined Zero Direction [number] <put parameter description here>

Default: *0.0*

User defined Orientation [selection] <put parameter description here>

Options:

- 0 — [0] clockwise

- 1 — [1] counterclockwise

Default: *0*

Outputs

X Component [raster] <put output description here>

Y Component [raster] <put output description here>

Console usage

```
processing.runalg('saga:gradientvectorfrompolartocartesiancoordinates', dir, len, units, system, s
```

See also

Grid difference

Description

Creates a new grid layer as the result of the difference between two other grid layers.

Parameters

A [raster] First layer.

B [raster] Second layer.

Outputs

Difference (A - B) [raster] The resulting layer.

Console usage

```
processing.runalg('saga:griddifference', a, b, c)
```

See also

Grid division

Description

Creates a new grid layer as the result of the division between two other grid layers.

Parameters

Dividend [raster] First layer.

Divisor [raster] Second layer.

Outputs

`Quotient` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:griddivision', a, b, c)
```

See also

Grid normalisation

Description

Normalises the grid values according to minimum and maximum values chosen.

Parameters

`Grid` [raster] Grid to normalize.

`Target Range (min)` [number] Minimum value.

Default: *0*

`Target Range (max)` [number] Maximum value.

Default: *1*

Outputs

`Normalised Grid` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:gridnormalisation', input, range_min, range_max, output)
```

See also

Grids product

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

Outputs

`Product` [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridsproduct', grids, result)
```

See also

Grids sum

Description

Creates a new grid layer as the result of the sum of two or more grid layers.

Parameters

`Grids` [multipleinput: rasters] Grid layers to sum

Outputs

`Sum` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:gridssum', grids, result)
```

See also

Grid standardisation

Description

Standardises the grid layer values.

Parameters

`Grid` [raster] Grid to process.

`Stretch Factor` [number] stretching factor.

Default: *1.0*

Outputs

`Standardised Grid` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:gridstandardisation', input, stretch, output)
```

See also

Grid volume

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Method [selection] <put parameter description here>

Options:

- 0 — [0] Count Only Above Base Level
- 1 — [1] Count Only Below Base Level
- 2 — [2] Subtract Volumes Below Base Level
- 3 — [3] Add Volumes Below Base Level

Default: *0*

Base Level [number] <put parameter description here>

Default: *0.0*

Outputs

Console usage

```
processing.runalg('saga:gridvolume', grid, method, level)
```

See also

Metric conversions

Description

Performs numerical conversions of the grid values.

Parameters

Grid [raster] Grid to process.

Conversion [selection] Conversion type.

Options:

- 0 — [0] radians to degree
- 1 — [1] degree to radians
- 2 — [2] Celsius to Fahrenheit
- 3 — [3] Fahrenheit to Celsius

Default: *0*

Outputs

`Converted Grid` [raster] The resulting layer.

Console usage

```
processing.runalg('saga:metricconversions', grid, conversion, conv)
```

See also

Polynomial trend from grids

Description

<put algortithm description here>

Parameters

`Dependent Variables` [multipleinput: rasters] <put parameter description here>

`Independent Variable (per Grid and Cell)` [multipleinput: rasters] Optional.
<put parameter description here>

`Independent Variable (per Grid)` [fixedtable] <put parameter description here>

`Type of Approximated Function` [selection] <put parameter description here>

Options:

- 0 — [0] first order polynom (linear regression)
- 1 — [1] second order polynom
- 2 — [2] third order polynom
- 3 — [3] fourth order polynom
- 4 — [4] fifth order polynom

Default: *0*

Outputs

`Polynomial Coefficients` [raster] <put output description here>

`Coefficient of Determination` [raster] <put output description here>

Console usage

```
processing.runalg('saga:polynomialtrendfromgrids', grids, y_grids, y_table, polynom, parms, qualit
```

See also

Random field

Description

Generates a random grid layer.

Parameters

`Width (Cells)` **[number]** Width of the layer in cells.

Default: *100*

`Height (Cells)` **[number]** Height of the layer in cells.

Default: *100*

`Cellsize` **[number]** Cell size to use.

Default: *100.0*

`West` **[number]** West coordinate of the bottom-left corner of the grid.

Default: *0.0*

`South` **[number]** South coordinate of the bottom-left corner of the grid.

Default: *0.0*

`Method` **[selection]** Statistical method used for the calculation.

Options:

- 0 — [0] Uniform
- 1 — [1] Gaussian

Default: *0*

`Range Min` **[number]** Minimum cell value to use.

Default: *0.0*

`Range Max` **[number]** Maximum cell value to use.

Default: *1.0*

`Arithmetic Mean` **[number]** Mean of all the cell values to use.

Default: *0.0*

`Standard Deviation` **[number]** Standard deviation of all the cell values to use.

Default: *1.0*

Outputs

`Random Field` **[raster]** The resulting layer.

Console usage

```
processing.runalg('saga:randomfield', nx, ny, cellsize, xmin, ymin, method, range_min, range_max,
```

See also

Random terrain generation

Description

<put algortithm description here>

Parameters

`Radius (cells)` **[number]** <put parameter description here>

Default: *10*

`Iterations` **[number]** <put parameter description here>

Default: *10*

`Target Dimensions` **[selection]** <put parameter description here>

Options:

- 0 — [0] User defined

Default: *0*

`Grid Size` **[number]** <put parameter description here>

Default: *1.0*

`Cols` **[number]** <put parameter description here>

Default: *100*

`Rows` **[number]** <put parameter description here>

Default: *100*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:randomterraingeneration', radius, iterations, target_type, user_cell_size
```

See also

Raster calculator

Description

<put algortithm description here>

Parameters

`Main input layer` [raster] <put parameter description here>

`Additional layers` [multipleinput: rasters] Optional.

<put parameter description here>

`Formula` [string] <put parameter description here>

Default: *(not set)*

Outputs

`Result` [raster] <put output description here>

Console usage

```
processing.runalg('saga:rastercalculator', grids, xgrids, formula, result)
```

See also

.

18.7.4 Grid filter

Dtm filter (slope-based)

Description

<put algortithm description here>

Parameters

`Grid to filter` [raster] <put parameter description here>

`Search Radius` [number] <put parameter description here>

Default: *2*

`Approx. Terrain Slope` [number] <put parameter description here>

Default: *30.0*

`Use Confidence Interval` [boolean] <put parameter description here>

Default: *True*

Outputs

`Bare Earth` [raster] <put output description here>

`Removed Objects` [raster] <put output description here>

Console usage

```
processing.runalg('saga:dtmfilterslopebased', input, radius, terrainslope, stddev, ground, nongrou
```

See also

Filter clumps

Description

<put algortithm description here>

Parameters

Input Grid [raster] <put parameter description here>

Min. Size [number] <put parameter description here>

Default: *10*

Outputs

Filtered Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:filterclumps', grid, threshold, output)
```

See also

Gaussian filter

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Standard Deviation [number] <put parameter description here>

Default: *1*

Search Mode [selection] <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

Search Radius [number] <put parameter description here>

Default: *3*

Outputs

`Filtered Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:gaussianfilter', input, sigma, mode, radius, result)
```

See also

Laplacian filter

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] standard kernel 1
- 1 — [1] standard kernel 2
- 2 — [2] Standard kernel 3
- 3 — [3] user defined kernel

Default: *0*

`Standard Deviation (Percent of Radius)` [number] <put parameter description here>

Default: *0*

`Radius` [number] <put parameter description here>

Default: *1*

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] square
- 1 — [1] circle

Default: *0*

Outputs

`Filtered Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:laplacianfilter', input, method, sigma, radius, mode, result)
```

See also

Majority filter

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Search Mode` **[selection]** <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

`Radius` **[number]** <put parameter description here>

Default: *1*

`Threshold [Percent]` **[number]** <put parameter description here>

Default: *0*

Outputs

`Filtered Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:majorityfilter', input, mode, radius, threshold, result)
```

See also

Morphological filter

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Search Mode` **[selection]** <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

Radius [number] <put parameter description here>

Default: *1*

Method [selection] <put parameter description here>

Options:

- 0 — [0] Dilation
- 1 — [1] Erosion
- 2 — [2] Opening
- 3 — [3] Closing

Default: *0*

Outputs

Filtered Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:morphologicalfilter', input, mode, radius, method, result)
```

See also

Multi direction lee filter

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Estimated Noise (absolute) [number] <put parameter description here>

Default: *1.0*

Estimated Noise (relative) [number] <put parameter description here>

Default: *1.0*

Weighted [boolean] <put parameter description here>

Default: *True*

Method [selection] <put parameter description here>

Options:

- 0 — [0] noise variance given as absolute value
- 1 — [1] noise variance given relative to mean standard deviation
- 2 — [2] original calculation (Ringeler)

Default: *0*

Outputs

`Filtered Grid` [raster] <put output description here>

`Minimum Standard Deviation` [raster] <put output description here>

`Direction of Minimum Standard Deviation` [raster] <put output description here>

Console usage

```
processing.runalg('saga:multidirectionleefilter', input, noise_abs, noise_rel, weighted, method,
```

See also

Rank filter

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

`Radius` [number] <put parameter description here>

Default: *1*

`Rank [Percent]` [number] <put parameter description here>

Default: *50*

Outputs

`Filtered Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:rankfilter', input, mode, radius, rank, result)
```

See also

Simple filter

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Search Mode [selection] <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

Filter [selection] <put parameter description here>

Options:

- 0 — [0] Smooth
- 1 — [1] Sharpen
- 2 — [2] Edge

Default: *0*

Radius [number] <put parameter description here>

Default: *2*

Outputs

Filtered Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:simplefilter', input, mode, method, radius, result)
```

See also

User defined filter

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Filter Matrix [table] Optional.

<put parameter description here>

Default Filter Matrix (3x3) [fixedtable] <put parameter description here>

Outputs

Filtered Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:userdefinedfilter', input, filter, filter_3x3, result)
```

See also

.

18.7.5 Grid gridding

Inverse distance weighted

Description

Inverse distance grid interpolation from irregular distributed points.

Parameters

Points [vector: point] <put parameter description here>

Attribute [tablefield: any] <put parameter description here>

Target Grid [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] inverse distance to a power
- 1 — [1] linearly decreasing within search radius
- 2 — [2] exponential weighting scheme
- 3 — [3] gaussian weighting scheme

Default: *0*

Inverse Distance Power [number] <put parameter description here>

Default: *2*

Exponential and Gaussian Weighting Bandwidth [number] <put parameter description here>

Default: *1*

Search Range [selection] <put parameter description here>

Options:

- 0 — [0] search radius (local)
- 1 — [1] no search radius (global)

Default: *0*

Search Radius [number] <put parameter description here>

Default: *100.0*

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Number of Points` [selection] <put parameter description here>

Options:

- 0 — [0] maximum number of points
- 1 — [1] all points

Default: *0*

`Maximum Number of Points` [number] <put parameter description here>

Default: *10*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:inversedistanceweighted', shapes, field, target, weighting, power, bandwi
```

See also

Kernel density estimation

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Weight` [tablefield: any] <put parameter description here>

`Radius` [number] <put parameter description here>

Default: *10*

`Kernel` [selection] <put parameter description here>

Options:

- 0 — [0] quartic kernel
- 1 — [1] gaussian kernel

Default: *0*

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:kerneldensityestimation', points, population, radius, kernel, target, out
```

See also

Modifed quadratic shepard

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Quadratic Neighbors` [number] <put parameter description here>

Default: *13*

`Weighting Neighbors` [number] <put parameter description here>

Default: *19*

`Left` [number] <put parameter description here>

Default: *0.0*

`Right` [number] <put parameter description here>

Default: *0.0*

`Bottom` [number] <put parameter description here>

Default: *0.0*

`Top` [number] <put parameter description here>

Default: *0.0*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:modifedquadraticshepard', shapes, field, target, quadratic_neighbors, wei
```

See also

Natural neighbour

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Sibson` [boolean] <put parameter description here>

Default: *True*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:naturalneighbour', shapes, field, target, sibson, output_extent, user_size
```

See also

Nearest neighbour

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:nearestneighbour', shapes, field, target, output_extent, user_size, user_
```

See also

Shapes to grid

Description

<put algortithm description here>

Parameters

`Shapes` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Method for Multiple Values` [selection] <put parameter description here>

Options:

- 0 — [0] first
- 1 — [1] last
- 2 — [2] minimum
- 3 — [3] maximum
- 4 — [4] mean

Default: *0*

`Method for Lines` [selection] <put parameter description here>

Options:

- 0 — [0] thin
- 1 — [1] thick

Default: *0*

`Preferred Target Grid Type` [selection] <put parameter description here>

Options:

- 0 — [0] Integer (1 byte)
- 1 — [1] Integer (2 byte)
- 2 — [2] Integer (4 byte)
- 3 — [3] Floating Point (4 byte)
- 4 — [4] Floating Point (8 byte)

Default: *0*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:shapestogrid', input, field, multiple, line_type, grid_type, output_extent
```

See also

Triangulation

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:triangulation', shapes, field, target, output_extent, user_size, user_gri
```

See also

.

18.7.6 Cuadrícula spline

B-spline approximation

Description

<put algortithm description here>

Parameters

`Points` **[vector: point]** <put parameter description here>

`Attribute` **[tablefield: any]** <put parameter description here>

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Resolution` **[number]** <put parameter description here>

Default: *1.0*

`Output extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:bsplineapproximation', shapes, field, target, level, output_extent, user_s
```

See also

Cubic spline approximation

Description

<put algortithm description here>

Parameters

`Points` **[vector: point]** <put parameter description here>

`Attribute` **[tablefield: any]** <put parameter description here>

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Minimal Number of Points` **[number]** <put parameter description here>

Default: *3*

`Maximal Number of Points` **[number]** <put parameter description here>

Default: *20*

`Points per Square` **[number]** <put parameter description here>

Default: *5*

`Tolerance` **[number]** <put parameter description here>

Default: *140.0*

`Output extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:cubicsplineapproximation', shapes, field, target, npmin, npmax, nppc, k, 
```

See also

Multilevel b-spline interpolation (from grid)

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Method` **[selection]** <put parameter description here>

Options:

- 0 — [0] without B-spline refinement
- 1 — [1] with B-spline refinement

Default: *0*

`Threshold Error` **[number]** <put parameter description here>

Default: *0.0001*

`Maximum Level` **[number]** <put parameter description here>

Default: *11.0*

`Data Type` **[selection]** <put parameter description here>

Options:

- 0 — [0] same as input grid
- 1 — [1] floating point

Default: *0*

Output extent [extent] <put parameter description here>

Default: *0,1,0,1*

Cellsize [number] <put parameter description here>

Default: *100.0*

Outputs

Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:multilevelbsplineinterpolationfromgrid', gridpoints, target, method, epsi
```

See also

Multilevel b-spline interpolation

Description

<put algortithm description here>

Parameters

Points [vector: point] <put parameter description here>

Attribute [tablefield: any] <put parameter description here>

Target Grid [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

Method [selection] <put parameter description here>

Options:

- 0 — [0] without B-spline refinement
- 1 — [1] with B-spline refinement

Default: *0*

Threshold Error [number] <put parameter description here>

Default: *0.0001*

Maximum Level [number] <put parameter description here>

Default: *11.0*

Output extent [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:multilevelbsplineinterpolation', shapes, field, target, method, epsilon, l
```

See also

Thin plate spline (global)

Description

<put algortithm description here>

Parameters

`Points` **[vector: point]** <put parameter description here>

`Attribute` **[tablefield: any]** <put parameter description here>

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Regularisation` **[number]** <put parameter description here>

Default: *0.0*

`Output extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:thinplatesplineglobal', shapes, field, target, regul, output_extent, user_
```

See also

Thin plate spline (local)

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Regularisation` [number] <put parameter description here>

Default: *0.0001*

`Search Radius` [number] <put parameter description here>

Default: *100.0*

`Search Mode` [selection] <put parameter description here>

Options:

- 0 — [0] all directions
- 1 — [1] quadrants

Default: *0*

`Points Selection` [selection] <put parameter description here>

Options:

- 0 — [0] all points in search radius
- 1 — [1] maximum number of points

Default: *0*

`Maximum Number of Points` [number] <put parameter description here>

Default: *10*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:thinplatesplinelocal', shapes, field, target, regul, radius, mode, select
```

See also

Thin plate spline (tin)

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Regularisation` [number] <put parameter description here>

Default: *0.0*

`Neighbourhood` [selection] <put parameter description here>

Options:

- 0 — [0] immediate
- 1 — [1] level 1
- 2 — [2] level 2

Default: *0*

`Add Frame` [boolean] <put parameter description here>

Default: *True*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

`Cellsize` [number] <put parameter description here>

Default: *100.0*

Outputs

`Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:thinplatesplinetin', shapes, field, target, regul, level, frame, output_e
```

See also

.

18.7.7 Grid tools

Aggregate

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Aggregation Size [number] <put parameter description here>

Default: *3*

Method [selection] <put parameter description here>

Options:

- 0 — [0] Sum
- 1 — [1] Min
- 2 — [2] Max

Default: *0*

Outputs

Console usage

```
processing.runalg('saga:aggregate', input, size, method)
```

See also

Change grid values

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Replace Condition [selection] <put parameter description here>

Options:

- 0 — [0] Grid value equals low value
- 1 — [1] Low value < grid value < high value

- 2 — [2] Low value <= grid value < high value

Default: *0*

`Lookup Table` [fixedtable] <put parameter description here>

Outputs

`Changed Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:changegridvalues', grid_in, method, lookup, grid_out)
```

See also

Close gaps

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Mask` [raster] Optional.

<put parameter description here>

`Tension Threshold` [number] <put parameter description here>

Default: *0.1*

Outputs

`Changed Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:closegaps', input, mask, threshold, result)
```

See also

Close gaps with spline

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Mask` **[raster]** Optional.

<put parameter description here>

`Only Process Gaps with Less Cells` **[number]** <put parameter description here>

Default: *0*

`Maximum Points` **[number]** <put parameter description here>

Default: *1000*

`Number of Points for Local Interpolation` **[number]** <put parameter description here>

Default: *10*

`Extended Neighourhood` **[boolean]** <put parameter description here>

Default: *True*

`Neighbourhood` **[selection]** <put parameter description here>

Options:

- 0 — [0] Neumann
- 1 — [1] Moore

Default: *0*

`Radius (Cells)` **[number]** <put parameter description here>

Default: *0*

`Relaxation` **[number]** <put parameter description here>

Default: *0.0*

Outputs

`Closed Gaps Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:closegapswithspline', grid, mask, maxgapcells, maxpoints, localpoints, ext
```

See also

Close one cell gaps

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

Outputs

`Changed Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:closeonecellgaps', input, result)
```

See also

Convert data storage type

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Data storage type` [selection] <put parameter description here>

Options:

- 0 — [0] bit
- 1 — [1] unsigned 1 byte integer
- 2 — [2] signed 1 byte integer
- 3 — [3] unsigned 2 byte integer
- 4 — [4] signed 2 byte integer
- 5 — [5] unsigned 4 byte integer
- 6 — [6] signed 4 byte integer
- 7 — [7] 4 byte floating point number
- 8 — [8] 8 byte floating point number

Default: *0*

Outputs

`Converted Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:convertdatastoragetype', input, type, output)
```

See also

Crop to data

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Outputs

Cropped layer [raster] <put output description here>

Console usage

```
processing.runalg('saga:croptodata', input, output)
```

See also

Grid buffer

Description

<put algortithm description here>

Parameters

Features Grid [raster] <put parameter description here>

Distance [number] <put parameter description here>

Default: *1000*

Buffer Distance [selection] <put parameter description here>

Options:

- 0 — [0] Fixed
- 1 — [1] Cell value

Default: *0*

Outputs

Buffer Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridbuffer', features, dist, buffertype, buffer)
```

See also

Grid masking

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Mask` [raster] <put parameter description here>

Outputs

`Masked Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridmasking', grid, mask, masked)
```

See also

Grid orientation

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Copy
- 1 — [1] Flip
- 2 — [2] Mirror
- 3 — [3] Invert

Default: *0*

Outputs

`Changed Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridorientation', input, method, result)
```

See also

Grid proximity buffer

Description

<put algortithm description here>

Parameters

`Source Grid` [raster] <put parameter description here>

`Buffer distance` [number] <put parameter description here>

Default: *500.0*

`Equidistance` [number] <put parameter description here>

Default: *100.0*

Outputs

`Distance Grid` [raster] <put output description here>

`Allocation Grid` [raster] <put output description here>

`Buffer Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridproximitybuffer', source, dist, ival, distance, alloc, buffer)
```

See also

Grid shrink/expand

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Operation` [selection] <put parameter description here>

Options:

- 0 — [0] Shrink
- 1 — [1] Expand

Default: *0*

Search Mode [selection] <put parameter description here>

Options:

- 0 — [0] Square
- 1 — [1] Circle

Default: *0*

Radius [number] <put parameter description here>

Default: *1*

Method [selection] <put parameter description here>

Options:

- 0 — [0] min
- 1 — [1] max
- 2 — [2] mean
- 3 — [3] majority

Default: *0*

Outputs

Result Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:gridshrinkexpand', input, operation, mode, radius, method_expand, result)
```

See also

Invert data/no-data

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Outputs

Result [raster] <put output description here>

Console usage

```
processing.runalg('saga:invertdatanodata', input, output)
```

See also

Merge raster layers

Description

<put algortithm description here>

Parameters

`Grids to Merge` **[multipleinput: rasters]** <put parameter description here>

`Preferred data storage type` **[selection]** <put parameter description here>

Options:

- 0 — [0] 1 bit
- 1 — [1] 1 byte unsigned integer
- 2 — [2] 1 byte signed integer
- 3 — [3] 2 byte unsigned integer
- 4 — [4] 2 byte signed integer
- 5 — [5] 4 byte unsigned integer
- 6 — [6] 4 byte signed integer
- 7 — [7] 4 byte floating point
- 8 — [8] 8 byte floating point

Default: *0*

`Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Overlapping Cells` **[selection]** <put parameter description here>

Options:

- 0 — [0] mean value
- 1 — [1] first value in order of grid list

Default: *0*

Outputs

`Merged Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:mergerasterlayers', grids, type, interpol, overlap, merged)
```

See also

Patching

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Patch Grid [raster] <put parameter description here>

Interpolation Method [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

Outputs

Completed Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:patching', original, additional, interpolation, completed)
```

See also

Proximity grid

Description

<put algortithm description here>

Parameters

Features [raster] <put parameter description here>

Outputs

`Distance` [raster] <put output description here>

`Direction` [raster] <put output description here>

`Allocation` [raster] <put output description here>

Console usage

```
processing.runalg('saga:proximitygrid', features, distance, direction, allocation)
```

See also

Reclassify grid values

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] single
- 1 — [1] range
- 2 — [2] simple table

Default: *0*

`old value (for single value change)` [number] <put parameter description here>

Default: *0.0*

`new value (for single value change)` [number] <put parameter description here>

Default: *1.0*

`operator (for single value change)` [selection] <put parameter description here>

Options:

- 0 — [0] =
- 1 — [1] <
- 2 — [2] <=
- 3 — [3] >=
- 4 — [4] >

Default: *0*

`minimum value (for range)` [number] <put parameter description here>

Default: *0.0*

`maximum value (for range)` [number] <put parameter description here>

Default: *1.0*

`new value(for range)` [number] <put parameter description here>

Default: *2.0*

`operator (for range)` [selection] <put parameter description here>

Options:

- 0 — [0] <=
- 1 — [1] <

Default: *0*

`Lookup Table` [fixedtable] <put parameter description here>

`operator (for table)` [selection] <put parameter description here>

Options:

- 0 — [0] min <= value < max
- 1 — [1] min <= value <= max
- 2 — [2] min < value <= max
- 3 — [3] min < value < max

Default: *0*

`replace no data values` [boolean] <put parameter description here>

Default: *True*

`new value for no data values` [number] <put parameter description here>

Default: *0.0*

`replace other values` [boolean] <put parameter description here>

Default: *True*

`new value for other values` [number] <put parameter description here>

Default: *0.0*

Outputs

`Reclassified Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:reclassifygridvalues', input, method, old, new, soperator, min, max, rnew
```

See also

Resampling

Description

<put algortithm description here>

Parameters

`Grid` **[raster]** <put parameter description here>

`Preserve Data Type` **[boolean]** <put parameter description here>

Default: *True*

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Interpolation Method (Scale Up)` **[selection]** <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation
- 5 — [5] Mean Value
- 6 — [6] Mean Value (cell area weighted)
- 7 — [7] Minimum Value
- 8 — [8] Maximum Value
- 9 — [9] Majority

Default: *0*

`Interpolation Method (Scale Down)` **[selection]** <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Output extent` **[extent]** <put parameter description here>

Default: *0,1,0,1*

`Cellsize` **[number]** <put parameter description here>

Default: *100.0*

Outputs

`Grid` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:resampling', input, keep_type, target, scale_up_method, scale_down_method
```

See also

Sort grid

Description

<put algortithm description here>

Parameters

Input Grid [raster] <put parameter description here>

Down sort [boolean] <put parameter description here>

Default: *True*

Outputs

Sorted Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:sortgrid', grid, down, output)
```

See also

Split RGB bands

Description

<put algortithm description here>

Parameters

Input layer [raster] <put parameter description here>

Outputs

Output R band layer [raster] <put output description here>

Output G band layer [raster] <put output description here>

Output B band layer [raster] <put output description here>

Console usage

```
processing.runalg('saga:splitrgbbands', input, r, g, b)
```

See also

Threshold buffer

Description

<put algortithm description here>

Parameters

Features Grid [raster] <put parameter description here>

Value Grid [raster] <put parameter description here>

Threshold Grid [raster] Optional.

<put parameter description here>

Threshold [number] <put parameter description here>

Default: *0.0*

Threshold Type [selection] <put parameter description here>

Options:

- 0 — [0] Absolute
- 1 — [1] Relative from cell value

Default: *0*

Outputs

Buffer Grid [raster] <put output description here>

Console usage

```
processing.runalg('saga:thresholdbuffer', features, value, thresholdgrid, threshold, thresholdtype
```

See also

.

18.7.8 Grid visualization

Histogram surface

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] rows
- 1 — [1] columns
- 2 — [2] circle

Default: *0*

Outputs

`Histogram` [raster] <put output description here>

Console usage

```
processing.runalg('saga:histogramsurface', grid, method, hist)
```

See also

Rgb composite

Description

<put algortithm description here>

Parameters

`R` [raster] <put parameter description here>

`G` [raster] <put parameter description here>

`B` [raster] <put parameter description here>

`Method for R value` [selection] <put parameter description here>

Options:

- 0 — 0 - 255
- 1 — Rescale to 0 - 255
- 2 — User defined rescale
- 3 — Percentiles
- 4 — Percentage of standard deviation

Default: *0*

`Method for G value` [selection] <put parameter description here>

Options:

- 0 — 0 - 255
- 1 — Rescale to 0 - 255

- 2 — User defined rescale
- 3 — Percentiles
- 4 — Percentage of standard deviation

Default: *0*

`Method for B value` **[selection]** <put parameter description here>

Options:

- 0 — 0 - 255
- 1 — Rescale to 0 - 255
- 2 — User defined rescale
- 3 — Percentiles
- 4 — Percentage of standard deviation

Default: *0*

`Rescale Range for RED min` **[number]** <put parameter description here>

Default: *0*

`Rescale Range for RED max` **[number]** <put parameter description here>

Default: *255*

`Percentiles Range for RED max` **[number]** <put parameter description here>

Default: *1*

`Percentiles Range for RED max` **[number]** <put parameter description here>

Default: *99*

`Percentage of standard deviation for RED` **[number]** <put parameter description here>

Default: *150.0*

`Rescale Range for GREEN min` **[number]** <put parameter description here>

Default: *0*

`Rescale Range for GREEN max` **[number]** <put parameter description here>

Default: *255*

`Percentiles Range for GREEN max` **[number]** <put parameter description here>

Default: *1*

`Percentiles Range for GREEN max` **[number]** <put parameter description here>

Default: *99*

`Percentage of standard deviation for GREEN` **[number]** <put parameter description here>

Default: *150.0*

`Rescale Range for BLUE min` **[number]** <put parameter description here>

Default: *0*

`Rescale Range for BLUE max` **[number]** <put parameter description here>

Default: *255*

`Percentiles Range for BLUE max` **[number]** <put parameter description here>

Default: *1*

`Percentiles Range for BLUE max` [number] <put parameter description here>

Default: *99*

`Percentage of standard deviation for BLUE` [number] <put parameter description here>

Default: *150.0*

Outputs

`Output RGB` [raster] <put output description here>

Console usage

```
processing.runalg('saga:rgbcomposite', grid_r, grid_g, grid_b, r_method, g_method, b_method, r_ra
```

See also

.

18.7.9 Clasificación de imágenes

Change detection

Description

<put algortithm description here>

Parameters

`Initial State` [raster] <put parameter description here>

`Look-up Table` [table] Optional.

<put parameter description here>

`Value` [tablefield: any] <put parameter description here>

`Value (Maximum)` [tablefield: any] <put parameter description here>

`Name` [tablefield: any] <put parameter description here>

`Final State` [raster] <put parameter description here>

`Look-up Table` [table] Optional.

<put parameter description here>

`Value` [tablefield: any] <put parameter description here>

`Value (Maximum)` [tablefield: any] <put parameter description here>

`Name` [tablefield: any] <put parameter description here>

`Report Unchanged Classes` [boolean] <put parameter description here>

Default: *True*

`Output as...` [selection] <put parameter description here>

Options:

- 0 — [0] cells
- 1 — [1] percent
- 2 — [2] area

Default: *0*

Outputs

`Changes` [raster] <put output description here>

`Changes` [table] <put output description here>

Console usage

```
processing.runalg('saga:changedetection', initial, ini_lut, ini_lut_min, ini_lut_max, ini_lut_nam
```

See also

Cluster analysis for grids

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Iterative Minimum Distance (Forgy 1965)
- 1 — [1] Hill-Climbing (Rubin 1967)
- 2 — [2] Combined Minimum Distance / Hillclimbing

Default: *0*

`Clusters` [number] <put parameter description here>

Default: *5*

`Normalise` [boolean] <put parameter description here>

Default: *True*

`Old Version` [boolean] <put parameter description here>

Default: *True*

Outputs

`Clusters` [raster] <put output description here>

`Statistics` [table] <put output description here>

Console usage

```
processing.runalg('saga:clusteranalysisforgrids', grids, method, ncluster, normalise, oldversion,
```

See also

Supervised classification

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Training Areas` [vector: polygon] <put parameter description here>

`Class Identifier` [tablefield: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Binary Encoding
- 1 — [1] Parallelepiped
- 2 — [2] Minimum Distance
- 3 — [3] Mahalanobis Distance
- 4 — [4] Maximum Likelihood
- 5 — [5] Spectral Angle Mapping
- 6 — [6] Winner Takes All

Default: *0*

`Normalise` [boolean] <put parameter description here>

Default: *True*

`Distance Threshold` [number] <put parameter description here>

Default: *0.0*

`Probability Threshold (Percent)` [number] <put parameter description here>

Default: *0.0*

`Probability Reference` [selection] <put parameter description here>

Options:

- 0 — [0] absolute
- 1 — [1] relative

Default: *0*

`Spectral Angle Threshold (Degree)` [number] <put parameter description here>

Default: *0.0*

Outputs

Class Information [table] <put output description here>

Classification [raster] <put output description here>

Quality [raster] <put output description here>

Console usage

```
processing.runalg('saga:supervisedclassification', grids, roi, roi_id, method, normalise, thresho
```

See also

.

18.7.10 Imagery RGA

Fast region growing algorithm

Description

<put algortithm description here>

Parameters

Input Grids [multipleinput: rasters] <put parameter description here>

Seeds Grid [raster] <put parameter description here>

Smooth Rep [raster] Optional.

<put parameter description here>

Outputs

Segmente [raster] <put output description here>

Mean [raster] <put output description here>

Console usage

```
processing.runalg('saga:fastregiongrowingalgorithm', input, start, rep, result, mean)
```

See also

.

18.7.11 Imagery segmentation

Grid skeletonization

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Standard
- 1 — [1] Hilditch's Algorithm
- 2 — [2] Channel Skeleton

Default: *0*

`Initialisation` [selection] <put parameter description here>

Options:

- 0 — [0] Less than
- 1 — [1] Greater than

Default: *0*

`Threshold (Init.)` [number] <put parameter description here>

Default: *0.0*

`Convergence` [number] <put parameter description here>

Default: *3.0*

Outputs

`Skeleton` [raster] <put output description here>

`Skeleton` [vector] <put output description here>

Console usage

```
processing.runalg('saga:gridskeletonization', input, method, init_method, init_threshold, converg
```

See also

Seed generation

Description

<put algortithm description here>

Parameters

`Features` [multipleinput: rasters] <put parameter description here>

`Bandwidth (Cells)` [number] <put parameter description here>

Default: *2*

`Type of Surface` [selection] <put parameter description here>

Options:

- 0 — [0] smoothed surface
- 1 — [1] variance (a)
- 2 — [2] variance (b)

Default: *0*

`Extraction of...` [selection] <put parameter description here>

Options:

- 0 — [0] minima
- 1 — [1] maxima
- 2 — [2] minima and maxima

Default: *0*

`Feature Aggregation` [selection] <put parameter description here>

Options:

- 0 — [0] additive
- 1 — [1] multiplicative

Default: *0*

`Normalized` [boolean] <put parameter description here>

Default: *True*

Outputs

`Surface` [raster] <put output description here>

`Seeds Grid` [raster] <put output description here>

`Seeds` [vector] <put output description here>

Console usage

```
processing.runalg('saga:seedgeneration', grids, factor, type_surface, type_seeds, type_merge, norm
```

See also

Simple region growing

Description

<put algortithm description here>

Parameters

`Seeds` [raster] <put parameter description here>

`Features` [multipleinput: rasters] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] feature space and position
- 1 — [1] feature space

Default: *0*

`Neighbourhood` [selection] <put parameter description here>

Options:

- 0 — [0] 4 (von Neumann)
- 1 — [1] 8 (Moore)

Default: *0*

`Variance in Feature Space` [number] <put parameter description here>

Default: *1.0*

`Variance in Position Space` [number] <put parameter description here>

Default: *1.0*

`Threshold - Similarity` [number] <put parameter description here>

Default: *0.0*

`Refresh` [boolean] <put parameter description here>

Default: *True*

`Leaf Size (for Speed Optimisation)` [number] <put parameter description here>

Default: *256*

Outputs

`Segments` [raster] <put output description here>

`Similarity` [raster] <put output description here>

`Seeds` [table] <put output description here>

Console usage

```
processing.runalg('saga:simpleregiongrowing', seeds, features, method, neighbour, sig_1, sig_2, t
```

See also

Watershed segmentation

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Output` [selection] <put parameter description here>

Options:

- 0 — [0] Seed Value
- 1 — [1] Segment ID

Default: *0*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Minima
- 1 — [1] Maxima

Default: *0*

`Join Segments based on Threshold Value` [selection] <put parameter description here>

Options:

- 0 — [0] do not join
- 1 — [1] seed to saddle difference
- 2 — [2] seeds difference

Default: *0*

`Threshold` [number] <put parameter description here>

Default: *0*

`Allow Edge Pixels to be Seeds` [boolean] <put parameter description here>

Default: *True*

`Borders` [boolean] <put parameter description here>

Default: *True*

Outputs

`Segments` [raster] <put output description here>

`Seed Points` [vector] <put output description here>

`Borders` [raster] <put output description here>

Console usage

```
processing.runalg('saga:watershedsegmentation', grid, output, down, join, threshold, edge, bborde
```

See also

.

18.7.12 Imagery tools

Vegetation index[distance based]

Description

<put algortithm description here>

Parameters

Near Infrared Band [raster] <put parameter description here>

Red Band [raster] <put parameter description here>

Slope of the soil line [number] <put parameter description here>

Default: *0.0*

Intercept of the soil line [number] <put parameter description here>

Default: *0.0*

Outputs

PVI (Richardson and Wiegand) [raster] <put output description here>

PVI (Perry & Lautenschlager) [raster] <put output description here>

PVI (Walther & Shabaani) [raster] <put output description here>

PVI (Qi, et al) [raster] <put output description here>

Console usage

```
processing.runalg('saga:vegetationindexdistancebased', nir, red, slope, intercept, pvi, pvi1, pvi
```

See also

Vegetation index[slope based]

Description

<put algortithm description here>

Parameters

Near Infrared Band [raster] <put parameter description here>

Red Band [raster] <put parameter description here>

Outputs

`Normalized Difference Vegetation Index` [raster] <put output description here>

`Ratio Vegetation Index` [raster] <put output description here>

`Transformed Vegetation Index` [raster] <put output description here>

`Corrected Transformed Vegetation Index` [raster] <put output description here>

`Thiam's Transformed Vegetation Index` [raster] <put output description here>

`Normalized Ratio Vegetation Index` [raster] <put output description here>

Console usage

```
processing.runalg('saga:vegetationindexslopebased', nir, red, ndvi, ratio, tvi, ctvi, ttvi, nratio
```

See also

.

18.7.13 Kriging

Ordinary kriging (global)

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Create Variance Grid` [boolean] <put parameter description here>

Default: *True*

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Variogram Model` [selection] <put parameter description here>

Options:

- 0 — [0] Spherical Model
- 1 — [1] Exponential Model
- 2 — [2] Gaussian Model
- 3 — [3] Linear Regression
- 4 — [4] Exponential Regression
- 5 — [5] Power Function Regression

Default: *0*

Block Kriging [boolean] <put parameter description here>

Default: *True*

Block Size [number] <put parameter description here>

Default: *100*

Logarithmic Transformation [boolean] <put parameter description here>

Default: *True*

Nugget [number] <put parameter description here>

Default: *0.0*

Sill [number] <put parameter description here>

Default: *0.0*

Range [number] <put parameter description here>

Default: *0.0*

Linear Regression [number] <put parameter description here>

Default: *1.0*

Exponential Regression [number] <put parameter description here>

Default: *0.1*

Power Function - A [number] <put parameter description here>

Default: *1.0*

Power Function - B [number] <put parameter description here>

Default: *0.5*

Grid Size [number] <put parameter description here>

Default: *1.0*

Fit Extent [boolean] <put parameter description here>

Default: *True*

Output extent [extent] <put parameter description here>

Default: *0,1,0,1*

Outputs

Grid [raster] <put output description here>

Variance [raster] <put output description here>

Console usage

```
processing.runalg('saga:ordinarykrigingglobal', shapes, field, bvariance, target, model, block, dl
```

See also

Ordinary kriging

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Create Variance Grid` [boolean] <put parameter description here>

Default: *True*

`Target Grid` [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Variogram Model` [selection] <put parameter description here>

Options:

- 0 — [0] Spherical Model
- 1 — [1] Exponential Model
- 2 — [2] Gaussian Model
- 3 — [3] Linear Regression
- 4 — [4] Exponential Regression
- 5 — [5] Power Function Regression

Default: *0*

`Block Kriging` [boolean] <put parameter description here>

Default: *True*

`Block Size` [number] <put parameter description here>

Default: *100*

`Logarithmic Transformation` [boolean] <put parameter description here>

Default: *True*

`Nugget` [number] <put parameter description here>

Default: *0.0*

`Sill` [number] <put parameter description here>

Default: *10.0*

`Range` [number] <put parameter description here>

Default: *100.0*

`Linear Regression` [number] <put parameter description here>

Default: *1.0*

Exponential Regression [number] <put parameter description here>

Default: *0.1*

Power Function - A [number] <put parameter description here>

Default: *1*

Power Function - B [number] <put parameter description here>

Default: *0.5*

Maximum Search Radius (map units) [number] <put parameter description here>

Default: *1000.0*

Min.Number of m_Points [number] <put parameter description here>

Default: *4*

Max. Number of m_Points [number] <put parameter description here>

Default: *20*

Grid Size [number] <put parameter description here>

Default: *1.0*

Fit Extent [boolean] <put parameter description here>

Default: *True*

Output extent [extent] <put parameter description here>

Default: *0,1,0,1*

Outputs

Grid [raster] <put output description here>

Variance [raster] <put output description here>

Console usage

```
processing.runalg('saga:ordinarykriging', shapes, field, bvariance, target, model, block, dblock,
```

See also

Universal kriging (global)

Description

<put algortithm description here>

Parameters

Points [vector: point] <put parameter description here>

Attribute [tablefield: any] <put parameter description here>

Create Variance Grid [boolean] <put parameter description here>

Default: *True*

`Target Grid` **[selection]** <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

`Variogram Model` **[selection]** <put parameter description here>

Options:

- 0 — [0] Spherical Model
- 1 — [1] Exponential Model
- 2 — [2] Gaussian Model
- 3 — [3] Linear Regression
- 4 — [4] Exponential Regression
- 5 — [5] Power Function Regression

Default: *0*

`Block Kriging` **[boolean]** <put parameter description here>

Default: *True*

`Block Size` **[number]** <put parameter description here>

Default: *100*

`Logarithmic Transformation` **[boolean]** <put parameter description here>

Default: *True*

`Nugget` **[number]** <put parameter description here>

Default: *0.0*

`Sill` **[number]** <put parameter description here>

Default: *0.0*

`Range` **[number]** <put parameter description here>

Default: *0.0*

`Linear Regression` **[number]** <put parameter description here>

Default: *1*

`Exponential Regression` **[number]** <put parameter description here>

Default: *0.5*

`Power Function - A` **[number]** <put parameter description here>

Default: *1.0*

`Power Function - B` **[number]** <put parameter description here>

Default: *0.1*

`Grids` **[multipleinput: rasters]** <put parameter description here>

`Grid Interpolation` **[selection]** <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation

- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

Grid Size [number] <put parameter description here>

Default: *1.0*

Fit Extent [boolean] <put parameter description here>

Default: *True*

Output extent [extent] <put parameter description here>

Default: *0,1,0,1*

Outputs

Grid [raster] <put output description here>

Variance [raster] <put output description here>

Console usage

```
processing.runalg('saga:universalkrigingglobal', shapes, field, bvariance, target, model, block, d
```

See also

Universal kriging

Description

<put algortithm description here>

Parameters

Points [vector: point] <put parameter description here>

Attribute [tablefield: any] <put parameter description here>

Create Variance Grid [boolean] <put parameter description here>

Default: *True*

Target Grid [selection] <put parameter description here>

Options:

- 0 — [0] user defined

Default: *0*

Variogram Model [selection] <put parameter description here>

Options:

- 0 — [0] Spherical Model
- 1 — [1] Exponential Model
- 2 — [2] Gaussian Model
- 3 — [3] Linear Regression

- 4 — [4] Exponential Regression
- 5 — [5] Power Function Regression

Default: *0*

`Block Kriging` [boolean] <put parameter description here>

Default: *True*

`Block Size` [number] <put parameter description here>

Default: *100*

`Logarithmic Transformation` [boolean] <put parameter description here>

Default: *True*

`Nugget` [number] <put parameter description here>

Default: *0.0*

`Sill` [number] <put parameter description here>

Default: *0.0*

`Range` [number] <put parameter description here>

Default: *0.0*

`Linear Regression` [number] <put parameter description here>

Default: *1.0*

`Exponential Regression` [number] <put parameter description here>

Default: *0.1*

`Power Function - A` [number] <put parameter description here>

Default: *1*

`Power Function - B` [number] <put parameter description here>

Default: *0.5*

`Grids` [multipleinput: rasters] <put parameter description here>

`Grid Interpolation` [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

`Min.Number of m_Points` [number] <put parameter description here>

Default: *4*

`Max. Number of m_Points` [number] <put parameter description here>

Default: *20*

`Maximum Search Radius (map units)` [number] <put parameter description here>

Default: *1000.0*

`Grid Size` [number] <put parameter description here>

Default: *1.0*

`Fit Extent` [boolean] <put parameter description here>

Default: *True*

`Output extent` [extent] <put parameter description here>

Default: *0,1,0,1*

Outputs

`Grid` [raster] <put output description here>

`Variance` [raster] <put output description here>

Console usage

```
processing.runalg('saga:universalkriging', shapes, field, bvariance, target, model, block, dblock,
```

See also

.

18.7.14 Shapes grid

Add grid values to points

Description

Creates a new vector layer as a result of the union of a points layer with the interpolated value of one or more base background grid layer(s). This way, the new layer created will have a new column in the attribute table that reflects the interpolated value of the background grid.

Parameters

`Points` [vector: point] Input layer.

`Grids` [multipleinput: rasters] Background grid layer(s)

`Interpolation` [selection] interpolation method to use.

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

Outputs

`Result` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:addgridvaluestopoints', shapes, grids, interpol, result)
```

See also

Add grid values to shapes

Description

<put algortithm description here>

Parameters

`Shapes` [vector: any] <put parameter description here>

`Grids` [multipleinput: rasters] <put parameter description here>

`Interpolation` [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbor
- 1 — [1] Bilinear Interpolation
- 2 — [2] Inverse Distance Interpolation
- 3 — [3] Bicubic Spline Interpolation
- 4 — [4] B-Spline Interpolation

Default: *0*

Outputs

`Result` [vector] <put output description here>

Console usage

```
processing.runalg('saga:addgridvaluestoshapes', shapes, grids, interpol, result)
```

See also

Clip grid with polygon

Description

<put algortithm description here>

Parameters

`Input` [raster] <put parameter description here>

`Polygons` [vector: polygon] <put parameter description here>

Outputs

`Output` [raster] <put output description here>

Console usage

```
processing.runalg('saga:clipgridwithpolygon', input, polygons, output)
```

See also

Contour lines from grid

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Minimum Contour Value` [number] <put parameter description here>

Default: *0.0*

`Maximum Contour Value` [number] <put parameter description here>

Default: *10000.0*

`Equidistance` [number] <put parameter description here>

Default: *100.0*

Outputs

`Contour Lines` [vector] <put output description here>

Console usage

```
processing.runalg('saga:contourlinesfromgrid', input, zmin, zmax, zstep, contour)
```

See also

Gradient vectors from directional components

Description

<put algortithm description here>

Parameters

`X Component` [raster] <put parameter description here>

`Y Component` [raster] <put parameter description here>

`Step` [number] <put parameter description here>

Default: *1*

`Size Range Min` [number] <put parameter description here>

Default: *25.0*

`Size Range Max` [number] <put parameter description here>

Default: *100.0*

`Aggregation` [selection] <put parameter description here>

Options:

- 0 — [0] nearest neighbour
- 1 — [1] mean value

Default: *0*

`Style` [selection] <put parameter description here>

Options:

- 0 — [0] simple line
- 1 — [1] arrow
- 2 — [2] arrow (centered to cell)

Default: *0*

Outputs

`Gradient Vectors` [vector] <put output description here>

Console usage

```
processing.runalg('saga:gradientvectorsfromdirectionalcomponents', x, y, step, size_min, size_max
```

See also

Gradient vectors from direction and length

Description

<put algortithm description here>

Parameters

`Direction` [raster] <put parameter description here>

`Length` [raster] <put parameter description here>

`Step` **[number]** <put parameter description here>

Default: *1*

`Size Range Min` **[number]** <put parameter description here>

Default: *25.0*

`Size Range Max` **[number]** <put parameter description here>

Default: *100.0*

`Aggregation` **[selection]** <put parameter description here>

Options:

- 0 — [0] nearest neighbour
- 1 — [1] mean value

Default: *0*

`Style` **[selection]** <put parameter description here>

Options:

- 0 — [0] simple line
- 1 — [1] arrow
- 2 — [2] arrow (centered to cell)

Default: *0*

Outputs

`Gradient Vectors` **[vector]** <put output description here>

Console usage

```
processing.runalg('saga:gradientvectorsfromdirectionandlength', dir, len, step, size_min, size_ma
```

See also

Gradient vectors from surface

Description

<put algortithm description here>

Parameters

`Surface` **[raster]** <put parameter description here>

`Step` **[number]** <put parameter description here>

Default: *1*

`Size Range Min` **[number]** <put parameter description here>

Default: *25.0*

`Size Range Max` **[number]** <put parameter description here>

Default: *100.0*

Aggregation [selection] <put parameter description here>

Options:

- 0 — [0] nearest neighbour
- 1 — [1] mean value

Default: *0*

Style [selection] <put parameter description here>

Options:

- 0 — [0] simple line
- 1 — [1] arrow
- 2 — [2] arrow (centered to cell)

Default: *0*

Outputs

Gradient Vectors [vector] <put output description here>

Console usage

```
processing.runalg('saga:gradientvectorsfromsurface', surface, step, size_min, size_max, aggr, sty
```

See also

Grid statistics for polygons

Description

<put algortithm description here>

Parameters

Grids [multipleinput: rasters] <put parameter description here>

Polygons [vector: polygon] <put parameter description here>

Number of Cells [boolean] <put parameter description here>

Default: *True*

Minimum [boolean] <put parameter description here>

Default: *True*

Maximum [boolean] <put parameter description here>

Default: *True*

Range [boolean] <put parameter description here>

Default: *True*

Sum [boolean] <put parameter description here>

Default: *True*

Mean [boolean] <put parameter description here>

Default: *True*

Variance [boolean] <put parameter description here>

Default: *True*

Standard Deviation [boolean] <put parameter description here>

Default: *True*

Quantiles [number] <put parameter description here>

Default: *0*

Outputs

Statistics [vector] <put output description here>

Console usage

```
processing.runalg('saga:gridstatisticsforpolygons', grids, polygons, count, min, max, range, sum,
```

See also

Grid values to points (randomly)

Description

<put algortithm description here>

Parameters

Grid [raster] <put parameter description here>

Frequency [number] <put parameter description here>

Default: *100*

Outputs

Points [vector] <put output description here>

Console usage

```
processing.runalg('saga:gridvaluestopointsrandomly', grid, freq, points)
```

See also

Grid values to points

Description

<put algortithm description here>

Parameters

`Grids` [multipleinput: rasters] <put parameter description here>

`Polygons` [vector: any] Optional.

<put parameter description here>

`Exclude NoData Cells` [boolean] <put parameter description here>

Default: *True*

`Type` [selection] <put parameter description here>

Options:

- 0 — [0] nodes
- 1 — [1] cells

Default: *0*

Outputs

`Shapes` [vector] <put output description here>

Console usage

```
processing.runalg('saga:gridvaluestopoints', grids, polygons, nodata, type, shapes)
```

See also

Local minima and maxima

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

Outputs

`Minima` [vector] <put output description here>

`Maxima` [vector] <put output description here>

Console usage

```
processing.runalg('saga:localminimaandmaxima', grid, minima, maxima)
```

See also

Vectorising grid classes

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Class Selection` [selection] <put parameter description here>

Options:

- 0 — [0] one single class specified by class identifier
- 1 — [1] all classes

Default: *0*

`Class Identifier` [number] <put parameter description here>

Default: *0*

`Vectorised class as...` [selection] <put parameter description here>

Options:

- 0 — [0] one single (multi-)polygon object
- 1 — [1] each island as separated polygon

Default: *0*

Outputs

`Polygons` [vector] <put output description here>

Console usage

```
processing.runalg('saga:vectorisinggridclasses', grid, class_all, class_id, split, polygons)
```

See also

.

18.7.15 Shapes lines

Convert points to line(s)

Description

Converts points to lines.

Parameters

`Points` [vector: point] Points to convert.

`Order by...` [tablefield: any] Lines will be ordered following this field.

`Separate by...` [tablefield: any] Lines will be grouped according to this field.

Outputs

`Lines` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:convertpointstolines', points, order, separate, lines)
```

See also

Convert polygons to lines

Description

Creates lines from polygons.

Parameters

`Polygons` [vector: polygon] Layer to process.

Outputs

`Lines` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:convertpolygonstolines', polygons, lines)
```

See also

Line dissolve

Description

<put algortithm description here>

Parameters

`Lines` [vector: any] <put parameter description here>

`1. Attribute` [tablefield: any] <put parameter description here>

`2. Attribute` [tablefield: any] <put parameter description here>

`3. Attribute` **[tablefield: any]** <put parameter description here>

`Dissolve...` **[selection]** <put parameter description here>

Options:

- 0 — [0] lines with same attribute value(s)
- 1 — [1] all lines

Default: *0*

Outputs

`Dissolved Lines` **[vector]** <put output description here>

Console usage

```
processing.runalg('saga:linedissolve', lines, field_1, field_2, field_3, all, dissolved)
```

See also

Line-polygon intersection

Description

<put algortithm description here>

Parameters

`Lines` **[vector: line]** <put parameter description here>

`Polygons` **[vector: polygon]** <put parameter description here>

`Output` **[selection]** <put parameter description here>

Options:

- 0 — [0] one multi-line per polygon
- 1 — [1] keep original line attributes

Default: *0*

Outputs

`Intersection` **[vector]** <put output description here>

Console usage

```
processing.runalg('saga:linepolygonintersection', lines, polygons, method, intersect)
```

See also

Line properties

Description

Calculates some information on each line of the layer.

Parameters

`Lines` [vector: line] Layer to analyze.

`Number of Parts` [boolean] Determites whether to calculate number of segments in line.

Default: *True*

`Number of Vertices` [boolean] Determites whether to calculate number of vertices in line.

Default: *True*

`Length` [boolean] Determites whether to calculate total line lenght.

Default: *True*

Outputs

`Lines with Property Attributes` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:lineproperties', lines, bparts, bpoints, blength, output)
```

See also

Line simplification

Description

Simplyfies the geometry of a lines layer.

Parameters

`Lines` [vector: line] Layer to process.

`Tolerance` [number] Simplification tolerance.

Default: *1.0*

Outputs

`Simplified Lines` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:linesimplification', lines, tolerance, output)
```

See also

.

18.7.16 Shapes points

Add coordinates to points

Description

Adds the X and Y coordinates of feature in the attribute table of input layer.

Parameters

`Points` [vector: point] Input layer.

Outputs

`Output` [vector] Resulting layer with the updated attribute table.

Console usage

```
processing.runalg('saga:addcoordinatestopoints', input, output)
```

See also

Add polygon attributes to points

Description

Adds the specified field of the polygons layer to the attribute table of the points layer. The new attributes added for each point depend on the value of the background polygon layer.

Parameters

`Points` [vector: point] Points layer.

`Polygons` [vector: polygon] Background polygons layer.

`Attribute` [tablefield: any] Attribute of the polygons layer that will be added to the points layer.

Outputs

`Result` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:addpolygonattributestopoints', input, polygons, field, output)
```

See also

Aggregate point observations

Description

<put algortithm description here>

Parameters

Reference Points [vector: any] <put parameter description here>

ID [tablefield: any] <put parameter description here>

Observations [table] <put parameter description here>

X [tablefield: any] <put parameter description here>

Y [tablefield: any] <put parameter description here>

Track [tablefield: any] <put parameter description here>

Date [tablefield: any] <put parameter description here>

Time [tablefield: any] <put parameter description here>

Parameter [tablefield: any] <put parameter description here>

Maximum Time Span (Seconds) [number] <put parameter description here>

Default: *60.0*

Maximum Distance [number] <put parameter description here>

Default: *0.002*

Outputs

Aggregated [table] <put output description here>

Console usage

```
processing.runalg('saga:aggregatepointobservations', reference, reference_id, observations, x, y,
```

See also

Clip points with polygons

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Polygons` [vector: polygon] <put parameter description here>

`Add Attribute to Clipped Points` [tablefield: any] <put parameter description here>

`Clipping Options` [selection] <put parameter description here>

Options:

- 0 — [0] one layer for all points
- 1 — [1] separate layer for each polygon

Default: *0*

Outputs

`Clipped Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:clippointswithpolygons', points, polygons, field, method, clips)
```

See also

Convert lines to points

Description

Converts lines layer into a points.

Parameters

`Lines` [vector: line] Lines layer to convert.

`Insert Additional Points` [boolean] Determines whether to add additional nodes or not.

Default: *True*

`Insert Distance` [number] Distance between the additional points.

Default: *1.0*

Outputs

`Points` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:convertlinestopoints', lines, add, dist, points)
```

See also

Convert multipoints to points

Description

<put algortithm description here>

Parameters

Multipoints [vector: point] <put parameter description here>

Outputs

Points [vector] <put output description here>

Console usage

```
processing.runalg('saga:convertmultipointstopoints', multipoints, points)
```

See also

Convex hull

Description

<put algortithm description here>

Parameters

Points [vector: point] <put parameter description here>

Hull Construction [selection] <put parameter description here>

Options:

- 0 — [0] one hull for all shapes
- 1 — [1] one hull per shape
- 2 — [2] one hull per shape part

Default: *0*

Outputs

Convex Hull [vector] <put output description here>

Minimum Bounding Box [vector] <put output description here>

Console usage

```
processing.runalg('saga:convexhull', shapes, polypoints, hulls, boxes)
```

See also

Distance matrix

Description

Generates a distance matrix between each point of the input layer. A unique ID will be created in the first row of the resulting matrix (symmetric matrix), while every other cell reflects the distance between the points.

Parameters

`Points` [vector: point] Input layer.

Outputs

`Distance Matrix Table` [table] The resulting table.

Console usage

```
processing.runalg('saga:distancematrix', points, table)
```

See also

Fit n points to shape

Description

<put algortithm description here>

Parameters

`Shapes` [vector: polygon] <put parameter description here>

`Number of points` [number] <put parameter description here>

Default: *10*

Outputs

`Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:fitnpointstoshape', shapes, numpoints, points)
```

See also

Points filter

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Radius` [number] <put parameter description here>

Default: *1*

`Minimum Number of Points` [number] <put parameter description here>

Default: *0*

`Maximum Number of Points` [number] <put parameter description here>

Default: *0*

`Quadrants` [boolean] <put parameter description here>

Default: *True*

`Filter Criterion` [selection] <put parameter description here>

Options:

- 0 — [0] keep maxima (with tolerance)
- 1 — [1] keep minima (with tolerance)
- 2 — [2] remove maxima (with tolerance)
- 3 — [3] remove minima (with tolerance)
- 4 — [4] remove below percentile
- 5 — [5] remove above percentile

Default: *0*

`Tolerance` [number] <put parameter description here>

Default: *0.0*

`Percentile` [number] <put parameter description here>

Default: *50*

Outputs

`Filtered Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:pointsfilter', points, field, radius, minnum, maxnum, quadrants, method,
```

See also

Points thinning

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Resolution` [number] <put parameter description here>

Default: *1.0*

Outputs

`Thinned Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:pointsthinning', points, field, resolution, thinned)
```

See also

Remove duplicate points

Description

<put algortithm description here>

Parameters

`Points` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Point to Keep` [selection] <put parameter description here>

Options:

- 0 — [0] first point
- 1 — [1] last point
- 2 — [2] point with minimum attribute value
- 3 — [3] point with maximum attribute value

Default: *0*

`Numeric Attribute Values` [selection] <put parameter description here>

Options:

- 0 — [0] take value from the point to be kept

- 1 — [1] minimum value of all duplicates
- 2 — [2] maximum value of all duplicates
- 3 — [3] mean value of all duplicates

Default: *0*

Outputs

`Result` [vector] <put output description here>

Console usage

```
processing.runalg('saga:removeduplicatepoints', points, field, method, numeric, result)
```

See also

Separate points by direction

Description

<put algortithm description here>

Parameters

`Points` [vector: point] <put parameter description here>

`Number of Directions` [number] <put parameter description here>

Default: *4*

`Tolerance (Degree)` [number] <put parameter description here>

Default: *5*

Outputs

`Ouput` [vector] <put output description here>

Console usage

```
processing.runalg('saga:separatepointsbydirection', points, directions, tolerance, output)
```

See also

.

18.7.17 Shapes polygons

Convert lines to polygons

Description

Converts lines to polygons.

Parameters

`Lines` [vector: line] Lines to convert.

Outputs

`Polygons` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:convertlinestopolygons', lines, polygons)
```

See also

Convert polygon/line vertices to points

Description

Converts the line or polygon vertices into points.

Parameters

`Shapes` [vector: any] Layer to process.

Outputs

`Points` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:convertpolygonlineverticestopoints', shapes, points)
```

See also

Polygon centroids

Description

Calculates the centroids of polygons.

Parameters

`Polygons` [vector: polygon] Input layer.

`Centroids for each part` [boolean] Determites whether centroids should be calculated for each part of multipart polygon or not.

Default: *True*

Outputs

`Centroids` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:polygoncentroids', polygons, method, centroids)
```

See also

Polygon dissolve

Description

<put algortithm description here>

Parameters

`Polygons` [vector: polygon] <put parameter description here>

`1. Attribute` [tablefield: any] Optional.

<put parameter description here>

`2. Attribute` [tablefield: any] Optional.

<put parameter description here>

`3. Attribute` [tablefield: any] Optional.

<put parameter description here>

`Dissolve...` [selection] <put parameter description here>

Options:

- 0 — [0] polygons with same attribute value
- 1 — [1] all polygons
- 2 — [2] polygons with same attribute value (keep inner boundaries)
- 3 — [3] all polygons (keep inner boundaries)

Default: *0*

Outputs

`Dissolved Polygons` [vector] <put output description here>

Console usage

```
processing.runalg('saga:polygondissolve', polygons, field_1, field_2, field_3, dissolve, dissolved
```

See also

Polygon-line intersection

Description

<put algortithm description here>

Parameters

Polygons [vector: polygon] <put parameter description here>

Lines [vector: line] <put parameter description here>

Outputs

Intersection [vector] <put output description here>

Console usage

```
processing.runalg('saga:polygonlineintersection', polygons, lines, intersect)
```

See also

Polygon parts to separate polygons

Description

<put algortithm description here>

Parameters

Polygons [vector: polygon] <put parameter description here>

Ignore Lakes [boolean] <put parameter description here>

Default: *True*

Outputs

Polygon Parts [vector] <put output description here>

Console usage

```
processing.runalg('saga:polygonpartstoseparatepolygons', polygons, lakes, parts)
```

See also

Polygon properties

Description

<put algortithm description here>

Parameters

`Polygons` [vector: polygon] <put parameter description here>

`Number of Parts` [boolean] <put parameter description here>

Default: *True*

`Number of Vertices` [boolean] <put parameter description here>

Default: *True*

`Perimeter` [boolean] <put parameter description here>

Default: *True*

`Area` [boolean] <put parameter description here>

Default: *True*

Outputs

`Polygons with Property Attributes` [vector] <put output description here>

Console usage

```
processing.runalg('saga:polygonproperties', polygons, bparts, bpoints, blength, barea, output)
```

See also

Polygon shape indices

Description

Calculates spatial statistics for polygons. This includes:

- area
- perimeter
- perimeter / area
- perimeter / square root of the area
- maximum distance
- maximum distance / area
- maximum distance / square root of the area
- shape index

Parameters

`Shapes` [vector: polygon] Layer to analyze.

Outputs

`Shape Index` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:polygonshapeindices', shapes, index)
```

See also

Polygons to edges and nodes

Description

Extracts boundaries and nodes of polygons in separate files.

Parameters

`Polygons` [vector: polygon] Input layer.

Outputs

`Edges` [vector] Resulting line layer with polygons boundaries.

`Nodes` [vector] Resulting line layer with polygons nodes.

Console usage

```
processing.runalg('saga:polygonstoedgesandnodes', polygons, edges, nodes)
```

See also

.

18.7.18 Herramientas de figuras

Create graticule

Description

Creates a grid.

Parameters

`Extent` [vector: any] Optional.

Grid will be created according to the selected layer.

`Output extent` [extent] Extent of the grid.

Default: *0,1,0,1*

`Division Width` [number] X-axes spacing between the lines.

Default: *1.0*

`Division Height` [number] Y-axes spacing between the lines.

Default: *1.0*

`Type` [selection] Geometry type of the resulting grid.

Options:

- 0 — [0] Lines
- 1 — [1] Rectangles

Default: *0*

Outputs

`Graticule` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:creategraticule', extent, output_extent, distx, disty, type, graticule)
```

See also

Cut shapes layer

Description

<put algortithm description here>

Parameters

`Vector layer to cut` [vector: any] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] completely contained
- 1 — [1] intersects
- 2 — [2] center

Default: *0*

`Cutting polygons` [vector: any] <put parameter description here>

Outputs

`Result` [vector] <put output description here>

`Extent` [vector] <put output description here>

Console usage

```
processing.runalg('saga:cutshapeslayer', shapes, method, polygons_polygons, cut, extent)
```

See also

Get shapes extents

Description

Creates polygons according to the extent of the input layer features.

Parameters

`Shapes` [vector: any] Input layer.

`Parts` [boolean] Determines whether create polygon for each feature (`True`) or just create single polygon for whole layer (`False`).

Default: *True*

Outputs

`Extents` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:getshapesextents', shapes, parts, extents)
```

See also

Merge shapes layers

Description

Merges two or more input layer into a unique resulting layer. You can merge together only layer of the same type (polygons with polygons, lines with lines, points with points).

The attribute table of the resulting layer will include only the attributes of the first input layer. Two additional columns will be added: one corresponding to the ID of every merged layer and the other one corresponding to the original name of the merged layer.

Parameters

`Main Layer` [vector: any] Initial layer.

`Additional Layers` [multipleinput: any vectors] Optional.

Layer(s) to merge with.

Outputs

`Merged Layer` [vector] The resulting layer.

Console usage

```
processing.runalg('saga:mergeshapeslayers', main, layers, out)
```

See also

Polar to cartesian coordinates

Description

<put algortithm description here>

Parameters

`Polar Coordinates` [vector: any] <put parameter description here>

`Exaggeration` [tablefield: any] <put parameter description here>

`Exaggeration Factor` [number] <put parameter description here>

Default: *1*

`Radius` [number] <put parameter description here>

Default: *6371000.0*

`Degree` [boolean] <put parameter description here>

Default: *True*

Outputs

`Cartesian Coordinates` [vector] <put output description here>

Console usage

```
processing.runalg('saga:polartocartesiancoordinates', polar, f_exagg, d_exagg, radius, degree, ca
```

See also

Quadtree structure to shapes

Description

<put algortithm description here>

Parameters

`Shapes` [vector: any] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

Outputs

`Polygons` [vector] <put output description here>

`Lines` [vector] <put output description here>

`Duplicated Points` [vector] <put output description here>

Console usage

```
processing.runalg('saga:quadtreestructuretoshapes', shapes, attribute, polygons, lines, points)
```

See also

Shapes buffer

Description

Creates buffer around features based on fixed distance or distance field.

Parameters

`Shapes` [vector: any] Input layer.

`Buffer Distance` [selection] Buffering method.

Options:

- 0 — [0] fixed value
- 1 — [1] attribute field

Default: *0*

`Buffer Distance (Fixed)` [number] Buffer distance for "fixed value" method.

Default: *100.0*

`Buffer Distance (Attribute)` [tablefield: any] Name of the distance field for "attribute field" method.

`Scaling Factor for Attribute Value` [number] <put parameter description here>

Default: *1.0*

Number of Buffer Zones [number] Number of buffer(s) to generate.

Default: *1.0*

Circle Point Distance [Degree] [number] Smoothness of the buffer borders: great numbers means rough borders.

Default: *5.0*

Dissolve Buffers [boolean] Determines whether to dissolve results or not.

Default: *True*

Outputs

Buffer [vector] The resulting layer.

Console usage

```
processing.runalg('saga:shapesbuffer', shapes, buf_type, buf_dist, buf_field, buf_scale, buf_zone
```

See also

Split shapes layer randomly

Description

Splits the input layer randomly in two parts.

Parameters

Shapes [vector: any] Layer to split.

Split ratio (%) [number] Split ratio between the resulting layers.

Default: *50*

Outputs

Group A [vector] First resulting layer.

Group B [vector] Second resulting layer.

Console usage

```
processing.runalg('saga:splitshapeslayerrandomly', shapes, percent, a, b)
```

See also

Transform shapes

Description

<put algortithm description here>

Parameters

`Shapes` [vector: any] <put parameter description here>

`dX` [number] <put parameter description here>

Default: *0.0*

`dY` [number] <put parameter description here>

Default: *0.0*

`Angle` [number] <put parameter description here>

Default: *0.0*

`Scale Factor X` [number] <put parameter description here>

Default: *1.0*

`Scale Factor Y` [number] <put parameter description here>

Default: *1.0*

`X` [number] <put parameter description here>

Default: *0.0*

`Y` [number] <put parameter description here>

Default: *0.0*

Outputs

`Output` [vector] <put output description here>

Console usage

```
processing.runalg('saga:transformshapes', in, dx, dy, angle, scalex, scaley, anchorx, anchory, out
```

See also

.

18.7.19 Shapes transect

Transect through polygon shapefile

Description

<put algortithm description here>

Parameters

`Line Transect(s)` [vector: line] <put parameter description here>

`Theme` [vector: any] <put parameter description here>

`Theme Field` [tablefield: any] <put parameter description here>

Outputs

`Result table` [table] <put output description here>

Console usage

```
processing.runalg('saga:transectthroughpolygonshapefile', transect, theme, theme_field, transect_
```

See also

.

18.7.20 Simulation fire

Fire risk analysis

Description

<put algortithm description here>

Parameters

`DEM` [raster] <put parameter description here>

`Fuel Model` [raster] <put parameter description here>

`Wind Speed` [raster] <put parameter description here>

`Wind Direction` [raster] <put parameter description here>

`Dead Fuel Moisture 1H` [raster] <put parameter description here>

`Dead Fuel Moisture 10H` [raster] <put parameter description here>

`Dead Fuel Moisture 100H` [raster] <put parameter description here>

`Herbaceous Fuel Moisture` [raster] <put parameter description here>

`Wood Fuel Moisture` [raster] <put parameter description here>

`Value` [raster] Optional.

<put parameter description here>

`Base Probability` [raster] Optional.

<put parameter description here>

`Number of Events` [number] <put parameter description here>

Default: *1000*

`Fire Length` [number] <put parameter description here>

Default: *100*

Outputs

`Danger` [raster] <put output description here>

`Compound Probability` [raster] <put output description here>

`Priority Index` [raster] <put output description here>

Console usage

```
processing.runalg('saga:fireriskanalysis', dem, fuel, windspd, winddir, m1h, m10h, m100h, mherb, m
```

See also

Simulation

Description

<put algortithm description here>

Parameters

`DEM` [raster] <put parameter description here>

`Fuel Model` [raster] <put parameter description here>

`Wind Speed` [raster] <put parameter description here>

`Wind Direction` [raster] <put parameter description here>

`Dead Fuel Moisture 1H` [raster] <put parameter description here>

`Dead Fuel Moisture 10H` [raster] <put parameter description here>

`Dead Fuel Moisture 100H` [raster] <put parameter description here>

`Herbaceous Fuel Moisture` [raster] <put parameter description here>

`Wood Fuel Moisture` [raster] <put parameter description here>

`Ignition Points` [raster] <put parameter description here>

`Update View` [boolean] <put parameter description here>

Default: *True*

Outputs

`Time` [raster] <put output description here>

`Flame Length` [raster] <put output description here>

`Intensity` [raster] <put output description here>

Console usage

```
processing.runalg('saga:simulation', dem, fuel, windspd, winddir, m1h, m10h, m100h, mherb, mwood,
```

See also

.

18.7.21 Simulation hydrology

Overland flow - kinematic wave d8

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Gauges` [vector: any] Optional.

<put parameter description here>

`Simulation Time [h]` [number] <put parameter description here>

Default: *24*

`Simulation Time Step [h]` [number] <put parameter description here>

Default: *0.1*

`Manning's Roughness` [number] <put parameter description here>

Default: *0.03*

`Max. Iterations` [number] <put parameter description here>

Default: *100*

`Epsilon` [number] <put parameter description here>

Default: *0.0001*

`Precipitation` [selection] <put parameter description here>

Options:

- 0 — [0] Homogenous
- 1 — [1] Above Elevation
- 2 — [2] Left Half

Default: *0*

`Threshold Elevation` [number] <put parameter description here>

Default: *0.0*

Outputs

`Runoff` [raster] <put output description here>

`Flow at Gauges` [table] <put output description here>

Console usage

```
processing.runalg('saga:overlandflowkinematicwaved8', dem, gauges, time_span, time_step, roughness
```

See also

Water retention capacity

Description

<put algortithm description here>

Parameters

`Plot Holes` [vector: any] <put parameter description here>

`DEM` [raster] <put parameter description here>

Outputs

`Final Parameters` [vector] <put output description here>

`Water Retention Capacity` [raster] <put output description here>

Console usage

```
processing.runalg('saga:waterretentioncapacity', shapes, dem, output, retention)
```

See also

.

18.7.22 Table calculus

Fill gaps in records

Description

<put algortithm description here>

Parameters

`Table` [table] <put parameter description here>

`Order` [tablefield: any] <put parameter description here>

`Interpolation` [selection] <put parameter description here>

Options:

- 0 — [0] Nearest Neighbour
- 1 — [1] Linear

- 2 — [2] Spline

Default: *0*

Outputs

`Table without Gaps` [table] <put output description here>

Console usage

```
processing.runalg('saga:fillgapsinrecords', table, order, method, nogaps)
```

See also

Principle components analysis

Description

<put algortithm description here>

Parameters

`Table` [table] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] correlation matrix
- 1 — [1] variance-covariance matrix
- 2 — [2] sums-of-squares-and-cross-products matrix

Default: *0*

`Number of Components` [number] <put parameter description here>

Default: *3*

Outputs

`Principle Components` [table] <put output description here>

Console usage

```
processing.runalg('saga:principlecomponentsanalysis', table, method, nfirst, pca)
```

See also

Running average

Description

<put algortithm description here>

Parameters

`Input` [table] <put parameter description here>

`Attribute` [tablefield: any] <put parameter description here>

`Number of Records` [number] <put parameter description here>

Default: *10*

Outputs

`Output` [table] <put output description here>

Console usage

```
processing.runalg('saga:runningaverage', input, field, count, output)
```

See also

.

18.7.23 Herramientas de tabla

Change date format

Description

Converts the date format of the input layer.

Parameters

`Table` [table] Input table.

`Date Field` [tablefield: any] Attribute the date.

`Input Format` [selection] Input date format.

Options:

- 0 — [0] dd.mm.yy
- 1 — [1] yy.mm.dd
- 2 — [2] dd:mm:yy
- 3 — [3] yy:mm:dd
- 4 — [4] ddmmyyyy, fix size
- 5 — [5] yyyymmdd, fix size
- 6 — [6] ddmmyy, fix size
- 7 — [7] yymmdd, fix size
- 8 — [8] Julian Day

Default: *0*

`Output Format` [selection] Output date format.

Options:

- 0 — [0] dd.mm.yy
- 1 — [1] yy.mm.dd
- 2 — [2] dd:mm:yy
- 3 — [3] yy:mm:dd
- 4 — [4] ddmmyyyy, fix size
- 5 — [5] yyyymmdd, fix size
- 6 — [6] ddmmyy, fix size
- 7 — [7] yymmdd, fix size
- 8 — [8] Julian Day

Default: *0*

Outputs

`Output` [table] The resulting table.

Console usage

```
processing.runalg('saga:changedateformat', table, field, fmt_in, fmt_out, output)
```

See also

Change time format

Description

Converts the time format of the input layer.

Parameters

`Table` [table] Input table.

`Time Field` [tablefield: any] Attribute with time.

`Input Format` [selection] Input time format.

Options:

- 0 — [0] hh.mm.ss
- 1 — [1] hh:mm:ss
- 2 — [2] hhmmss, fix size
- 3 — [3] hours
- 4 — [4] minutes
- 5 — [5] seconds

Default: *0*

`Output Format` [selection] Output time format.

Options:

- 0 — [0] hh.mm.ss
- 1 — [1] hh:mm:ss
- 2 — [2] hhmmss, fix size
- 3 — [3] hours
- 4 — [4] minutes
- 5 — [5] seconds

Default: *0*

Outputs

`Output` [table] The resulting table.

Console usage

```
processing.runalg('saga:changetimeformat', table, field, fmt_in, fmt_out, output)
```

See also

.

18.7.24 Terrain channels

Channel network and drainage basins

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Threshold` [number] <put parameter description here>

Default: *5.0*

Outputs

`Flow Direction` [raster] <put output description here>

`Flow Connectivity` [raster] <put output description here>

`Strahler Order` [raster] <put output description here>

`Drainage Basins` [raster] <put output description here>

`Channels` [vector] <put output description here>

`Drainage Basins` [vector] <put output description here>

`Junctions` [vector] <put output description here>

Console usage

```
processing.runalg('saga:channelnetworkanddrainagebasins', dem, threshold, direction, connection,
```

See also

Channel network

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Flow Direction` [raster] Optional.

<put parameter description here>

`Initiation Grid` [raster] <put parameter description here>

`Initiation Type` [selection] <put parameter description here>

Options:

- 0 — [0] Less than
- 1 — [1] Equals
- 2 — [2] Greater than

Default: *0*

`Initiation Threshold` [number] <put parameter description here>

Default: *0.0*

`Divergence` [raster] Optional.

<put parameter description here>

`Tracing: Max. Divergence` [number] <put parameter description here>

Default: *10*

`Tracing: Weight` [raster] Optional.

<put parameter description here>

`Min. Segment Length` [number] <put parameter description here>

Default: *10*

Outputs

`Channel Network` [raster] <put output description here>

`Channel Direction` [raster] <put output description here>

`Channel Network` [vector] <put output description here>

Console usage

```
processing.runalg('saga:channelnetwork', elevation, sinkroute, init_grid, init_method, init_value,
```

See also

Overland flow distance to channel network

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Channel Network` [raster] <put parameter description here>

`Flow Algorithm` [selection] <put parameter description here>

Options:

- 0 — [0] D8
- 1 — [1] MFD

Default: *0*

Outputs

`Overland Flow Distance` [raster] <put output description here>

`Vertical Overland Flow Distance` [raster] <put output description here>

`Horizontal Overland Flow Distance` [raster] <put output description here>

Console usage

```
processing.runalg('saga:overlandflowdistancetochannelnetwork', elevation, channels, method, distan
```

See also

Strahler order

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

Outputs

`Strahler Order` [raster] <put output description here>

Console usage

```
processing.runalg('saga:strahlerorder', dem, strahler)
```

See also

Vertical distance to channel network

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Channel Network` [raster] <put parameter description here>

`Tension Threshold [Percentage of Cell Size]` [number] <put parameter description here>

Default: *1*

`Keep Base Level below Surface` [boolean] <put parameter description here>

Default: *True*

Outputs

`Vertical Distance to Channel Network` [raster] <put output description here>

`Channel Network Base Level` [raster] <put output description here>

Console usage

```
processing.runalg('saga:verticaldistancetochannelnetwork', elevation, channels, threshold, nounde
```

See also

Watershed basins

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Channel Network` [raster] <put parameter description here>

`Sink Route` [raster] Optional.

<put parameter description here>

`Min. Size` [number] <put parameter description here>

Default: *0*

Outputs

`Watershed Basins` [raster] <put output description here>

Console usage

```
processing.runalg('saga:watershedbasins', elevation, channels, sinkroute, minsize, basins)
```

See also

.

18.7.25 Terrain hydrology

Burn stream network into dem

Description

<put algortithm description here>

Parameters

`DEM` [raster] <put parameter description here>

`Streams` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] simply decrease cell's value by epsilon
- 1 — [1] lower cell's value to neighbours minimum value minus epsilon

Default: *0*

`Epsilon` [number] <put parameter description here>

Default: *1.0*

Outputs

`Processed DEM` [raster] <put output description here>

Console usage

```
processing.runalg('saga:burnstreamnetworkintodem', dem, stream, method, epsilon, burn)
```

See also

Catchment area (flow tracing)

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Sink Routes` [raster] Optional.

<put parameter description here>

`Weight` [raster] Optional.

<put parameter description here>

`Material` [raster] Optional.

<put parameter description here>

`Target` [raster] Optional.

<put parameter description here>

`Step` [number] <put parameter description here>

Default: *1*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Rho 8
- 1 — [1] Kinematic Routing Algorithm
- 2 — [2] DEMON

Default: *0*

`DEMON - Min. DQV` [number] <put parameter description here>

Default: *0.0*

`Flow Correction` [boolean] <put parameter description here>

Default: *True*

Outputs

`Catchment Area` [raster] <put output description here>

`Catchment Height` [raster] <put output description here>

`Catchment Slope` [raster] <put output description here>

`Total accumulated Material` [raster] <put output description here>

`Accumulated Material from _left_ side` [raster] <put output description here>

`Accumulated Material from _right_ side` [raster] <put output description here>

Console usage

```
processing.runalg('saga:catchmentareaflowtracing', elevation, sinkroute, weight, material, target,
```

See also

Catchment area (recursive)

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Sink Routes` [raster] Optional.

<put parameter description here>

`Weight` [raster] Optional.

<put parameter description here>

`Material` [raster] Optional.

<put parameter description here>

`Target` [raster] Optional.

<put parameter description here>

`Step` [number] <put parameter description here>

Default: *1*

`Target Areas` [raster] Optional.

<put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Deterministic 8
- 1 — [1] Rho 8
- 2 — [2] Deterministic Infinity
- 3 — [3] Multiple Flow Direction

Default: *0*

`Convergence` [number] <put parameter description here>

Default: *1.1*

Outputs

`Catchment Area` **[raster]** <put output description here>

`Catchment Height` **[raster]** <put output description here>

`Catchment Slope` **[raster]** <put output description here>

`Total accumulated Material` **[raster]** <put output description here>

`Accumulated Material from _left_ side` **[raster]** <put output description here>

`Accumulated Material from _right_ side` **[raster]** <put output description here>

`Flow Path Length` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:catchmentarearecursive', elevation, sinkroute, weight, material, target, s
```

See also

Catchment Area

Description

<put algortithm description here>

Parameters

`Elevation` **[raster]** <put parameter description here>

`Method` **[selection]** <put parameter description here>

Options:

- 0 — [0] Deterministic 8
- 1 — [1] Rho 8
- 2 — [2] Braunschweiger Reliefmodell
- 3 — [3] Deterministic Infinity
- 4 — [4] Multiple Flow Direction
- 5 — [5] Multiple Triangular Flow Directon

Default: *0*

Outputs

`Catchment Area` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:catchmentarea', elevation, method, carea)
```

See also

Cell balance

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Parameter` [raster] Optional.

<put parameter description here>

`Default Weight` [number] <put parameter description here>

Default: *1.0*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Deterministic 8
- 1 — [1] Multiple Flow Direction

Default: *0*

Outputs

`Cell Balance` [raster] <put output description here>

Console usage

```
processing.runalg('saga:cellbalance', dem, weights, weight, method, balance)
```

See also

Edge contamination

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

Outputs

`Edge Contamination` [raster] <put output description here>

Console usage

```
processing.runalg('saga:edgecontamination', dem, contamination)
```

See also

Fill Sinks

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Minimum Slope [Degree] [number] <put parameter description here>

Default: *0.01*

Outputs

Filled DEM [raster] <put output description here>

Console usage

```
processing.runalg('saga:fillsinks', dem, minslope, result)
```

See also

Fill sinks (wang & liu)

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Minimum Slope [Degree] [number] <put parameter description here>

Default: *0.01*

Outputs

Filled DEM [raster] <put output description here>

Flow Directions [raster] <put output description here>

Watershed Basins [raster] <put output description here>

Console usage

```
processing.runalg('saga:fillsinkswangliu', elev, minslope, filled, fdir, wshed)
```

See also

Fill sinks xxl (wang & liu)

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Minimum Slope [Degree] [number] <put parameter description here>

Default: *0.01*

Outputs

Filled DEM [raster] <put output description here>

Console usage

```
processing.runalg('saga:fillsinksxxlwangliu', elev, minslope, filled)
```

See also

Flat detection

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Flat Area Values [selection] <put parameter description here>

Options:

- 0 — [0] elevation
- 1 — [1] enumeration

Default: *0*

Outputs

`No Flats` [raster] <put output description here>

`Flat Areas` [raster] <put output description here>

Console usage

```
processing.runalg('saga:flatdetection', dem, flat_output, noflats, flats)
```

See also

Flow path length

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Seeds` [raster] Optional.

<put parameter description here>

`Seeds Only` [boolean] <put parameter description here>

Default: *True*

`Flow Routing Algorithm` [selection] <put parameter description here>

Options:

- 0 — [0] Deterministic 8 (D8)
- 1 — [1] Multiple Flow Direction (FD8)

Default: *0*

`Convergence (FD8)` [number] <put parameter description here>

Default: *1.1*

Outputs

`Flow Path Length` [raster] <put output description here>

Console usage

```
processing.runalg('saga:flowpathlength', elevation, seed, seeds_only, method, convergence, length
```

See also

Flow width and specific catchment area

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Total Catchment Area (TCA) [raster] Optional.

<put parameter description here>

Method [selection] <put parameter description here>

Options:

- 0 — [0] Deterministic 8
- 1 — [1] Multiple Flow Direction (Quinn et al. 1991)
- 2 — [2] Aspect

Default: *0*

Outputs

Flow Width [raster] <put output description here>

Specific Catchment Area (SCA) [raster] <put output description here>

Console usage

```
processing.runalg('saga:flowwidthandspecificcatchmentarea', dem, tca, method, width, sca)
```

See also

Lake flood

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Seeds [raster] <put parameter description here>

Absolute Water Levels [boolean] <put parameter description here>

Default: *True*

Outputs

`Lake` [raster] <put output description here>

`Surface` [raster] <put output description here>

Console usage

```
processing.runalg('saga:lakeflood', elev, seeds, level, outdepth, outlevel)
```

See also

Ls factor

Description

<put algortithm description here>

Parameters

`Slope` [raster] <put parameter description here>

`Catchment Area` [raster] <put parameter description here>

`Area to Length Conversion` [selection] <put parameter description here>

Options:

- 0 — [0] no conversion (areas already given as specific catchment area)
- 1 — [1] 1 / cell size (specific catchment area)
- 2 — [2] square root (catchment length)

Default: *0*

`Method (LS)` [selection] <put parameter description here>

Options:

- 0 — [0] Moore et al. 1991
- 1 — [1] Desmet & Govers 1996
- 2 — [2] Boehner & Selige 2006

Default: *0*

`Rill/Interrill Erosivity` [number] <put parameter description here>

Default: *0.0*

`Stability` [selection] <put parameter description here>

Options:

- 0 — [0] stable
- 1 — [1] instable (thawing)

Default: *0*

Outputs

LS Factor [raster] <put output description here>

Console usage

```
processing.runalg('saga:lsfactor', slope, area, conv, method, erosivity, stability, ls)
```

See also

Saga wetness index

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

t [number] <put parameter description here>

Default: *10*

Outputs

Catchment area [raster] <put output description here>

Catchment slope [raster] <put output description here>

Modified catchment area [raster] <put output description here>

Wetness index [raster] <put output description here>

Console usage

```
processing.runalg('saga:sagawetnessindex', dem, t, c, gn, cs, sb)
```

See also

Sink drainage route detection

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Threshold [boolean] <put parameter description here>

Default: *True*

Threshold Height [number] <put parameter description here>

Default: *100.0*

Outputs

Sink Route [raster] <put output description here>

Console usage

```
processing.runalg('saga:sinkdrainageroutedetection', elevation, threshold, thrsheight, sinkroute)
```

See also

Sink removal

Description

<put algortithm description here>

Parameters

DEM [raster] <put parameter description here>

Sink Route [raster] Optional.

<put parameter description here>

Method [selection] <put parameter description here>

Options:

- 0 — [0] Deepen Drainage Routes
- 1 — [1] Fill Sinks

Default: *0*

Threshold [boolean] <put parameter description here>

Default: *True*

Threshold Height [number] <put parameter description here>

Default: *100.0*

Outputs

Preprocessed DEM [raster] <put output description here>

Console usage

```
processing.runalg('saga:sinkremoval', dem, sinkroute, method, threshold, thrsheight, dem_preproc)
```

See also

Slope length

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Outputs

Slope Length [raster] <put output description here>

Console usage

```
processing.runalg('saga:slopelength', dem, length)
```

See also

Stream power index

Description

<put algortithm description here>

Parameters

Slope [raster] <put parameter description here>

Catchment Area [raster] <put parameter description here>

Area Conversion [selection] <put parameter description here>

Options:

- 0 — [0] no conversion (areas already given as specific catchment area)
- 1 — [1] 1 / cell size (pseudo specific catchment area)

Default: *0*

Outputs

Stream Power Index [raster] <put output description here>

Console usage

```
processing.runalg('saga:streampowerindex', slope, area, conv, spi)
```

See also

Topographic wetness index (twi)

Description

<put algortithm description here>

Parameters

`Slope` [raster] <put parameter description here>

`Catchment Area` [raster] <put parameter description here>

`Transmissivity` [raster] Optional.

<put parameter description here>

`Area Conversion` [selection] <put parameter description here>

Options:

- 0 — [0] no conversion (areas already given as specific catchment area)
- 1 — [1] 1 / cell size (pseudo specific catchment area)

Default: *0*

`Method (TWI)` [selection] <put parameter description here>

Options:

- 0 — [0] Standard
- 1 — [1] TOPMODEL

Default: *0*

Outputs

`Topographic Wetness Index` [raster] <put output description here>

Console usage

```
processing.runalg('saga:topographicwetnessindextwi', slope, area, trans, conv, method, twi)
```

See also

Upslope Area

Description

<put algortithm description here>

Parameters

`Target Area` [raster] Optional.

<put parameter description here>

`Target X coordinate` [number] <put parameter description here>

Default: *0.0*

`Target Y coordinate` [number] <put parameter description here>

Default: *0.0*

`Elevation` [raster] <put parameter description here>

`Sink Routes` [raster] Optional.

<put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Deterministic 8
- 1 — [1] Deterministic Infinity
- 2 — [2] Multiple Flow Direction

Default: *0*

`Convergence` [number] <put parameter description here>

Default: *1.1*

Outputs

`Upslope Area` [raster] <put output description here>

Console usage

```
processing.runalg('saga:upslopearea', target, target_pt_x, target_pt_y, elevation, sinkroute, met
```

See also

.

18.7.26 Terrain lighting

Analytical hillshading

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Shading Method` [selection] <put parameter description here>

Options:

- 0 — [0] Standard
- 1 — [1] Standard (max. 90Degree)
- 2 — [2] Combined Shading
- 3 — [3] Ray Tracing

Default: *0*

`Azimuth [Degree]` [number] <put parameter description here>

Default: *315.0*

`Declination [Degree]` [number] <put parameter description here>

Default: *45.0*

`Exaggeration` [number] <put parameter description here>

Default: *4.0*

Outputs

`Analytical Hillshading` [raster] <put output description here>

Console usage

```
processing.runalg('saga:analyticalhillshading', elevation, method, azimuth, declination, exaggerat
```

See also

Sky view factor

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Maximum Search Radius` [number] <put parameter description here>

Default: *10000*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] multi scale
- 1 — [1] sectors

Default: *0*

`Multi Scale Factor` [number] <put parameter description here>

Default: *3*

`Number of Sectors` [number] <put parameter description here>

Default: *8*

Outputs

`Visible Sky` [raster] <put output description here>

`Sky View Factor` [raster] <put output description here>

`Sky View Factor (Simplified)` [raster] <put output description here>

`Terrain View Factor` [raster] <put output description here>

Console usage

```
processing.runalg('saga:skyviewfactor', dem, maxradius, method, level_inc, ndirs, visible, svf, s
```

See also

Topographic correction

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Original Image` [raster] <put parameter description here>

`Azimuth` [number] <put parameter description here>

Default: *180.0*

`Height` [number] <put parameter description here>

Default: *45.0*

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Cosine Correction (Teillet et al. 1982)
- 1 — [1] Cosine Correction (Civco 1989)
- 2 — [2] Minnaert Correction
- 3 — [3] Minnaert Correction with Slope (Riano et al. 2003)
- 4 — [4] Minnaert Correction with Slope (Law & Nichol 2004)
- 5 — [5] C Correction
- 6 — [6] Normalization (after Civco, modified by Law & Nichol)

Default: *0*

`Minnaert Correction` **[number]** <put parameter description here>

Default: *0.5*

`Maximum Cells (C Correction Analysis)` **[number]** <put parameter description here>

Default: *1000*

`Value Range` **[selection]** <put parameter description here>

Options:

- 0 — [0] 1 byte (0-255)
- 1 — [1] 2 byte (0-65535)

Default: *0*

Outputs

`Corrected Image` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:topographiccorrection', dem, original, azi, hgt, method, minnaert, maxcel
```

See also

.

18.7.27 Morfometría del terreno

Convergence index

Description

Calculates an index of convergence/divergence regarding to overland flow. By its meaning it is similar to plan or horizontal curvature, but gives much smoother results. The calculation uses the aspects of surrounding cells, i.e. it looks to which degree surrounding cells point to the center cell. The result is given as percentages, negative values correspond to convergent, positive to divergent flow conditions. Minus 100 would be like a peak of a cone, plus 100 a pit, and 0 an even slope.

Parameters

`Elevation` **[raster]** <put parameter description here>

`Method` **[selection]** <put parameter description here>

Options:

- 0 — [0] Aspect
- 1 — [1] Gradient

Default: *0*

`Gradient Calculation` **[selection]** <put parameter description here>

Options:

- 0 — [0] 2 x 2

- 1 — [1] 3 x 3

Default: *0*

Outputs

Convergence Index [raster] <put output description here>

Console usage

```
processing.runalg('saga:convergenceindex', elevation, method, neighbours, result)
```

See also

- Koethe, R. / Lehmeier, F. (1996): 'SARA, System zur Automatischen Relief-Analyse', Benutzerhandbuch, 2. Auflage [Geogr. Inst. Univ. Goettingen, unpublished]

Convergence index (search radius)

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Radius [Cells] [number] <put parameter description here>

Default: *10*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

Inverse Distance Weighting Power [number] <put parameter description here>

Default: *1*

Inverse Distance Offset [boolean] <put parameter description here>

Default: *True*

Gaussian and Exponential Weighting Bandwidth [number] <put parameter description here>

Default: *1*

Gradient [boolean] <put parameter description here>

Default: *True*

`Difference` **[selection]** <put parameter description here>

Options:

- 0 — [0] direction to the center cell
- 1 — [1] center cell's aspect direction

Default: *0*

Outputs

`Convergence Index` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:convergenceindexsearchradius', elevation, radius, distance_weighting_weig
```

See also

Curvature classification

Description

<put algortithm description here>

Parameters

`Plan Curvature` **[raster]** <put parameter description here>

`Profile Curvature` **[raster]** <put parameter description here>

`Threshold for plane` **[number]** <put parameter description here>

Default: *0.001*

Outputs

`Curvature Classification` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:curvatureclassification', cplan, cprof, threshold, class)
```

See also

Diurnal anisotropic heating

Description

<put algortithm description here>

Parameters

`Elevation` **[raster]** <put parameter description here>

`Alpha Max (Degree)` **[number]** <put parameter description here>

Default: *202.5*

Outputs

`Diurnal Anisotropic Heating` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:diurnalanisotropicheating', dem, alpha_max, dah)
```

See also

Downslope distance gradient

Description

<put algortithm description here>

Parameters

`Elevation` **[raster]** <put parameter description here>

`Vertical Distance` **[number]** <put parameter description here>

Default: *10*

`Output` **[selection]** <put parameter description here>

Options:

- 0 — [0] distance
- 1 — [1] gradient (tangens)
- 2 — [2] gradient (degree)

Default: *0*

Outputs

`Gradient` **[raster]** <put output description here>

`Gradient Difference` **[raster]** <put output description here>

Console usage

```
processing.runalg('saga:downslopedistancegradient', dem, distance, output, gradient, difference)
```

See also

Effective air flow heights

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Wind Direction [raster] Optional.

<put parameter description here>

Wind Speed [raster] Optional.

<put parameter description here>

Constant Wind Direction [Degree] [number] <put parameter description here>

Default: *135*

Old Version [boolean] <put parameter description here>

Default: *True*

Search Distance [km] [number] <put parameter description here>

Default: *300*

Acceleration [number] <put parameter description here>

Default: *1.5*

Use Pyramids with New Version [boolean] <put parameter description here>

Default: *True*

Lee Factor [number] <put parameter description here>

Default: *0.5*

Luv Factor [number] <put parameter description here>

Default: *1.0*

Wind Direction Units [selection] <put parameter description here>

Options:

- 0 — [0] radians
- 1 — [1] degree

Default: *0*

Wind Speed Scale Factor [number] <put parameter description here>

Default: *1.0*

Outputs

Effective Air Flow Heights [raster] <put output description here>

Console usage

```
processing.runalg('saga:effectiveairflowheights', dem, dir, len, dir_const, oldver, maxdist, acce
```

See also

Hypsometry

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Number of Classes [number] <put parameter description here>

Default: *100.0*

Sort [selection] <put parameter description here>

Options:

- 0 — [0] up
- 1 — [1] down

Default: *0*

Classification Constant [selection] <put parameter description here>

Options:

- 0 — [0] height
- 1 — [1] area

Default: *0*

Use Z-Range [boolean] <put parameter description here>

Default: *True*

Z-Range Min [number] <put parameter description here>

Default: *0.0*

Z-Range Max [number] <put parameter description here>

Default: *1000.0*

Outputs

Hypsometry [table] <put output description here>

Console usage

```
processing.runalg('saga:hypsometry', elevation, count, sorting, method, bzrange, zrange_min, zran
```

See also

Land surface temperature

Description

<put algortithm description here>

Parameters

Elevation [m] [raster] <put parameter description here>

Short Wave Radiation [kW/m2] [raster] <put parameter description here>

Leaf Area Index [raster] <put parameter description here>

Elevation at Reference Station [m] [number] <put parameter description here>

Default: *0.0*

Temperature at Reference Station [Deg.Celsius] [number] <put parameter description here>

Default: *0.0*

Temperature Gradient [Deg.Celsius/km] [number] <put parameter description here>

Default: *6.5*

C Factor [number] <put parameter description here>

Default: *1.0*

Outputs

Land Surface Temperature [Deg.Celsius] [raster] <put output description here>

Console usage

```
processing.runalg('saga:landsurfacetemperature', dem, swr, lai, z_reference, t_reference, t_gradi
```

See also

Mass balance index

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Vertical Distance to Channel Network [raster] Optional.

<put parameter description here>

T Slope [number] <put parameter description here>

Default: *15.0*

T Curvature [number] <put parameter description here>

Default: *0.01*

T Vertical Distance to Channel Network [number] <put parameter description here>

Default: *15.0*

Outputs

Mass Balance Index [raster] <put output description here>

Console usage

```
processing.runalg('saga:massbalanceindex', dem, hrel, tslope, tcurve, threl, mbi)
```

See also

Morphometric protection index

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Radius [number] <put parameter description here>

Default: *2000.0*

Outputs

Protection Index [raster] <put output description here>

Console usage

```
processing.runalg('saga:morphometricprotectionindex', dem, radius, protection)
```

See also

Multiresolution index of valley bottom flatness (mrvbf)

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Initial Threshold for Slope` [number] <put parameter description here>

Default: *16*

`Threshold for Elevation Percentile (Lowness)` [number] <put parameter description here>

Default: *0.4*

`Threshold for Elevation Percentile (Upness)` [number] <put parameter description here>

Default: *0.35*

`Shape Parameter for Slope` [number] <put parameter description here>

Default: *4.0*

`Shape Parameter for Elevation Percentile` [number] <put parameter description here>

Default: *3.0*

`Update Views` [boolean] <put parameter description here>

Default: *True*

`Classify` [boolean] <put parameter description here>

Default: *True*

`Maximum Resolution (Percentage)` [number] <put parameter description here>

Default: *100*

Outputs

`MRVBF` [raster] <put output description here>

`MRRTF` [raster] <put output description here>

Console usage

```
processing.runalg('saga:multiresolutionindexofvalleybottomflatnessmrvbf', dem, t_slope, t_pctl_v,
```

See also

Real area calculation

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

Outputs

`Real Area Grid` [raster] <put output description here>

Console usage

```
processing.runalg('saga:realareacalculation', dem, area)
```

See also

Relative heights and slope positions

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`w` [number] <put parameter description here>

Default: *0.5*

`t` [number] <put parameter description here>

Default: *10.0*

`e` [number] <put parameter description here>

Default: *2.0*

Outputs

`Slope Height` [raster] <put output description here>

`Valley Depth` [raster] <put output description here>

`Normalized Height` [raster] <put output description here>

`Standardized Height` [raster] <put output description here>

`Mid-Slope Positon` [raster] <put output description here>

Console usage

```
processing.runalg('saga:relativeheightsandslopepositions', dem, w, t, e, ho, hu, nh, sh, ms)
```

See also

Slope, aspect, curvature

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Maximum Slope (Travis et al. 1975)
- 1 — [1] Maximum Triangle Slope (Tarboton 1997)
- 2 — [2] Least Squares Fitted Plane (Horn 1981, Costa-Cabral & Burgess 1996)
- 3 — [3] Fit 2.Degree Polynom (Bauer, Rohdenburg, Bork 1985)
- 4 — [4] Fit 2.Degree Polynom (Heerdegen & Beran 1982)
- 5 — [5] Fit 2.Degree Polynom (Zevenbergen & Thorne 1987)
- 6 — [6] Fit 3.Degree Polynom (Haralick 1983)

Default: *5*

Outputs

`Slope` [raster] <put output description here>

`Aspect` [raster] <put output description here>

`Curvature` [raster] <put output description here>

`Plan Curvature` [raster] <put output description here>

`Profile Curvature` [raster] <put output description here>

Console usage

```
processing.runalg('saga:slopeaspectcurvature', elevation, method, slope, aspect, curv, hcurv, vcu
```

See also

Surface specific points

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Method` [selection] <put parameter description here>

Options:

- 0 — [0] Mark Highest Neighbour
- 1 — [1] Opposite Neighbours
- 2 — [2] Flow Direction
- 3 — [3] Flow Direction (up and down)

- 4 — [4] Peucker & Douglas

Default: *0*

Threshold [number] <put parameter description here>

Default: *2.0*

Outputs

Result [raster] <put output description here>

Console usage

```
processing.runalg('saga:surfacespecificpoints', elevation, method, threshold, result)
```

See also

Terrain ruggedness index (tri)

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Radius (Cells) [number] <put parameter description here>

Default: *1*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

Inverse Distance Weighting Power [number] <put parameter description here>

Default: *1*

Inverse Distance Offset [boolean] <put parameter description here>

Default: *True*

Gaussian and Exponential Weighting Bandwidth [number] <put parameter description here>

Default: *1.0*

Outputs

Terrain Ruggedness Index (TRI) [raster] <put output description here>

Console usage

```
processing.runalg('saga:terrainruggednessindextri', dem, radius, distance_weighting_weighting, di
```

See also

Topographic position index (tpi)

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Standardize [boolean] <put parameter description here>

Default: *True*

Min Radius [number] <put parameter description here>

Default: *0.0*

Max Radius [number] <put parameter description here>

Default: *100.0*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

Inverse Distance Weighting Power [number] <put parameter description here>

Default: *1*

Inverse Distance Offset [boolean] <put parameter description here>

Default: *True*

Gaussian and Exponential Weighting Bandwidth [number] <put parameter description here>

Default: *75.0*

Outputs

Topographic Position Index [raster] <put output description here>

Console usage

```
processing.runalg('saga:topographicpositionindextpi', dem, standard, radius_min, radius_max, dist
```

See also

Tpi based landform classification

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Min Radius A [number] <put parameter description here>

Default: *0*

Max Radius A [number] <put parameter description here>

Default: *100*

Min Radius B [number] <put parameter description here>

Default: *0*

Max Radius B [number] <put parameter description here>

Default: *1000*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

Inverse Distance Weighting Power [number] <put parameter description here>

Default: *1*

Inverse Distance Offset [boolean] <put parameter description here>

Default: *True*

Gaussian and Exponential Weighting Bandwidth [number] <put parameter description here>

Default: *75.0*

Outputs

Landforms [raster] <put output description here>

Console usage

```
processing.runalg('saga:tpibasedlandformclassification', dem, radius_a_min, radius_a_max, radius_b
```

See also

Vector ruggedness measure (vrm)

Description

<put algortithm description here>

Parameters

Elevation [raster] <put parameter description here>

Radius (Cells) [number] <put parameter description here>

Default: *1*

Distance Weighting [selection] <put parameter description here>

Options:

- 0 — [0] no distance weighting
- 1 — [1] inverse distance to a power
- 2 — [2] exponential
- 3 — [3] gaussian weighting

Default: *0*

Inverse Distance Weighting Power [number] <put parameter description here>

Default: *1*

Inverse Distance Offset [boolean] <put parameter description here>

Default: *True*

Gaussian and Exponential Weighting Bandwidth [number] <put parameter description here>

Default: *1*

Outputs

Vector Terrain Ruggedness (VRM) [raster] <put output description here>

Console usage

```
processing.runalg('saga:vectorruggednessmeasurevrm', dem, radius, distance_weighting_weighting, d
```

See also

Wind effect

Description

<put algortithm description here>

Parameters

`Elevation` [raster] <put parameter description here>

`Wind Direction` [raster] Optional.

<put parameter description here>

`Wind Speed` [raster] Optional.

<put parameter description here>

`Constant Wind Direction [Degree]` [number] <put parameter description here>

Default: *135*

`Old Version` [boolean] <put parameter description here>

Default: *True*

`Search Distance [km]` [number] <put parameter description here>

Default: *300.0*

`Acceleration` [number] <put parameter description here>

Default: *1.5*

`Use Pyramids` [boolean] <put parameter description here>

Default: *True*

`Wind Direction Units` [selection] <put parameter description here>

Options:

- 0 — [0] radians
- 1 — [1] degree

Default: *0*

`Wind Speed Scale Factor` [number] <put parameter description here>

Default: *1.0*

Outputs

`Wind Effect` [raster] <put output description here>

`Windward Effect` [raster] <put output description here>

`Leeward Effect` [raster] <put output description here>

Console usage

```
processing.runalg('saga:windeffect', dem, dir, len, dir_const, oldver, maxdist, accel, pyramids, d
```

See also

.

18.7.28 Terrain profiles

Cross profiles

Description

<put algortithm description here>

Parameters

`DEM` [raster] <put parameter description here>

`Lines` [vector: line] <put parameter description here>

`Profile Distance` [number] <put parameter description here>

Default: *10.0*

`Profile Length` [number] <put parameter description here>

Default: *10.0*

`Profile Samples` [number] <put parameter description here>

Default: *10.0*

Outputs

`Cross Profiles` [vector] <put output description here>

Console usage

```
processing.runalg('saga:crossprofiles', dem, lines, dist_line, dist_profile, num_profile, profile
```

See also

Profile from points table

Description

<put algortithm description here>

Parameters

`Grid` [raster] <put parameter description here>

`Input` [table] <put parameter description here>

`X` [tablefield: any] <put parameter description here>

`Y` [tablefield: any] <put parameter description here>

Outputs

`Result` [table] <put output description here>

Console usage

```
processing.runalg('saga:profilefrompointstable', grid, table, x, y, result)
```

See also

Profiles from lines

Description

<put algortithm description here>

Parameters

`DEM` [raster] <put parameter description here>

`Values` [multipleinput: rasters] Optional.

<put parameter description here>

`Lines` [vector: line] <put parameter description here>

`Name` [tablefield: any] <put parameter description here>

`Each Line as new Profile` [boolean] <put parameter description here>

Default: *True*

Outputs

`Profiles` [vector] <put output description here>

`Profiles` [vector] <put output description here>

Console usage

```
processing.runalg('saga:profilesfromlines', dem, values, lines, name, split, profile, profiles)
```

See also

.

18.8 TauDEM algorithm provider

TauDEM (Terrain Analysis Using Digital Elevation Models) is a set of Digital Elevation Model (DEM) tools for the extraction and analysis of hydrologic information from topography as represented by a DEM. This is software developed at Utah State University (USU) for hydrologic digital elevation model analysis and watershed delineation.

TauDEM is distributed as a set of standalone command line executable programs for a Windows and source code for compiling and use on other systems.

Nota: Please remember that Processing contains only the interface description, so you need to install TauDEM 5.0.6 by yourself and configure Processing properly.

Documentation for TauDEM algorithms derived from official TauDEM documentation

.

18.8.1 Basic Grid Analysis

D8 Contributing Area

Description

Calculates a grid of contributing areas using the single direction D8 flow model. The contribution of each grid cell is taken as one (or when the optional weight grid is used, the value from the weight grid). The contributing area for each grid cell is taken as its own contribution plus the contribution from upslope neighbors that drain in to it according to the D8 flow model.

If the optional outlet point shapefile is used, only the outlet cells and the cells upslope (by the D8 flow model) of them are in the domain to be evaluated.

By default, the tool checks for edge contamination. This is defined as the possibility that a contributing area value may be underestimated due to grid cells outside of the domain not being counted. This occurs when drainage is inwards from the boundaries or areas with "no data" values for elevation. The algorithm recognizes this and reports "no data" for the contributing area. It is common to see streaks of "no data" values extending inwards from boundaries along flow paths that enter the domain at a boundary. This is the desired effect and indicates that contributing area for these grid cells is unknown due to it being dependent on terrain outside of the domain of data available. Edge contamination checking may be turned off in cases where you know this is not an issue or want to ignore these problems, if for example, the DEM has been clipped along a watershed outline.

Parameters

`D8 Flow Direction Grid` **[raster]** A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Outlets Shapefile` **[vector: point]** Optional.

A point shapefile defining the outlets of interest. If this input file is used, only the cells upslope of these outlet cells are considered to be within the domain being evaluated.

`Weight Grid` **[raster]** Optional.

A grid giving contribution to flow for each cell. These contributions (also sometimes referred to as weights or loadings) are used in the contributing area accumulation. If this input file is not used, the contribution to flow will assumed to be one for each grid cell.

`Check for edge contamination` **[boolean]** A flag that indicates whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a contributing area value may be underestimated due to the fact that grid cells outside of the domain have not been evaluated. This occurs when drainage is inwards from the boundaries or areas with NODATA values for elevation. The algorithm recognizes this and reports NODATA for the impated cells. It is common to see streaks of NODATA values extending inwards from boundaries along flow paths that enter the domain at a boundary. This is the desired effect and indicates that contributing area for these grid cells is unknown due to it being dependent on terrain outside of the domain of available data. Edge contamination checking may be turned off in cases where you know this is not an issue, or want to ignore these problems, if for example, the DEM has been clipped along a watershed outline.

Default: *True*

Outputs

D8 Contributing Area Grid [raster] A grid of contributing area values calculated as the cells own contribution plus the contribution from upslope neighbors that drain in to it according to the D8 flow model.

Console usage

```
processing.runalg('taudem:d8contributingarea', -p, -o, -wg, -nc, -ad8)
```

See also

D8 Flow Directions

Description

Creates 2 grids. The first contains the flow direction from each grid cell to one of its adjacent or diagonal neighbors, calculated using the direction of steepest descent. The second contain the slope, as evaluated in the direction of steepest descent, and is reported as drop/distance, i.e. tan of the angle. Flow direction is reported as NODATA for any grid cell adjacent to the edge of the DEM domain, or adjacent to a NODATA value in the DEM. In flat areas, flow directions are assigned away from higher ground and towards lower ground using the method of Garbrecht and Martz (1997). The D8 flow direction algorithm may be applied to a DEM that has not had its pits filled, but it will then result in NODATA values for flow direction and slope at the lowest point of each pit.

D8 Flow Direction Coding:

- 1 — East
- 2 — Northeast
- 3 — North
- 4 — Northwest
- 5 — West
- 6 — Southwest
- 7 — South
- 8 — Southeast

The flow direction routing across flat areas is performed according to the method described by Garbrecht, J. and L. W. Martz, (1997), "The Assignment of Drainage Direction Over Flat Surfaces in Raster Digital Elevation Models", Journal of Hydrology, 193: 204-213.

Parameters

Pit Filled Elevation Grid [raster] A grid of elevation values. This is usually the output of the **"Pit Remove"** tool, in which case it is elevations with pits removed. Pits are low elevation areas in digital elevation models (DEMs) that are completely surrounded by higher terrain. They are generally taken to be artifacts of the digitation process that interfere with the processing of flow across DEMs. So they are removed by raising their elevation to the point where they just drain off the domain. This step is not essential if you have reason to believe that the pits in your DEM are real. If a few pits actually exist and so should not be removed, while at the same time others are believed to be artifacts that need to be removed, the actual pits should have NODATA elevation values inserted at their lowest point. NODATA values serve to define edges of the domain in the flow field, and elevations are only raised to where flow is off an edge, so an internal NODATA value will stop a pit from being removed, if necessary.

Outputs

D8 Flow Direction Grid [raster] A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope.

D8 Slope Grid [raster] A grid giving slope in the D8 flow direction. This is measured as drop/distance.

Console usage

```
processing.runalg('taudem:d8flowdirections', -fel, -p, -sd8)
```

See also

D-Infinity Contributing Area

Description

Calculates a grid of specific catchment area which is the contributing area per unit contour length using the multiple flow direction D-infinity approach. D-infinity flow direction is defined as steepest downward slope on planar triangular facets on a block centered grid. The contribution at each grid cell is taken as the grid cell length (or when the optional weight grid input is used, from the weight grid). The contributing area of each grid cell is then taken as its own contribution plus the contribution from upslope neighbors that have some fraction draining to it according to the D-infinity flow model. The flow from each cell either all drains to one neighbor, if the angle falls along a cardinal (0, π/2, π, 3π/2) or ordinal (π/4, 3π/4, 5π/4, 7π/4) direction, or is on an angle falling between the direct angle to two adjacent neighbors. In the latter case the flow is proportioned between these two neighbor cells according to how close the flow direction angle is to the direct angle to those cells. The contour length used here is the grid cell size. The resulting units of the specific catchment area are length units the same as those of the grid cell size.

When the optional weight grid is not used, the result is reported in terms of specific catchment area, the upslope area per unit contour length, taken here as the number of cells times grid cell length (cell area divided by cell length). This assumes that grid cell length is the effective contour length, in the definition of specific catchment area and does not distinguish any difference in contour length dependent upon the flow direction. When the optional weight grid is used, the result is reported directly as a summation of weights, without any scaling.

If the optional outlet point shapefile is used, only the outlet cells and the cells upslope (by the D-infinity flow model) of them are in the domain to be evaluated.

By default, the tool checks for edge contamination. This is defined as the possibility that a contributing area value may be underestimated due to grid cells outside of the domain not being counted. This occurs when drainage is inwards from the boundaries or areas with "no data" values for elevation. The algorithm recognizes this and reports "no data" for the contributing area. It is common to see streaks of "no data" values extending inwards from boundaries along flow paths that enter the domain at a boundary. This is the desired effect and indicates that contributing area for these grid cells is unknown due to it being dependent on terrain outside of the domain of data available. Edge contamination checking may be turned off in cases where you know it is not an issue or want to ignore these problems, if for example, the DEM has been clipped along a watershed outline.

Parameters

D-Infinity Flow Direction Grid [raster] A grid of flow directions based on the D-infinity flow method using the steepest slope of a triangular facet. Flow direction is determined as the direction of the steepest downward slope on the 8 triangular facets of a 3x3 block centered grid. Flow direction is encoded as an angle in radians, counter-clockwise from east as a continuous (floating point) quantity between 0 and 2π. The resulting flow in a grid is then usually interpreted as being proportioned between the two neighboring cells that define the triangular facet with the steepest downward slope.

`Outlets Shapefile` **[vector: point]** Optional.

A point shapefile defining the outlets of interest. If this input file is used, only the cells upslope of these outlet cells are considered to be within the domain being evaluated.

`Weight Grid` **[raster]** Optional.

A grid giving contribution to flow for each cell. These contributions (also sometimes referred to as weights or loadings) are used in the contributing area accumulation. If this input file is not used, the result is reported in terms of specific catchment area (the upslope area per unit contour length) taken as the number of cells times grid cell length (cell area divided by cell length).

`Check for edge contamination` **[boolean]** A flag that indicates whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a contributing area value may be underestimated due to the fact that grid cells outside of the domain have not been evaluated. This occurs when drainage is inwards from the boundaries or areas with NODATA values for elevation. The algorithm recognizes this and reports NODATA for the impated cells. It is common to see streaks of NODATA values extending inwards from boundaries along flow paths that enter the domain at a boundary. This is the desired effect and indicates that contributing area for these grid cells is unknown due to it being dependent on terrain outside of the domain of available data. Edge contamination checking may be turned off in cases where you know this is not an issue, or want to ignore these problems, if for example, the DEM has been clipped along a watershed outline.

Default: *True*

Outputs

`D-Infinity Specific Catchment Area Grid` **[raster]** A grid of specific catchment area which is the contributing area per unit contour length using the multiple flow direction D-infinity approach. The contributing area of each grid cell is then taken as its own contribution plus the contribution from upslope neighbors that have some fraction draining to it according to the D-infinity flow model.

Console usage

```
processing.runalg('taudem:dinfinitycontributingarea', -ang, -o, -wg, -nc, -sca)
```

See also

D-Infinity Flow Directions

Description

Assigns a flow direction based on the D-infinity flow method using the steepest slope of a triangular facet (Tarboton, 1997, "A New Method for the Determination of Flow Directions and Contributing Areas in Grid Digital Elevation Models", Water Resources Research, 33(2): 309-319). Flow direction is defined as steepest downward slope on planar triangular facets on a block centered grid. Flow direction is encoded as an angle in radians counter-clockwise from east as a continuous (floating point) quantity between 0 and 2π. The flow direction angle is determined as the direction of the steepest downward slope on the eight triangular facets formed in a 3 x 3 grid cell window centered on the grid cell of interest. The resulting flow in a grid is then usually interpreted as being proportioned between the two neighboring cells that define the triangular facet with the steepest downward slope.

A block-centered representation is used with each elevation value taken to represent the elevation of the center of the corresponding grid cell. Eight planar triangular facets are formed between each grid cell and its eight neighbors. Each of these has a downslope vector which when drawn outwards from the center may be at an angle that lies within or outside the 45 degree ($\pi/4$ radian) angle range of the facet at the center point. If the slope vector angle is within the facet angle, it represents the steepest flow direction on that facet. If the slope vector angle is outside a facet, the steepest flow direction associated with that facet is taken along the steepest edge. The slope and flow direction associated with the grid cell is taken as the magnitude and direction of the steepest downslope vector from all eight facets. Slope is measured as drop/distance, i.e. tan of the slope angle.

In the case where no slope vectors are positive (downslope), the flow direction is set using the method of Garbrecht and Martz (1997) for the determination of flow across flat areas. This makes flat areas drain away from high ground and towards low ground. The flow path grid to enforce drainage along existing streams is an optional input, and if used, takes precedence over elevations for the setting of flow directions.

The D-infinity flow direction algorithm may be applied to a DEM that has not had its pits filled, but it will then result in "no data" values for the D-infinity flow direction and slope associated with the lowest point of the pit.

Parameters

`Pit Filled Elevation Grid` **[raster]** A grid of elevation values. This is usually the output of the **"Pit Remove"** tool, in which case it is elevations with pits removed.

Outputs

`D-Infinity Flow Directions Grid` **[raster]** A grid of flow directions based on the D-infinity flow method using the steepest slope of a triangular facet. Flow direction is determined as the direction of the steepest downward slope on the 8 triangular facets of a 3x3 block centered grid. Flow direction is encoded as an angle in radians, counter-clockwise from east as a continuous (floating point) quantity between 0 and 2π. The resulting flow in a grid is then usually interpreted as being proportioned between the two neighboring cells that define the triangular facet with the steepest downward slope.

`D-Infinity Slope Grid` **[raster]** A grid of slope evaluated using the D-infinity method described in Tarboton, D. G., (1997), "A New Method for the Determination of Flow Directions and Contributing Areas in Grid Digital Elevation Models", Water Resources Research, 33(2): 309-319. This is the steepest outwards slope on one of eight triangular facets centered at each grid cell, measured as drop/distance, i.e. tan of the slope angle.

Console usage

```
processing.runalg('taudem:dinfinityflowdirections', -fel, -ang, -slp)
```

See also

Grid Network

Description

Creates 3 grids that contain for each grid cell: 1) the longest path, 2) the total path, and 3) the Strahler order number. These values are derived from the network defined by the D8 flow model.

The longest upslope length is the length of the flow path from the furthest cell that drains to each cell. The total upslope path length is the length of the entire grid network upslope of each grid cell. Lengths are measured between cell centers taking into account cell size and whether the direction is adjacent or diagonal.

Strahler order is defined as follows: A network of flow paths is defined by the D8 Flow Direction grid. Source flow paths have a Strahler order number of one. When two flow paths of different order join the order of the downstream flow path is the order of the highest incoming flow path. When two flow paths of equal order join the downstream flow path order is increased by 1. When more than two flow paths join the downstream flow path order is calculated as the maximum of the highest incoming flow path order or the second highest incoming flow path order + 1. This generalizes the common definition to cases where more than two flow paths join at a point.

Where the optional mask grid and threshold value are input, the function is evaluated only considering grid cells that lie in the domain with mask grid value greater than or equal to the threshold value. Source (first order) grid cells are taken as those that do not have any other grid cells from inside the domain draining in to them, and only when two of these flow paths join is order propagated according to the ordering rules. Lengths are also only evaluated counting paths within the domain greater than or equal to the threshold.

If the optional outlet point shapefile is used, only the outlet cells and the cells upslope (by the D8 flow model) of them are in the domain to be evaluated.

Parameters

`D8 Flow Direction Grid` **[raster]** A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Outlets Shapefile` **[vector: point]** Optional.

A point shapefile defining the outlets of interest. If this input file is used, only the cells upslope of these outlet cells are considered to be within the domain being evaluated.

`Mask Grid` **[raster]** Optional.

A grid that is used to determine the domain do be analyzed. If the mask grid value >= mask threshold (see below), then the cell will be included in the domain. While this tool does not have an edge contamination flag, if edge contamination analysis is needed, then a mask grid from a function like **"D8 Contributing Area"** that does support edge contamination can be used to achieve the same result.

`Mask Threshold` **[number]** This input parameter is used in the calculation mask grid value >= mask threshold to determine if the grid cell is in the domain to be analyzed.

Default: *100*

Outputs

`Longest Upslope Length Grid` **[raster]** A grid that gives the length of the longest upslope D8 flow path terminating at each grid cell. Lengths are measured between cell centers taking into account cell size and whether the direction is adjacent or diagonal.

`Total Upslope Length Grid` **[raster]** The total upslope path length is the length of the entire D8 flow grid network upslope of each grid cell. Lengths are measured between cell centers taking into account cell size and whether the direction is adjacent or diagonal.

`Strahler Network Order Grid` **[raster]** A grid giving the Strahler order number for each cell. A network of flow paths is defined by the D8 Flow Direction grid. Source flow paths have a Strahler order number of one. When two flow paths of different order join the order of the downstream flow path is the order of the highest incoming flow path. When two flow paths of equal order join the downstream flow path order is increased by 1. When more than two flow paths join the downstream flow path order is calculated as the maximum of the highest incoming flow path order or the second highest incoming flow path order + 1. This generalizes the common definition to cases where more than two flow paths join at a point.

Console usage

```
processing.runalg('taudem:gridnetwork', d8_flow_dir_grid, outlets_shape, mask_grid, threshold, lo
```

See also

Pit Remove

Description

Identifies all pits in the DEM and raises their elevation to the level of the lowest pour point around their edge. Pits are low elevation areas in digital elevation models (DEMs) that are completely surrounded by higher terrain. They are generally taken to be artifacts that interfere with the routing of flow across DEMs, so are removed by raising their elevation to the point where they drain off the edge of the domain. The pour point is the lowest point on the boundary of the "watershed" draining to the pit. This step is not essential if you have reason to believe that the pits in your DEM are real. If a few pits actually exist and so should not be removed, while at the same time others are believed to be artifacts that need to be removed, the actual pits should have NODATA elevation values inserted at their lowest point. NODATA values serve to define edges in the domain, and elevations are only raised to where flow is off an edge, so an internal NODATA value will stop a pit from being removed, if necessary.

Parameters

`Elevation Grid` [raster] A digital elevation model (DEM) grid to serve as the base input for the terrain analysis and stream delineation.

Outputs

`Pit Removed Elevation Grid` [raster] A grid of elevation values with pits removed so that flow is routed off of the domain.

Console usage

```
processing.runalg('taudem:pitremove', -z, -fel)
```

See also

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18.8.2 Specialized Grid Analysis

D8 Distance To Streams

Description

Computes the horizontal distance to stream for each grid cell, moving downslope according to the D8 flow model, until a stream grid cell is encountered.

Parameters

`D8 Flow Direction Grid` [raster] This input is a grid of flow directions that are encoded using the D8 method where all flow from a cells goes to a single neighboring cell in the direction of steepest descent. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Stream Raster Grid` [raster] A grid indicating streams. Such a grid can be created by several of the tools in the **"Stream Network Analysis"** toolset. However, the tools in the **"Stream Network Analysis"** toolset only create grids with a value of 0 for no stream, or 1 for stream cells. This tool can also accept grids with values greater than 1, which can be used in conjunction with the `Threshold` parameter to determine the location of streams. This allows Contributing Area grids to be used to define streams as well as the normal Stream Raster grids. This grid expects integer (long integer) values and any non-integer values will be truncated to an integer before being evaluated.

`Threshold` [number] This value acts as threshold on the `Stream Raster Grid` to determine the location of streams. Cells with a `Stream Raster Grid` value greater than or equal to the `Threshold` value are interpreted as streams.

Default: *50*

Outputs

`Output Distance to Streams` [raster] A grid giving the horizontal distance along the flow path as defined by the D8 Flow Directions Grid to the streams in the Stream Raster Grid.

Console usage

```
processing.runalg('taudem:d8distancetostreams', -p, -src, -thresh, -dist)
```

See also

D-Infinity Avalanche Runout

Description

Identifies an avalanche's affected area and the flow path length to each cell in that affacted area. All cells downslope from each source area cell, up to the point where the slope from the source to the affected area is less than a threshold angle called the Alpha Angle can be in the affected area. This tool uses the D-infinity multiple flow direction method for determining flow direction. This will likely cause very small amounts of flow to be dispersed to some downslope cells that might overstate the affected area, so a threshold proportion can be set to avoid this excess dispersion. The flow path length is the distance from the cell in question to the source cell that has the highest angle.

All points downslope from the source area are potentially in the affected area, but not beyond a point where the slope from the source to the affected area is less than a threshold angle called the Alpha Angle.

Slope is to be measured using the straight line distance from source point to evaluation point.

It makes more physical sense to me for the angle to be measured along the flow path. Nevertheless it is equally easy to code straight line angles as angles along the flow path, so an option that allows switching will be provided. The most practical way to evaluate avalanche runout is to keep track of the source point with the greatest angle to each point. Then the recursive upslope flow algebra approach will look at a grid cell and all its upslope neighbors that flow to it. Information from the upslope neighbors will be used to calculate the angle to the grid cell in question and retain it in the runout zone if the angle exceeds the alpha angle. This procedure makes the assumption that the maximum angle at a grid cell will be from the set of cells that have maximum angles to the inflowing neighbors. This will always be true of angle is calculated along a flow path, but I can conceive of cases where flow paths bend back on themselves where this would not be the case for straight line angles.

The D-infinity multiple flow direction field assigns flow from each grid cell to multiple downslope neighbors using proportions (`Pik`) that vary between 0 and 1 and sum to 1 for all flows out of a grid cell. It may be desirable to specify a threshold `T` that this proportion has to exceed before a grid cell is counted as flowing to a downslope grid cell, e.g. `Pik > T` (=0.2 say) to avoid dispersion to grid cells that get very little flow. `T` will be specified as a user input. If all upslope grid cells are to be used `T` may be input as 0.

Avalanche source sites are to be input as a short integer grid (name suffix `*ass`, e.g. `demass`) comprised of positive values where avalanches may be triggered and 0 values elsewhere.

The following grids are output:

- rz — A runout zone indicator with value 0 to indicate that this grid cell is not in the runout zone and value > 0 to indicate that this grid cell is in the runout zone. Since there may be information in the angle to the associated source site, this variable will be assigned the angle to the source site (in degrees)
- dm — Along flow distance from the source site that has the highest angle to the point in question

Parameters

`D-Infinity Flow Direction Grid` **[raster]** A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

`Pit Filled Elevation Grid` **[raster]** This input is a grid of elevation values. As a general rule, it is recommended that you use a grid of elevation values that have had the pits removed for this input. Pits are generally taken to be artifacts that interfere with the analysis of flow across them. This grid can be obtained as the output of the **"Pit Remove"** tool, in which case it contains elevation values where the pits have been filled to the point where they just drain.

`Avalanche Source Site Grid` **[raster]** This is a grid of source areas for snow avalanches that are commonly identified manually using a mix of experience and visual interpretation of maps. Avalanche source sites are to be input as a short integer grid (name suffix `*ass`, e.g. `demass`) comprised of positive values where avalanches may be triggered and 0 values elsewhere.

`Proportion Threshold` **[number]** This value is a threshold proportion that is used to limit the disperson of flow caused by using the D-infinity multiple flow direction method for determining flow direction. The D-infinity multiple flow direction method often causes very small amounts of flow to be dispersed to some downslope cells that might overstate the affected area, so a threshold proportion can be set to avoid this excess dispersion.

Default: *0.2*

`Alpha Angle Threshold` **[number]** This value is the threshold angle, called the Alpha Angle, that is used to determine which of the cells downslope from the source cells are in the affected area. Only the cells downslope from each source area cell, up to the point where the slope from the source to the affected area is less than a threshold angle are in the affected area.

Default: *18*

`Measure distance along flow path` **[boolean]** This option selects the method used to measure the distance used to calculate the slope angle. If option is *True* then measure it along the flow path, where the *False* option causes the slope to be measure along the straight line distance from the source cell to the evaluation cell.

Default: *True*

Outputs

`Runout Zone Grid` **[raster]** This grid Identifies the avalanche's runout zone (affected area) using a runout zone indicator with value 0 to indicate that this grid cell is not in the runout zone and value > 0 to indicate that this grid cell is in the runout zone. Since there may be information in the angle to the associated source site, this variable will be assigned the angle to the source site (in degrees).

`Path Distance Grid` **[raster]** This is a grid of the flow distance from the source site that has the highest angle to each cell.

Console usage

```
processing.runalg('taudem:dinfinityavalancherunout', -ang, -fel, -ass, -thresh, -alpha, -direct, -
```

See also

D-Infinity Concentration Limited Accumulation

Description

This function applies to the situation where an unlimited supply of a substance is loaded into flow at a concentration or solubility threshold Csol over a region indicated by an indicator grid (dg). It a grid of the concentration of a substance at each location in the domain, where the supply of substance from a supply area is loaded into the flow at a concentration or solubility threshold. The flow is first calculated as a D-infinity weighted contributing area of an input Effective Runoff Weight Grid (notionally excess precipitation). The concentation of substance over the supply area (indicator grid) is at the concentration threshold. As the substance moves downslope with the D-infinity flow field, it is subject to first order decay in moving from cell to cell as well as dilution due to changes in flow. The decay multiplier grid gives the fractional (first order) reduction in quantity in moving from grid cell `x` to the next downslope cell. If the outlets shapefile is used, the tool only evaluates the part of the domain that contributes flow to the locations given by the shapefile. This is useful for a tracking a contaminant or compound from an area with unlimited supply of that compound that is loaded into a flow at a concentration or solubility threshold over a zone and flow from the zone may be subject to decay or attenuation.

The indicator grid (`dg`) is used to delineate the area of the substance supply using the (0, 1) indicator function `i(x)`. `A[]` denotes the weighted accumulation operator evaluated using the D-Infinity Contributing Area function. The Effective Runoff Weight Grid gives the supply to the flow (e.g. the excess rainfall if this is overland flow) denoted as `w(x)`. The specific discharge is then given by:

`Q(x)=A[w(x)]`

This weighted accumulation `Q(x)` is output as the Overland Flow Specific Discharge Grid. Over the substance supply area concentration is at the threshold (the threshold is a saturation or solubility limit). If `i(x) = 1`, then

`C(x) = Csol, and L(x) = Csol Q(x),`

where `L(x)` denotes the load being carried by the flow. At remaining locations, the load is determined by load accumulation and the concentration by dilution:

Here `d(x) = d(i, j)` is a decay multiplier giving the fractional (first order) reduction in mass in moving from grid cell `x` to the next downslope cell. If travel (or residence) times `t(x)` associated with flow between cells are available `d(x)` may be evaluated as `exp(-k t(x))` where `k` is a first order decay parameter. The Concentration grid output is `C(x)`. If the outlets shapefile is used, the tool only evaluates the part of the domain that contributes flow to the locations given by the shapefile.

Useful for a tracking a contaminant released or partitioned to flow at a fixed threshold concentration.

Parameters

`D-Infinity Flow Direction Grid` [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This grid can be created by the function **"D-Infinity Flow Directions"**.

`Disturbance Indicator Grid` [raster] A grid that indicates the source zone of the area of substance supply and must be 1 inside the zone and 0 or NODATA over the rest of the domain.

`Decay Multiplier Grid` [raster] A grid giving the factor by which flow leaving each grid cell is multiplied before accumulation on downslope grid cells. This may be used to simulate the movement of an attenuating or decaying substance. If travel (or residence) times `t(x)` associated with flow between cells are available `d(x)` may be evaluated as `exp(-k t(x))` where `k` is a first order decay parameter.

`Effective Runoff Weight Grid` [raster] A grid giving the input quantity (notionally effective runoff or excess precipitation) to be used in the D-infinity weighted contributing area evaluation of Overland Flow Specific Discharge.

`Outlets shapefile` [vector: point] Optional.

This optional input is a point shapefile defining outlets of interest. If this file is used, the tool will only evaluate the area upslope of these outlets.

`Concentration Threshold` [number] The concentration or solubility threshold. Over the substance supply area, concentration is at this threshold.

Default: *1.0*

`Check for edge contamination` [boolean] This option determines whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being considered when determining contributing area.

Default: *True*

Outputs

`Concentration Grid` [raster] A grid giving the resulting concentration of the compound of interest in the flow.

Console usage

```
processing.runalg('taudem:dinfinityconcentrationlimitedaccumulation', -ang, -dg, -dm, -q, -o, -cs
```

See also

D-Infinity Decaying Accumulation

Description

The D-Infinity Decaying Accumulation tool creates a grid of the accumulated quantity at each location in the domain where the quantity accumulates with the D-infinity flow field, but is subject to first order decay in moving from cell to cell. By default, the quantity contribution of each grid cell is the cell length to give a per unit width accumulation, but can optionally be expressed with a weight grid. The decay multiplier grid gives the fractional (first order) reduction in quantity in accumulating from grid cell `x` to the next downslope cell.

A decayed accumulation operator `DA[.]` takes as input a mass loading field `m(x)` expressed at each grid location as `m(i, j)` that is assumed to move with the flow field but is subject to first order decay in moving from cell to cell. The output is the accumulated mass at each location `DA(x)`. The accumulation of `m` at each grid cell can be numerically evaluated.

Here `d(x) = d(i ,j)` is a decay multiplier giving the fractional (first order) reduction in mass in moving from grid cell `x` to the next downslope cell. If travel (or residence) times `t(x)` associated with flow between cells are available `d(x)` may be evaluated as `exp(-k t(x))` where `k` is a first order decay parameter. The weight grid is used to represent the mass loading `m(x)`. If not specified this is taken as 1. If the outlets shapefile is used the function is only evaluated on that part of the domain that contributes flow to the locations given by the shapefile.

Useful for a tracking contaminant or compound subject to decay or attenuation.

Parameters

`D-Infinity Flow Direction Grid` [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This grid can be created by the function **"D-Infinity Flow Directions"**.

`Decay Multiplier Grid` [raster] A grid giving the factor by which flow leaving each grid cell is multiplied before accumulation on downslope grid cells. This may be used to simulate the movement of an attenuating substance.

`Weight Grid` [raster] Optional.

A grid giving weights (loadings) to be used in the accumulation. If this optional grid is not specified, weights are taken as the linear grid cell size to give a per unit width accumulation.

`Outlets Shapefile` [vector: point] Optional.

This optional input is a point shapefile defining outlets of interest. If this file is used, the tool will only evaluate ther area upslope of these outlets.

`Check for edge contamination` [boolean] This option determines whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being considered when determining contributing area.

Default: *True*

Outputs

`Decayed Specific Catchment Area Grid` [raster] The D-Infinity Decaying Accumulation tool creates a grid of the accumulated mass at each location in the domain where mass moves with the D-infinity flow field, but is subject to first order decay in moving from cell to cell.

Console usage

```
processing.runalg('taudem:dinfinitydecayingaccumulation', -ang, -dm, -wg, -o, -nc, -dsca)
```

See also

D-Infinity Distance Down

Description

Calculates the distance downslope to a stream using the D-infinity flow model. The D-infinity flow model is a multiple flow direction model, because the outflow from each grid cell is proportioned between up to 2 downslope grid cells. As such, the distance from any grid cell to a stream is not uniquely defined. Flow that originates at a particular grid cell may enter the stream at a number of different cells. The statistical method may be selected as the longest, shortest or weighted average of the flow path distance to the stream. Also one of several ways of measuring distance may be selected: the total straight line path (Pythagoras), the horizontal component of the straight line path, the vertical component of the straight line path, or the total surface flow path.

Parameters

`D-Infinity Flow Direction Grid` [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

`Pit Filled Elevation Grid` [raster] This input is a grid of elevation values. As a general rule, it is recommended that you use a grid of elevation values that have had the pits removed for this input. Pits are generally taken to be artifacts that interfere with the analysis of flow across them. This grid can be obtained as the output of the **"Pit Remove"** tool, in which case it contains elevation values where the pits have been filled to the point where they just drain.

`Stream Raster Grid` [raster] A grid indicating streams, by using a grid cell value of 1 on streams and 0 off streams. This is usually the output of one of the tools in the **"Stream Network Analysis"** toolset.

`Weight Path Grid` [raster] Optional.

A grid giving weights (loadings) to be used in the distance calculation. This might be used for example where only flow distance through a buffer is to be calculated. The weight is then 1 in the buffer and 0 outside it. Alternatively the weight may reflect some sort of cost function for travel over the surface, perhaps representing travel time or attenuation of a process. If this input file is not used, the loadings will assumed to be one for each grid cell.

`Statistical Method` [selection] Statistical method used to calculate the distance down to the stream. In the D-Infinity flow model, the outflow from each grid cell is proportioned between two downslope grid cells. Therefore, the distance from any grid cell to a stream is not uniquely defined. Flow that originates at a particular grid cell may enter the stream at a number of cells. The distance to the stream may be defined as the longest (maximum), shortest (minimum) or weighted average of the distance down to the stream.

Options:

- 0 — Minimum
- 1 — Maximum
- 2 — Average

Default: *2*

`Distance Method` [selection] Distance method used to calculate the distance down to the stream. One of several ways of measuring distance may be selected: the total straight line path (Pythagoras), the horizontal component of the straight line path (horizontal), the vertical component of the straight line path (vertical), or the total surface flow path (surface).

Options:

- 0 — Pythagoras
- 1 — Horizontal
- 2 — Vertical
- 3 — Surface

Default: *1*

`Check for edge contamination` [boolean] A flag that determines whether the tool should check for edge contamination. This is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being counted. In the context of Distance Down this occurs when part of a flow path traced downslope from a grid cell leaves the domain without reaching a stream grid cell. With edge contamination checking selected, the algorithm recognizes this and reports no data for the result. This is the desired effect and indicates that values for these grid cells is unknown due to it being dependent on terrain outside of the domain of data available. Edge contamination checking may be overridden in cases where you know this is not an issue or want to evaluate the distance using only the fraction of flow paths that terminate at a stream.

Default: *True*

Outputs

`D-Infinity Drop to Stream Grid` [raster] Grid containing the distance to stream calculated using the D-infinity flow model and the statistical and path methods chosen.

Console usage

```
processing.runalg('taudem:dinfinitydistancedown', dinf_flow_dir_grid, pit_filled_grid, stream_gric
```

See also

D-Infinity Distance Up

Description

This tool calculates the distance from each grid cell up to the ridge cells along the reverse D-infinity flow directions. Ridge cells are defined to be grid cells that have no contribution from grid cells further upslope. Given the convergence of multiple flow paths at any grid cell, any given grid cell can have multiple upslope ridge cells. There are three statictical methods that this tool can use: maximum distance, minimum distance and waited flow average over these flow paths. A variant on the above is to consider only grid cells that contribute flow with a proportion greater than a user specified threshold (t) to be considered as upslope of any given grid cell. Setting t=0.5 would result in only one flow path from any grid cell and would give the result equivalent to a D8 flow model, rather than D-infinity flow model, where flow is proportioned between two downslope grid cells. Finally there are several different optional paths that can be measured: the total straight line path (Pythagoras), the horizontal component of the straight line path, the vertical component of the straight line path, or the total surface flow path.

Parameters

`D-Infinity Flow Direction Grid` [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

`Pit Filled Elevation Grid` [raster] This input is a grid of elevation values. As a general rule, it is recommended that you use a grid of elevation values that have had the pits removed for this input. Pits are generally taken to be artifacts that interfere with the analysis of flow across them. This grid can be obtained as the output of the **"Pit Remove"** tool, in which case it contains elevation values where the pits have been filled to the point where they just drain.

`Slope Grid` [raster] This input is a grid of slope values. This is measured as drop/distance and it is most often obtained as the output of the **"D-Infinity Flow Directions"** tool.

`Statistical Method` [selection] Statistical method used to calculate the distance down to the stream. In the D-Infinity flow model, the outflow from each grid cell is proportioned between two downslope grid cells. Therefore, the distance from any grid cell to a stream is not uniquely defined. Flow that originates at a particular grid cell may enter the stream at a number of cells. The distance to the stream may be defined as the longest (maximum), shortest (minimum) or weighted average of the distance down to the stream.

Options:

- 0 — Minimum
- 1 — Maximum
- 2 — Average

Default: *2*

`Distance Method` [selection] Distance method used to calculate the distance down to the stream. One of several ways of measuring distance may be selected: the total straight line path (Pythagoras), the horizontal component of the straight line path (horizontal), the vertical component of the straight line path (vertical), or the total surface flow path (surface).

Options:

- 0 — Pythagoras

- 1 — Horizontal
- 2 — Vertical
- 3 — Surface

Default: *1*

Proportion Threshold [number] The proportion threshold parameter where only grid cells that contribute flow with a proportion greater than this user specified threshold (`t`) is considered to be upslope of any given grid cell. Setting `t=0.5` would result in only one flow path from any grid cell and would give the result equivalent to a D8 flow model, rather than D-Infinity flow model, where flow is proportioned between two downslope grid cells.

Default: *0.5*

Check for edge contamination [boolean] A flag that determines whether the tool should check for edge contamination. This is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being counted.

Default: *True*

Outputs

D-Infinity Distance Up [raster] Grid containing the distances up to the ridge calculated using the D-Infinity flow model and the statistical and path methods chosen.

Console usage

```
processing.runalg('taudem:dinfinitydistanceup', dinf_flow_dir_grid, pit_filled_grid, slope_grid, s
```

See also

D-Infinity Reverse Accumulation

Description

This works in a similar way to evaluation of weighted Contributing area, except that the accumulation is by propagating the weight loadings upslope along the reverse of the flow directions to accumulate the quantity of weight loading downslope from each grid cell. The function also reports the maximum value of the weight loading downslope from each grid cell in the Maximum Downslope grid.

This function is designed to evaluate and map the hazard due to activities that may have an effect downslope. The example is land management activities that increase runoff. Runoff is sometimes a trigger for landslides or debris flows, so the weight grid here could be taken as a terrain stability map. Then the reverse accumulation provides a measure of the amount of unstable terrain downslope from each grid cell, as an indicator of the danger of activities that may increase runoff, even though there may be no potential for any local impact.

Parameters

D-Infinity Flow Direction Grid [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

Weight Grid [raster] A grid giving weights (loadings) to be used in the accumulation.

Outputs

`Reverse Accumulation Grid` [raster] The grid giving the result of the **"Reverse Accumulation"** function. This works in a similar way to evaluation of weighted Contributing area, except that the accumulation is by propagating the weight loadings upslope along the reverse of the flow directions to accumulate the quantity of loading downslope from each grid cell.

`Maximum Downslope Grid` [raster] The grid giving the maximum of the weight loading grid downslope from each grid cell.

Console usage

```
processing.runalg('taudem:dinfinityreverseaccumulation', -ang, -wg, -racc, -dmax)
```

See also

D-Infinity Transport Limited Accumulation - 2

Description

This function is designed to calculate the transport and deposition of a substance (e.g. sediment) that may be limited by both supply and the capacity of the flow field to transport it. This function accumulates substance flux (e.g. sediment transport) subject to the rule that transport out of any grid cell is the minimum between supply and transport capacity, `Tcap`. The total supply at a grid cell is calculated as the sum of the transport in from upslope grid cells, `Tin`, plus the local supply contribution, `E` (e.g. erosion). This function also outputs deposition, `D`, calculated as total supply minus actual transport.

Here `E` is the supply. `Tout` at each grid cell becomes `Tin` for downslope grid cells and is reported as Transport limited accumulation (`tla`). `D` is deposition (`tdep`). The function provides the option to evaluate concentration of a compound (contaminant) adhered to the transported substance. This is evaluated as follows:

Where `Lin` is the total incoming compound loading and `Cin` and `Tin` refer to the Concentration and Transport entering from each upslope grid cell.

If

else

where `Cs` is the concentration supplied locally and the difference in the second term on the right represents the additional supply from the local grid cell. Then,

`Cout` at each grid cell comprises is the concentration grid output from this function.

If the outlets shapefile is used the tool only evaluates that part of the domain that contributes flow to the locations given by the shapefile.

Transport limited accumulation is useful for modeling erosion and sediment delivery, including the spatial dependence of sediment delivery ratio and contaminant that adheres to sediment.

Parameters

`D-Infinity Flow Direction Grid` [raster] A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

`Supply Grid` [raster] A grid giving the supply (loading) of material to a transport limited accumulation function. In the application to erosion, this grid would give the erosion detachment, or sediment supplied at each grid cell.

`Transport Capacity Grid` [raster] A grid giving the transport capacity at each grid cell for the transport limited accumulation function. In the application to erosion this grid would give the transport capacity of the carrying flow.

`Input Concentration Grid` [raster] A grid giving the concentration of a compound of interest in the supply to the transport limited accumulation function. In the application to erosion, this grid would give the concentration of say phosphorous adhered to the eroded sediment.

`Outlets Shapefile` [vector: point] Optional.

This optional input is a point shapefile defining outlets of interest. If this file is used, the tool will only evaluate the area upslope of these outlets.

`Check for edge contamination` [boolean] This option determines whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being considered when determining the result.

Default: *True*

Outputs

`Transport Limited Accumulation Grid` [raster] This grid is the weighted accumulation of supply accumulated respecting the limitations in transport capacity and reports the transport rate calculated by accumulating the substance flux subject to the rule that the transport out of any grid cell is the minimum of the total supply (local supply plus transport in) to that grid cell and the transport capacity.

`Deposition Grid` [raster] A grid giving the deposition resulting from the transport limited accumulation. This is the residual from the transport in to each grid cell minus the transport capacity out of the grid cell. The deposition grid is calculated as the transport in + the local supply - the tranport out.

`Output Concentration Grid` [raster] If an input concentation in supply grid is given, then this grid is also output and gives the concentration of a compound (contaminant) adhered or bound to the transported substance (e.g. sediment) is calculated.

Console usage

```
processing.runalg('taudem:dinfinitytransportlimitedaccumulation2', dinf_flow_dir_grid, supply_gri
```

See also

D-Infinity Transport Limited Accumulation

Description

This function is designed to calculate the transport and deposition of a substance (e.g. sediment) that may be limited by both supply and the capacity of the flow field to transport it. This function accumulates substance flux (e.g. sediment transport) subject to the rule that transport out of any grid cell is the minimum between supply and transport capacity, `Tcap`. The total supply at a grid cell is calculated as the sum of the transport in from upslope grid cells, `Tin`, plus the local supply contribution, `E` (e.g. erosion). This function also outputs deposition, `D`, calculated as total supply minus actual transport.

Here `E` is the supply. `Tout` at each grid cell becomes `Tin` for downslope grid cells and is reported as Transport limited accumulation (`tla`). `D` is deposition (`tdep`). The function provides the option to evaluate concentration of a compound (contaminant) adhered to the transported substance. This is evaluated as follows:

Where `Lin` is the total incoming compound loading and `Cin` and `Tin` refer to the Concentration and Transport entering from each upslope grid cell.

If

else

where `Cs` is the concentration supplied locally and the difference in the second term on the right represents the additional supply from the local grid cell. Then,

`Cout` at each grid cell comprises is the concentration grid output from this function.

If the outlets shapefile is used the tool only evaluates that part of the domain that contributes flow to the locations given by the shapefile.

Transport limited accumulation is useful for modeling erosion and sediment delivery, including the spatial dependence of sediment delivery ratio and contaminant that adheres to sediment.

Parameters

`D-Infinity Flow Direction Grid` **[raster]** A grid giving flow direction by the D-infinity method. Flow direction is measured in radians, counter clockwise from east. This can be created by the tool **"D-Infinity Flow Directions"**.

`Supply Grid` **[raster]** A grid giving the supply (loading) of material to a transport limited accumulation function. In the application to erosion, this grid would give the erosion detachment, or sediment supplied at each grid cell.

`Transport Capacity Grid` **[raster]** A grid giving the transport capacity at each grid cell for the transport limited accumulation function. In the application to erosion this grid woul give the transport capacity of the carrying flow.

`Outlets Shapefile` **[vector: point]** Optional.

This optional input is a point shapefile defining outlets of interest. If this file is used, the tool will only evaluate the area upslope of these outlets.

`Check for edge contamination` **[boolean]** This option determines whether the tool should check for edge contamination. Edge contamination is defined as the possibility that a value may be underestimated due to grid cells outside of the domain not being considered when determining the result.

Default: *True*

Outputs

Transport Limited Accumulation Grid [raster] This grid is the weighted accumulation of supply accumulated respecting the limitations in transport capacity and reports the transport rate calculated by accumulating the substance flux subject to the rule that the transport out of any grid cell is the minimum of the total supply (local supply plus transport in) to that grid cell and the transport capacity.

Deposition Grid [raster] A grid giving the deposition resulting from the transport limited accumulation. This is the residual from the transport in to each grid cell minus the transport capacity out of the grid cell. The deposition grid is calculated as the transport in + the local supply - the tranport out.

Console usage

```
processing.runalg('taudem:dinfinitytransportlimitedaccumulation', dinf_flow_dir_grid, supply_grid,
```

See also

D-Infinity Upslope Dependence

Description

The D-Infinity Upslope Dependence tool quantifies the amount each grid cell in the domain contributes to a destination set of grid cells. D-Infinity flow directions proportion flow from each grid cell between multiple downslope grid cells. Following this flow field downslope the amount of flow originating at each grid cell that reaches the destination zone is defined. Upslope influence is evaluated using a downslope recursion, examining grid cells downslope from each grid cell, so that the map produced identifies the area upslope where flow through the destination zone originates, or the area it depends on, for its flow.

The figures below illustrate the amount each source point in the domain `x` (blue) contributes to the destination point or zone `y` (red). If the indicator weighted contributing area function is denoted `I(y; x)` giving the weighted contribution using a unit value (1) from specific grid cells `y` to grid cells `x`, then the upslope dependence is: `D(x; y) = I(y; x)`.

This is useful for example to track where flow or a flow related substance or contaminant that enters a destination area may come from.

Parameters

D-Infinity Flow Direction Grid [raster] A grid giving flow direction by the D-Infinity method where the flow direction angle is determined as the direction of the steepest downward slope on the eight triangular facets formed in a 3x3 grid cell window centered on the grid cell of interest. This grid can be produced using the **"D-Infinity Flow Direction"** tool.

Destination Grid [raster] A grid that encodes the destination zone that may receive flow from upslope. This grid must be 1 inside the zone y and 0 over the rest of the domain.

Outputs

`Output Upslope Dependence Grid` [raster] A grid quantifing the amount each source point in the domain contributes to the zone defined by the destination grid.

Console usage

```
processing.runalg('taudem:dinfinityupslopedependence', -ang, -dg, -dep)
```

See also

Slope Average Down

Description

This tool computes slope in a D8 downslope direction averaged over a user selected distance. Distance should be specified in horizontal map units.

Parameters

`D8 Flow Direction Grid` [raster] This input is a grid of flow directions that are encoded using the D8 method where all flow from a cells goes to a single neighboring cell in the direction of steepest descent.This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Pit Filled Elevation Grid` [raster] This input is a grid of elevation values. As a general rule, it is recommended that you use a grid of elevation values that have had the pits removed for this input. Pits are generally taken to be artifacts that interfere with the analysis of flow across them. This grid can be obtained as the output of the **"Pit Remove"** tool, in which case it contains elevation values where the pits have been filled to the point where they just drain.

`Downslope Distance` [number] Input parameter of downslope distance over which to calculate the slope (in horizontal map units).

Default: *50*

Outputs

`Slope Average Down Grid` [raster] This output is a grid of slopes calculated in the D8 downslope direction, averaged over the selected distance.

Console usage

```
processing.runalg('taudem:slopeaveragedown', -p, -fel, -dn, -slpd)
```

See also

Slope Over Area Ratio

Description

Calculates the ratio of the slope to the specific catchment area (contributing area). This is algebraically related to the more common ln(a/tan beta) wetness index, but contributing area is in the denominator to avoid divide by 0 errors when slope is 0.

Parameters

`Slope Grid` [raster] A grid of slope. This grid can be generated using ether the **"D8 Flow Directions"** tool or the **"D-Infinity Flow Directions"** tool.

`Specific Catchment Area Grid` [raster] A grid giving the contributing area value for each cell taken as its own contribution plus the contribution from upslope neighbors that drain in to it. Contributing area is counted in terms of the number of grid cells (or summation of weights). This grid can be generated using either the **"D8 Contributing Area"** tool or the **"D-Infinity Contributing Area"** tool.

Outputs

`Slope Divided By Area Ratio Grid` [raster] A grid of the ratio of slope to specific catchment area (contributing area). This is algebraically related to the more common `ln(a/tan beta)` wetness index, but contributing area is in the denominator to avoid divide by 0 errors when slope is 0.

Console usage

```
processing.runalg('taudem:slopeoverarearatio', -slp, -sca, -sar)
```

See also

.

18.8.3 Stream Network Analysis

D8 Extreme Upslope Value

Description

Evaluates the extreme (either maximum or minimum) upslope value from an input grid based on the D8 flow model. This is intended initially for use in stream raster generation to identify a threshold of the slope times area product that results in an optimum (according to drop analysis) stream network.

If the optional outlet point shapefile is used, only the outlet cells and the cells upslope (by the D8 flow model) of them are in the domain to be evaluated.

By default, the tool checks for edge contamination. This is defined as the possibility that a result may be underestimated due to grid cells outside of the domain not being counted. This occurs when drainage is inwards from the boundaries or areas with "no data" values for elevation. The algorithm recognizes this and reports "no data" for the result for these grid cells. It is common to see streaks of "no data" values extending inwards from boundaries along flow paths that enter the domain at a boundary. This is the desired effect and indicates that the result for these grid cells is unknown due to it being dependent on terrain outside of the domain of data available. Edge contamination checking may be turned off in cases where you know this is not an issue or want to ignore these problems, if for example, the DEM has been clipped along a watershed outline.

Parameters

`D8 Flow Directions Grid` [raster] A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Upslope Values Grid` [raster] This is the grid of values of which the maximum or minimum upslope value is selected. The values most commonly used are the slope times area product needed when generating stream rasters according to drop analysis.

`Outlets Shapefile` [vector: point] Optional.

A point shape file defining outlets of interest. If this input file is used, only the area upslope of these outlets will be evaluated by the tool.

`Check for edge contamination` [boolean] A flag that indicates whether the tool should check for edge contamination.

Default: *True*

`Use max upslope value` [boolean] A flag to indicate whether the maximum or minimum upslope value is to be calculated.

Default: *True*

Outputs

`Extereme Upslope Values Grid` [raster] A grid of the maximum/minimum upslope values.

Console usage

```
processing.runalg('taudem:d8extremeupslopevalue', -p, -sa, -o, -nc, -min, -ssa)
```

See also

Length Area Stream Source

Description

Creates an indicator grid (1, 0) that evaluates `A >= (M)(Ly)` based on upslope path length, D8 contributing area grid inputs, and parameters `M` and `y`. This grid indicates likely stream source grid cells. This is an experimental method with theoretical basis in Hack's law which states that for streams `L ~ A 0.6`. However for hillslopes with parallel flow `L ~ A`. So a transition from hillslopes to streams may be represented by `L ~ A 0.8` suggesting identifying grid cells as stream cells if `A > M (L (1/0.8))`.

Parameters

`Length Grid` [raster] A grid of the maximum upslope length for each cell. This is calculated as the length of the flow path from the furthest cell that drains to each cell. Length is measured between cell centers taking into account cell size and whether the direction is adjacent or diagonal. It is this length (`L`) that is used in the formula, `A >(M)(Ly)`, to determine which cells are considered stream cells. This grid can be obtained as an output from the **"Grid Network"** tool.

`Contributing Area Grid` **[raster]** A grid of contributing area values for each cell that were calculated using the D8 algorithm. The contributing area for a cell is the sum of its own contribution plus the contribution from all upslope neighbors that drain to it, measured as a number of cells. This grid is typically obtained as the output of the **"D8 Contributing Area"** tool. In this tool, it is the contributing area (`A`) that is compared in the formula `A > (M)(Ly)` to determine the transition to a stream.

`Threshold` **[number]** The multiplier threshold (`M`) parameter which is used in the formula: `A > (M)(Ly)`, to identify the beginning of streams.

Default: *0.03*

`Exponent` **[number]** The exponent (`y`) parameter which is used in the formula: `A > (M)(Ly)`, to identify the beginning of streams. In branching systems, Hack's law uggests that `L = 1/M A(1/y)` with `1/y = 0.6` (or 0.56) (`y` about 1.7). In parallel flow systems `L` is proportional to `A` (`y` about 1). This method tries to identify the transition between these two paradigms by using an exponent `y` somewhere in between (`y` about 1.3).

Default: *1.3*

Outputs

`Stream Source Grid` **[raster]** An indicator grid (1,0) that evaluates A >= (M)(L^y), based on the maximum upslope path length, the D8 contributing area grid inputs, and parameters `M` and `y`. This grid indicates likely stream source grid cells.

Console usage

```
processing.runalg('taudem:lengthareastreamsource', length_grid, contrib_area_grid, threshold, expo
```

See also

Move Outlets To Streams

Description

Moves outlet points that are not aligned with a stream cell from a stream raster grid, downslope along the D8 flow direction until a stream raster cell is encountered, the "max_dist" number of grid cells are examined, or the flow path exits the domain (i.e. a "no data" value is encountered for the D8 flow direction). The output file is a new outlets shapefile where each point has been moved to coincide with the stream raster grid, if possible. A field "dist_moved" is added to the new outlets shapefile to indicate the changes made to each point. Points that are already on a stream cell are not moved and their "dist_moved" field is assigned a value 0. Points that are initially not on a stream cell are moved by sliding them downslope along the D8 flow direction until one of the following occurs: a) A stream raster grid cell is encountered before traversing the "max_dist" number of grid cells. In which case, the point is moved and the "dist_moved" field is assigned a value indicating how many grid cells the point was moved. b) More than the "max_number" of grid cells are traversed, or c) the traversal ends up going out of the domain (i.e., a "no data" D8 flow direction value is encountered). In which case, the point is not moved and the "dist_moved" field is assigned a value of -1.

Parameters

`D8 Flow Direction Grid` **[raster]** A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Stream Raster Grid` [raster] This output is an indicator grid (1, 0) that indicates the location of streams, with a value of 1 for each of the stream cells and 0 for the remainder of the cells. This file is produced by several different tools in the **"Stream Network Analysis"** toolset.

`Outlets Shapefile` [vector: point] A point shape file defining points of interest or outlets that should ideally be located on a stream, but may not be exactly on the stream due to the fact that the shapefile point locations may not have been accurately registered with respect to the stream raster grid.

`Maximum Number of Grid Cells to traverse` [number] This input paramater is the maximum number of grid cells that the points in the input outlet shapefile will be moved before they are saved to the output outlet shapefile.

Default: *50*

Outputs

`Output Outlet Shapefile` [vector] A point shape file defining points of interest or outlets. This file has one point in it for each point in the input outlet shapefile. If the original point was located on a stream, then the point was not moved. If the origianl point was not on a stream, the point was moved downslope according to the D8 flow direction until it reached a stream or the maximum distance had been reached. This file has an additional field "dist_moved" added to it which is the number of cells that the point was moved. This field is 0 if the cell was originally on a stream, -1 if it was not moved becuase there was not a stream within the maximum distance, or some positive value if it was moved.

Console usage

```
processing.runalg('taudem:moveoutletstostreams', -p, -src, -o, -md, -om)
```

See also

Peuker Douglas

Description

Creates an indicator grid (1, 0) of upward curved grid cells according to the Peuker and Douglas algorithm.

With this tool, the DEM is first smoothed by a kernel with weights at the center, sides, and diagonals. The Peuker and Douglas (1975) method (also explained in Band, 1986), is then used to identify upwardly curving grid cells. This technique flags the entire grid, then examines in a single pass each quadrant of 4 grid cells, and unflags the highest. The remaining flagged cells are deemed "upwardly curved", and when viewed, resemble a channel network. This proto-channel network generally lacks connectivity and requires thinning, issues that were discussed in detail by Band (1986).

Parameters

`Elevation Grid` [raster] A grid of elevation values. This is usually the output of the **"Pit Remove"** tool, in which case it is elevations with pits removed.

`Center Smoothing Weight` [number] The center weight parameter used by a kernel to smooth the DEM before the tool identifies upwardly curved grid cells.

Default: *0.4*

`Side Smoothing Weight` [number] The side weight parameter used by a kernel to smooth the DEM before the tool identifies upwardly curved grid cells.

Default: *0.1*

Diagonal Smoothing Weight [number] The diagonal weight parameter used by a kernel to smooth the DEM before the tool identifies upwardly curved grid cells.

Default: *0.05*

Outputs

Stream Source Grid [raster] An indicator grid (1, 0) of upward curved grid cells according to the Peuker and Douglas algorithm, and if viewed, resembles a channel network. This proto-channel network generally lacks connectivity and requires thinning, issues that were discussed in detail by Band (1986).

Console usage

```
processing.runalg('taudem:peukerdouglas', elevation_grid, center_weight, side_weight, diagonal_we
```

See also

- Band, L. E., (1986), "Topographic partition of watersheds with digital elevation models", Water Resources Research, 22(1): 15-24.
- Peuker, T. K. and D. H. Douglas, (1975), "Detection of surface-specific points by local parallel processing of discrete terrain elevation data", Comput. Graphics Image Process., 4: 375-387.

Slope Area Combination

Description

Creates a grid of slope-area values = `(Sm) (An)` based on slope and specific catchment area grid inputs, and parameters `m` and `n`. This tool is intended for use as part of the slope-area stream raster delineation method.

Parameters

Slope Grid [raster] This input is a grid of slope values. This grid can be obtained from the **"D-Infinity Flow Directions"** tool.

Contributing Area Grid [raster] A grid giving the specific catchment area for each cell taken as its own contribution (grid cell length or summation of weights) plus the proportional contribution from upslope neighbors that drain in to it. This grid is typically obtained from the **"D-Infinity Contributing Area"** tool.

Slope Exponent [number] The slope exponent (`m`) parameter which will be used in the formula: `(Sm) (An)`, that is used to create the slope-area grid.

Default: *2*

Area Exponent [number] The area exponent (`n`) parameter which will be used in the formula: `(Sm) (An)`, that is used to create the slope-area grid.

Default: *1*

Outputs

Slope Area Grid [raster] A grid of slope-area values = `(Sm) (An)` calculated from the slope grid, specific catchment area grid, `m` slope exponent parameter, and `n` area exponent parameter.

Console usage

```
processing.runalg('taudem:slopeareacombination', slope_grid, area_grid, slope_exponent, area_expo
```

See also

Stream Definition By Threshold

Description

Operates on any grid and outputs an indicator (1, 0) grid identifing cells with input values >= the threshold value. The standard use is to use an accumulated source area grid to as the input grid to generate a stream raster grid as the output. If you use the optional input mask grid, it limits the domain being evaluated to cells with mask values >= 0. When you use a D-infinity contributing area grid (`*sca`) as the mask grid, it functions as an edge contamination mask. The threshold logic is:

```
src = ((ssa >= thresh) & (mask >= s0)) ? 1:0
```

Parameters

`Accumulated Stream Source Grid` [raster] This grid nominally accumulates some characteristic or combination of characteristics of the watershed. The exact characteristic(s) varies depending on the stream network raster algorithm being used. This grid needs to have the property that grid cell values are monotonically increasing downslope along D8 flow directions, so that the resulting stream network is continuous. While this grid is often from an accumulation, other sources such as a maximum upslope function will also produce a suitable grid.

`Threshold` [number] This parameter is compared to the value in the Accumulated Stream Source grid (`*ssa`) to determine if the cell should be considered a stream cell. Streams are identified as grid cells for which ssa value is >= this threshold.

Default: *100*

`Mask Grid` [raster] Optional.

This optional input is a grid that is used to mask the domain of interest and output is only provided where this grid is >= 0. A common use of this input is to use a D-Infinity contributing area grid as the mask so that the delineated stream network is constrained to areas where D-infinity contributing area is available, replicating the functionality of an edge contamination mask.

Outputs

`Stream Raster Grid` [raster] This is an indicator grid (1, 0) that indicates the location of streams, with a value of 1 for each of the stream cells and 0 for the remainder of the cells.

Console usage

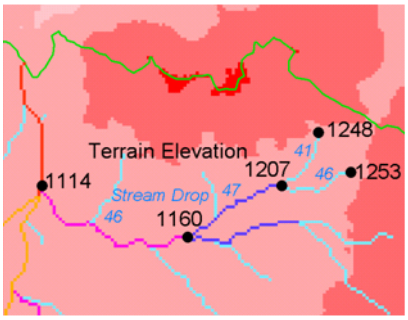
```
processing.runalg('taudem:streamdefinitionbythreshold', -ssa, -thresh, -mask, -src)
```

See also

Stream Drop Analysis

Description

Applies a series of thresholds (determined from the input parameters) to the input accumulated stream source grid (*ssa) grid and outputs the results in the *drp.txt file the stream drop statistics table. This function is designed to aid in the determination of a geomorphologically objective threshold to be used to delineate streams. Drop Analysis attempts to select the right threshold automatically by evaluating a stream network for a range of thresholds and examining the constant drop property of the resulting Strahler streams. Basically it asks the question: Is the mean stream drop for first order streams statistically different from the mean stream drop for higher order streams, using a T-test. Stream drop is the difference in elevation from the beginning to the end of a stream defined as the sequence of links of the same stream order. If the T-test shows a significant difference then the stream network does not obey this "law" so a larger threshold needs to be chosen. The smallest threshold for which the T-test does not show a significant difference gives the highest resolution stream network that obeys the constant stream drop "law" from geomorphology, and is the threshold chosen for the "objective" or automatic mapping of streams from the DEM. This function can be used in the development of stream network rasters, where the exact watershed characteristic(s) that were accumulated in the accumulated stream source grid vary based on the method being used to determine the stream network raster.



The constant stream drop "law" was identified by Broscoe (1959). For the science behind using this to determine a stream delineation threshold, see Tarboton et al. (1991, 1992), Tarboton and Ames (2001).

Parameters

`D8 Contributing Area Grid` [raster] A grid of contributing area values for each cell that were calculated using the D8 algorithm. The contributing area for a cell is the sum of its own contribution plus the contribution from all upslope neighbors that drain to it, measured as a number of cells or the sum of weight loadings. This grid can be obtained as the output of the **"D8 Contributing Area"** tool. This grid is used in the evaluation of drainage density reported in the stream drop table.

`D8 Flow Direction Grid` [raster] A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`Pit Filled Elevation Grid` [raster] A grid of elevation values. This is usually the output of the **"Pit Remove"** tool, in which case it is elevations with pits removed.

`Accumulated Stream Source Grid` [raster] This grid must be monotonically increasing along the downslope D8 flow directions. It it compared to a series of thresholds to determine the beginning of the streams. It is often generated by accumulating some characteristic or combination of characteristics of the watershed with the **"D8 Contributing Area"** tool, or using the maximum option of the **"D8 Flow Path Extreme"** tool. The exact method varies depending on the algorithm being used.

`Outlets Shapefile` [vector: point] A point shapefile defining the outlets upstream of which drop analysis is performed.

`Minimum Threshold` [number] This parameter is the lowest end of the range searched for possible threshold values using drop analysis. This technique looks for the smallest threshold in the range where the absolute value of the t-statistic is less than 2. For the science behind the drop analysis see Tarboton et al. (1991, 1992), Tarboton and Ames (2001).

Default: *5*

`Maximum Threshold` [number] This parameter is the highest end of the range searched for possible threshold values using drop analysis. This technique looks for the smallest threshold in the range where the absolute value of the t-statistic is less than 2. For the science behind the drop analysis see Tarboton et al. (1991, 1992), Tarboton and Ames (2001).

Default: *500*

`Number of Threshold Values` [number] The parameter is the number of steps to divide the search range into when looking for possible threshold values using drop analysis. This technique looks for the smallest threshold in the range where the absolute value of the t-statistic is less than 2. For the science behind the drop analysis see Tarboton et al. (1991, 1992), Tarboton and Ames (2001).

Default: *10*

`Spacing for Threshold Values` [selection] This parameter indicates whether logarithmic or linear spacing should be used when looking for possible threshold values using drop ananlysis.

Options:

- 0 — Logarithmic
- 1 — Linear

Default: *0*

Outputs

`D-Infinity Drop to Stream Grid` [file] This is a comma delimited text file with the following header line:

:: Threshold,DrainDen,NoFirstOrd,NoHighOrd,MeanDFirstOrd,MeanDHighOrd,StdDevFirstOrd,StdDevHighOrd,T

The file then contains one line of data for each threshold value examined, and then a summary line that indicates the optimum threshold value. This technique looks for the smallest threshold in the range where the absolute value of the t-statistic is less than 2. For the science behind the drop analysis, see Tarboton et al. (1991, 1992), Tarboton and Ames (2001).

Console usage

```
processing.runalg('taudem:streamdropanalysis', d8_contrib_area_grid, d8_flow_dir_grid, pit_filled_
```

See also

- Broscoe, A. J., (1959), "Quantitative analysis of longitudinal stream profiles of small watersheds", Office of Naval Research, Project NR 389-042, Technical Report No. 18, Department of Geology, Columbia University, New York.
- Tarboton, D. G., R. L. Bras and I. Rodriguez-Iturbe, (1991), "On the Extraction of Channel Networks from Digital Elevation Data", Hydrologic Processes, 5(1): 81-100.
- Tarboton, D. G., R. L. Bras and I. Rodriguez-Iturbe, (1992), "A Physical Basis for Drainage Density", Geomorphology, 5(1/2): 59-76.
- Tarboton, D. G. and D. P. Ames, (2001), "Advances in the mapping of flow networks from digital elevation data", World Water and Environmental Resources Congress, Orlando, Florida, May 20-24, ASCE, http://www.engineering.usu.edu/dtarb/asce2001.pdf.

Stream Reach and Watershed

Description

This tool produces a vector network and shapefile from the stream raster grid. The flow direction grid is used to connect flow paths along the stream raster. The Strahler order of each stream segment is computed. The sub-watershed draining to each stream segment (reach) is also delineated and labeled with the value identifier that corresponds to the WSNO (watershed number) attribute in the Stream Reach Shapefile.

This tool orders the stream network according to the Strahler ordering system. Streams that don't have any other streams draining in to them are order 1. When two stream reaches of different order join the order of the down-stream reach is the order of the highest incoming reach. When two reaches of equal order join the downstream reach order is increased by 1. When more than two reaches join the downstream reach order is calculated as the maximum of the highest incoming reach order or the second highest incoming reach order + 1. This generalizes the common definition to cases where more than two reaches join at a point. The network topological connectivity is stored in the Stream Network Tree file, and coordinates and attributes from each grid cell along the network are stored in the Network Coordinates file.

The stream raster grid is used as the source for the stream network, and the flow direction grid is used to trace connections within the stream network. Elevations and contributing area are used to determine the elevation and contributing area attributes in the network coordinate file. Points in the outlets shapefile are used to logically split stream reaches to facilitate representing watersheds upstream and downstream of monitoring points. The program uses the attribute field "id" in the outlets shapefile as identifiers in the Network Tree file. This tool then translates the text file vector network representation in the Network Tree and Coordinates files into a shapefile. Further attributes are also evaluated. The program has an option to delineate a single watershed by representing the entire area draining to the Stream Network as a single value in the output watershed grid.

Parameters

`Pit Filled Elevation Grid` **[raster]** A grid of elevation values. This is usually the output of the **"Pit Remove"** tool, in which case it is elevations with pits removed.

`D8 Flow Direction Grid` **[raster]** A grid of D8 flow directions which are defined, for each cell, as the direction of the one of its eight adjacent or diagonal neighbors with the steepest downward slope. This grid can be obtained as the output of the **"D8 Flow Directions"** tool.

`D8 Drainage Area` **[raster]** A grid giving the contributing area value in terms of the number of grid cells (or the summation of weights) for each cell taken as its own contribution plus the contribution from upslope neighbors that drain in to it using the D8 algorithm. This is usually the output of the **"D8 Contributing Area"** tool and is used to determine the contributing area attribute in the Network Coordinate file.

`Stream Raster Grid` **[raster]** An indicator grid indicating streams, by using a grid cell value of 1 on streams and 0 off streams. Several of the **"Stream Network Analysis"** tools produce this type of grid. The Stream Raster Grid is used as the source for the stream network.

`Outlets Shapefile as Network Nodes` **[vector: point]** Optional.

A point shape file defining points of interest. If this file is used, the tool will only deliiniate the stream network upstream of these outlets. Additionally, points in the Outlets Shapefile are used to logically split stream reaches to facilitate representing watersheds upstream and downstream of monitoring points. This tool REQUIRES THAT THERE BE an integer attribute field "id" in the Outlets Shapefile, because the "id" values are used as identifiers in the Network Tree file.

`Delineate Single Watershed` **[boolean]** This option causes the tool to delineate a single watershed by representing the entire area draining to the Stream Network as a single value in the output watershed grid. Otherwise a seperate watershed is delineated for each stream reach. Default is *False* (seperate watershed).

Default: *False*

Outputs

`Stream Order Grid` [raster] The Stream Order Grid has cells values of streams ordered according to the Strahler order system. The Strahler ordering system defines order 1 streams as stream reaches that don't have any other reaches draining in to them. When two stream reaches of different order join the order of the downstream reach is the order of the highest incoming reach. When two reaches of equal order join the downstream reach order is increased by 1. When more than two reaches join the downstream reach order is calculated as the maximum of the highest incoming reach order or the second highest incoming reach order + 1. This generalizes the common definition to cases where more than two flow paths reaches join at a point.

`Watershed Grid` [raster] This output grid identified each reach watershed with a unique ID number, or in the case where the delineate single watershed option was checked, the entire area draining to the stream network is identified with a single ID.

`Stream Reach Shapefile` [vector] This output is a polyline shapefile giving the links in a stream network. The columns in the attribute table are:

- LINKNO — Link Number. A unique number associated with each link (segment of channel between junctions). This is arbitrary and will vary depending on number of processes used
- DSLINKNO — Link Number of the downstream link. -1 indicates that this does not exist
- USLINKNO1 — Link Number of first upstream link. (-1 indicates no link upstream, i.e. for a source link)
- USLINKNO2 — Link Number of second upstream link. (-1 indicates no second link upstream, i.e. for a source link or an internal monitoring point where the reach is logically split but the network does not bifurcate)
- DSNODEID — Node identifier for node at downstream end of stream reach. This identifier corresponds to the "id" attribute from the Outlets shapefile used to designate nodes
- Order — Strahler Stream Order
- Length — Length of the link. The units are the horizontal map units of the underlying DEM grid
- Magnitude — Shreve Magnitude of the link. This is the total number of sources upstream
- DS_Cont_Ar — Drainage area at the downstream end of the link. Generally this is one grid cell upstream of the downstream end because the drainage area at the downstream end grid cell includes the area of the stream being joined
- Drop — Drop in elevation from the start to the end of the link
- Slope — Average slope of the link (computed as drop/length)
- Straight_L — Straight line distance from the start to the end of the link
- US_Cont_Ar — Drainage area at the upstream end of the link
- WSNO — Watershed number. Cross reference to the `*w.shp` and `*w` grid files giving the identification number of the watershed draining directly to the link
- DOUT_END — Distance to the eventual outlet (i.e. the most downstream point in the stream network) from the downstream end of the link
- DOUT_START — Distance to the eventual outlet from the upstream end of the link
- DOUT_MID — Distance to the eventual outlet from the midpoint of the link

`Network Connectivity Tree` [file] This output is a text file that details the network topological connectivity is stored in the Stream Network Tree file. Columns are as follows:

- Link Number (Arbitrary — will vary depending on number of processes used)
- Start Point Number in Network coordinates (`*coord.dat`) file (Indexed from 0)
- End Point Number in Network coordinates (`*coord.dat`) file (Indexed from 0)

- Next (Downstream) Link Number. Points to Link Number. -1 indicates no links downstream, i.e. a terminal link
- First Previous (Upstream) Link Number. Points to Link Number. -1 indicates no upstream links
- Second Previous (Upstream) Link Numbers. Points to Link Number. -1 indicates no upstream links. Where only one previous link is -1, it indicates an internal monitoring point where the reach is logically split, but the network does not bifurcate
- Strahler Order of Link
- Monitoring point identifier at downstream end of link. -1 indicates downstream end is not a monitoring point
- Network magnitude of the link, calculated as the number of upstream sources (following Shreve)

`Network Coordinates` [file] This output is a text file that contains the coordinates and attributes of points along the stream network. Columns are as follows:

- X coordinate
- Y Coordinate
- Distance along channels to the downstream end of a terminal link
- Elevation
- Contributing area

Console usage

```
processing.runalg('taudem:streamreachandwatershed', -fel, -p, -ad8, -src, -o, -sw, -ord, -w, -net,
```

See also

.

CAPÍTULO 19

Diseñadores de impresión

Con el diseñador de impresión se pueden crear buenos mapas y atlas que se pueden imprimir o guardar como archivo PDF, una imagen o un archivo SVG. Esta es una manera potente para compartir información geográfica producida con QGIS que se puede incluir en reportes o publicado.

El diseño de impresión ofrece crecientes capacidades de diseño e impresión. Se le permite añadir elementos a la vista del QGIS como, etiquetas de texto, imágenes, leyendas, barras de escala, formas básicas, flechas, tablas de atributos y marcos HTML. Puede cambiar el tamaño, grupo, alineación y posición de cada elemento y ajustar las propiedades para crear su diseño. El diseño se puede imprimir o exportar a formatos de imagen, PostScript, PDF o SVG (la exportación de SVG no funciona correctamente con algunas versiones recientes Qt4, debe intentarlo y comprobar de forma individual en el sistema). Puede guardar el diseño como una plantilla y cargarla de nuevo en otra sesión. Por último, la generación de varios mapas basados en una plantilla se puede hacer a través del generador de atlas. Ver una lista de herramientas en table_composer_1:

Icono	Propósito	Icono	Propósito
	Guardar Proyecto		Nuevo diseñador de impresión
	Duplicar diseñador de impresión		Administrador de diseñadores
	Cargar de plantilla		Guardar como plantilla
	Imprimir o exportar a PostScript		Exportar a un formato de imagen
	Exportar como SVG		Exportar como PDF
	Revertir el último cambio		Restaurar el último cambio
	Zum general		Zum a 100 %
	Acercar Zum		Alejar Zum
	Actualizar vista		
	Desplazar diseñador		Zum a una región específica
	Seleccionar/Mover elementos		Mover contenido dentro de un elemento
	Añadir nuevo mapa de QGIS a la vista del mapa		Añadir imagen a diseño de impresión
	Añadir etiqueta al diseño de impresión		Añadir nueva leyenda a diseño de impresión
	Añadir barra de escala a diseño de impresión		Añadir figura básica al diseño de impresión
	Añadir flecha		Añadir tabla de atributos
	Añadir un marco HTML		
	Agrupar elementos		Desagrupar elementos
	Bloquear elementos seleccionados		Desbloquear todos los elementos
	Subir los elementos seleccionados		Bajar elementos seleccionados
	Mover elementos seleccionados arriba		Mover elementos seleccionados abajo
	Alinear a la izquierda elementos seleccionados		Alinear a la derecha elementos seleccionados
	Alinear al centro elementos seleccionados		Alinear al centro vertical los elementos seleccionados
	Alinear arriba los elementos seleccionados		Alinear abajo los elementos seleccionados
	Vista previa del Atlas		Primer objeto espacial
	Anterior objeto espacial		Siguiente objeto espacial
	Último objeto espacial		Imprimir Atlas
	Exportar Atlas como imagen		Configuración de atlas

Tabla Diseñador 1: Herramientas del Diseñador de Impresión

Todas las herramientas del diseñador de impresión estan disponibles en los menús y como iconos en la barra de herramientas. La barra de herramientas se puede prender y apagar utilizando el botón derecho del ratón sobre la barra de herramientas.

19.1 Primeros pasos

19.1.1 Abrir una plantilla del diseñador de impresión

Antes de comenzar a trabajar con el Diseñador de impresión, debe cargar algunas capas ráster y vectoriales a la vista del del mapa de QGIS y adaptar sus propiedades para ajustar a su propia conveniencia. Después de todo lo que se representa y simboliza a su gusto, haga clic en el icono Nuevo diseño de impresión en la barra de herramientas o seleccione :menuselection:‘ Proyecto-> Nuevo diseñador de impresión‘. Se le pedirá que elija un título para la nuevo diseño.

19.1.2 Perspectiva general del Diseñador de impresión

Al abrir el Diseñador de impresión le proporciona un lienzo en blanco que representa la superficie del papel al usar la opción de impresión . Inicialmente se encuentra botones del lado izquierdo del lienzo para añadir elementos al mapa del diseño; el lienzo del mapa actual de QGIS, etiquetas de texto, imágenes, leyendas, barras de escala, formas básicas, flechas, tablas de atributos y marcos HTML. En esta barra de herramientas también se encuentran los botones de barra de herramientas para navegar, acercar zum sobre un área y desplazar la vista y los botones de la barra de herramientas para seleccionar un elemento del diseñador del mapa y mover el contenido del elemento del mapa.

Figure_composer_overview shows la vista inicial del Diseño de impresión se añade antes que cualquier otro elemento.

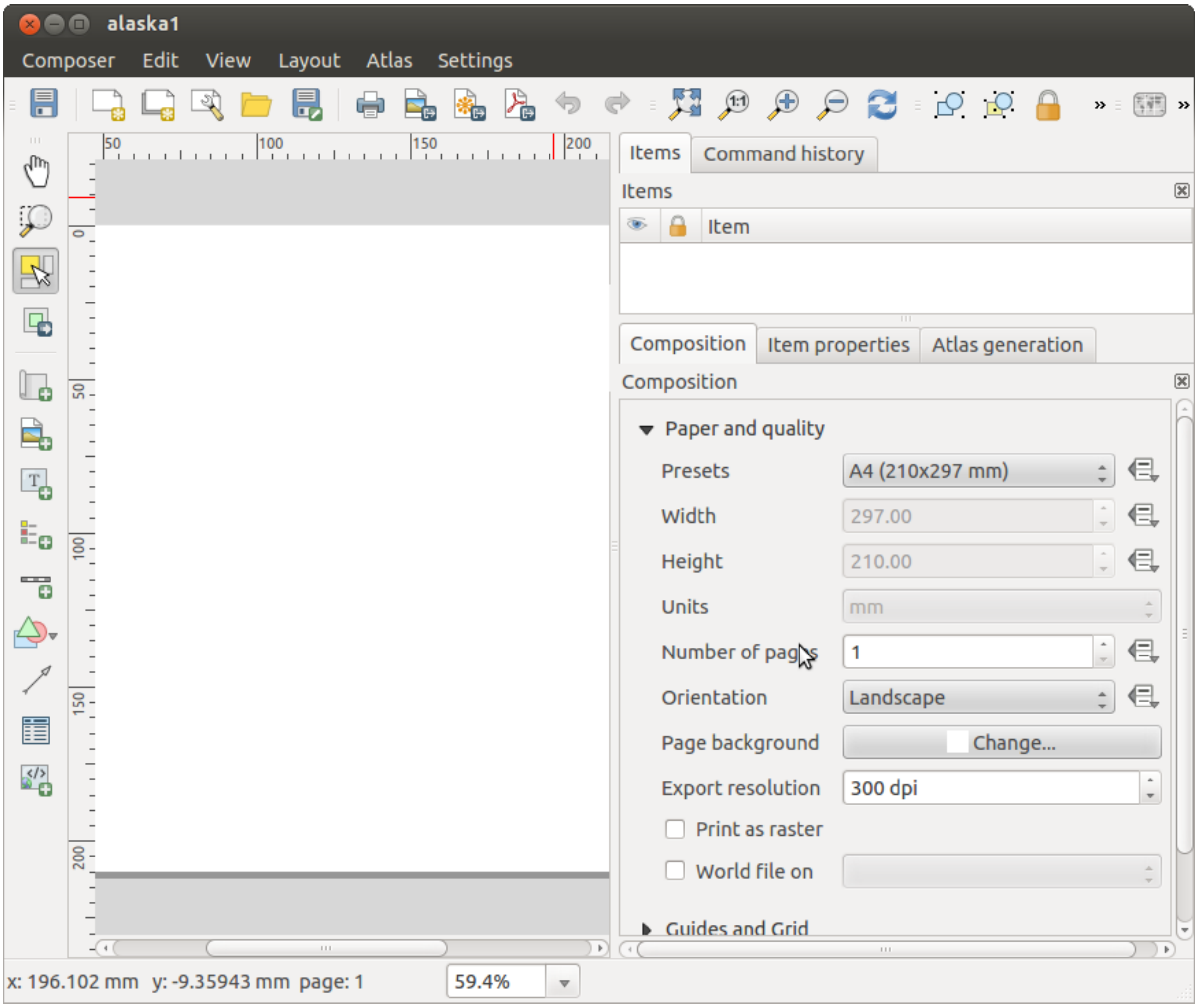


Figura 19.1: Diseñador de impresión

Del lado derecho del lienzo encontrará dos paneles. El panel superior tiene las pestañas *Elementos* e *Historia de la orden* y el panel inferior tiene las pestañas *Diseño*, *Propiedades del elemento* y *Generación de atlas*.

- La pestaña *Elementos* proporciona una lista de todos los elementos del diseño añadidos al lienzo.
- La pestaña *Historia de la orden* muestra una historia de todos los cambios aplicados al diseño. Con hacer un clic, es posible deshacer y rehacer pasos de ida y de vuelta a un cierto estatus
- La pestaña *Diseño* le permite establecer el tamaño del papel, orientación, fondo de la página, número de páginas y calidad de impresión para el archivo de salida en dpi. Además, también se puede activar la casilla *Imprimir como ráster*. Esto significa que todos los elementos serán convertidos a ráster antes de imprimirse o guardarse como PostScript o PDF. En esta pestaña, también puede personalizar la configuración de la cuadrícula o guías inteligentes.
- La pestaña *Propiedades del elemento* muestra las propiedades del elemento seleccionado. Haga clic en el icono Seleccionar/Mover elemento para mover un elemento (por ejemplo, la leyenda, la barra de escala o etiqueta) en el lienzo. Después haga clic en la pestaña *Propiedades del elemento* y personalice la configuración del elemento seleccionado.
- La pestaña *Generación de atlas* le permite habilitar la generación de un atlas del diseño actual y da acceso a sus parámetros.
- Por último, puede guardar su diseño de impresión con el botón Guardar proyecto.

En la parte inferior de la ventana del Diseñador de impresión, puede encontrar una barra de estado con la posición del ratón, número de página actual y una lista desplegable para establecer el nivel de zum.

Puede añadir múltiples elementos al diseño de impresión. También es posible tener más de una vista de mapa o leyenda o barra de escala en el lienzo, en una o varias páginas. Cada elemento tiene sus propias propiedades y, en caso del mapa, su extensión. Si quiere borrar algún elemento del lienzo, puede hacerlo con `Eliminar` o la tecla `Retroceso`.

Herramientas de navegación

Para navegar en el lienzo del diseño, el Diseñador de impresión proporciona algunas herramientas generales:

- Acercar zum
- Alejar zum
- Zum general
- Zum al 100 %
- Actualizar la vista (Si encuentra la vista en un estado inconsistente)
- Desplazar diseño
- Modo zum a la maqueta (zum a una región específica del diseñador)

Puede cambiar el nivel de zum también con la rueda del ratón o el cuadro combinado en la barra de estado. Si necesita cambiar a modo de panorama mientras se trabaja en el área del diseñador, puede mantener el `Barra espaciadora` o la rueda del ratón. Con `Ctrl+Barra espaciadora`, puede cambiar temporalmente al modo de zum marquesina, y con `Ctrl+Shift+Barra espaciadora`, para el modo alejar.

19.1.3 Ejemplo de sesión

Para demostrar cómo crear un mapa, por favor siga las siguientes instrucciones.

1. En el lado izquierdo, seleccione el botón de la barra de herramientas Añadir un nuevo mapa y dibuje un rectángulo en el lienzo manteniendo pulsado el botón izquierdo del ratón. Dentro del rectángulo dibujado la vista de mapa de QGIS al lienzo.
2. Seleccione el botón de la barra de herramientas Añadir nueva barra de escala y ubicar el elemento del mapa con el botón izquierdo del ratón en el lienzo del diseñador de impresión. Una barra de escala se añadirá al lienzo.
3. Seleccione el botón de la barra de herramientas Añadir nueva leyenda y dibuje un rectángulo en el lienzo manteniendo pulsado el botón izquierdo del ratón. Dentro del rectángulo dibujado se dibujará la leyenda.
4. Elija el icono Seleccionar/Mover elemento para seleccionar el mapa en el lienzo y moverlo un poco.
5. Mientras el elemento del mapa aun esta seleccionado, también se puede cambiar el tamaño del elemento mapa. Haga clic mientras mantiene pulsado el botón izquierdo del ratón, en un pequeño rectángulo blanco en una de las esquinas del elemento mapa y dibuje a una nueva ubicación para cambiar su tamaño.
6. Haga clic en la pestaña *Propiedades del elemento* en el panel inferior izquierdo y encuentre el ajuste para la orientación. Cambiar el valor del ajuste *Orientación del mapa* a '15.00|grados| '. Debe ver la orientación del elemento mapa que cambio.
7. Por último, puede guardar su diseño de impresión con el botón Guardar proyecto.

19.1.4 Opciones del diseñador de impresión

De *Configuración* → *Opciones del Diseñador* se pueden establecer algunas opciones que se utilizarán por defecto durante su trabajo.

- *Predeterminados de la Composición* le permite especificar la fuente predeterminada a utilizar.
- Con *Aspecto de la cuadrícula*, se puede establecer el estilo de la cuadrícula y el color.
- *Predeterminados de la cuadrícula* se define separación, desplazamiento y tolerancia de la cuadrícula. Hay tres tipos de cuadrícula: **Puntos**, **Sólido** y **Cruces**.
- *Predeterminados de las guías* se define la tolerancia de autoensamblado para las guías.

19.1.5 Pestaña de Diseño — Configuración general de diseño

En la pestaña *Diseño*, puede definir la configuración global de su diseño.

- Puede elegir uno de los *Preestablecidos* para su hoja de papel, o ingrese su *Anchura* y *Altura* personalizado.
- La composición ahora se puede dividir en varias páginas. Por ejemplo, una primer página puede mostrar una vista del mapa, y una segunda página puede mostrar la tabla de atributos asociada a la capa, mientras que una tercera página muestra un marco HTML enlazado a su página web de su organización. Establecer el *Número de páginas* al valor deseado. Puede elegir la página *Orientación* y su *Resolución de exportación*. Cuando se activa, *Imprimir como ráster* significa que todos los elementos serán rásterizados antes de imprimir o guardar como PostScript o PDF.
- *Cuadrícula* le permite personalizar la configuración de la cuadrícula como *Separación*, *Desplazamiento* y *Tolerancia* a sus necesidades.
- En *Autoensamblar a las alineaciones*, se puede cambiar la *Tolerancia*, que es la distancia máxima por debajo de la cual un elemento se ajustan a las guías inteligentes.

Ajustar a la cuadrícula y/o Guías inteligentes se pueden habilitar desde el menú *Ver*. En este menú, también se puede ocultar o mostrar la cuadrícula o guías inteligentes.

19.1.6 Opciones comunes en los elementos del diseñador

Los elementos del diseñador tienen un conjunto de propiedades comunes que se encontrará en la parte inferior de la pestaña *Propiedades del elemento*: Posición y tamaño, Rotación, Marco, Fondo, ID del elemento y Representación (Ver figure_composer_common_1).

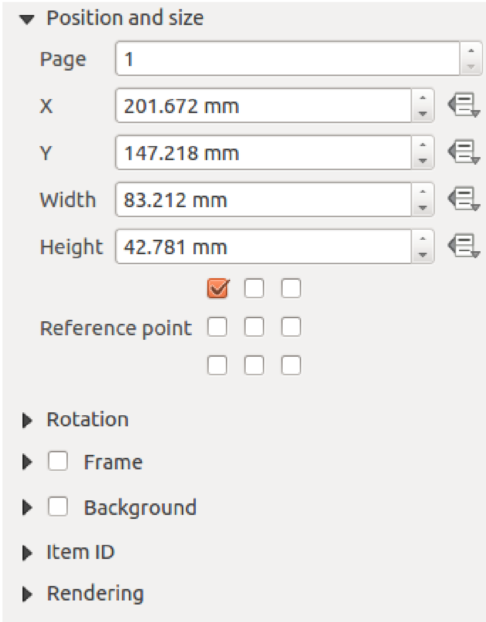


Figura 19.2: Diálogo de propiedades de elementos comunes

- El diálogo *Posición y tamaño* le permite definir tamaño y posición del marco que contiene los elementos. También puede optar por *Punto de referencia* para establecer las coordenadas **X** y **Y** previamente definidas.
- La *Rotación* establece la rotación del elemento (en grados).
- El *Marco* muestra u oculta el marco alrededor de la etiqueta. Haga clic en los botones **[Color]** y **[Delgadez]** para ajustar esas propiedades.
- El *Fondo* se activa o desactiva un color de fondo. Haga clic en el botón **[Color...]** para mostrar un diálogo donde puede escoger un color o elegir de una configuración personalizada. La transparencia también se puede ajustar hasta alcanzar el campo **Canal alfa**.
- Utilice el *ID del elemento* para crear una relación a otros elementos del Diseñador de impresión. Esto se utiliza con el servidor QGIS y algunos clientes web potenciales. Puede establecer un ID a un elemento (por ejemplo, un mapa y una etiqueta), y después el cliente web puede enviar datos para establecer una propiedad (por ejemplo, etiqueta de texto) para ese elemento especifico. El comando GetProjectSettings listará que elementos y que ID's están disponibles en un diseño.
- Modo *Representación* se puede seleccionar en el campo de opción. Ver Rendering_Mode.

Nota:

- Si checa *Utilice diálogo seleccionador de color* en las opciones generales de QGIS, el botón de color se actualizará tan pronto como elija un nuevo color desde la ventana **Diálogo de Color**. Si no, debe cerrar el **Diálogo de color**.
- El de a lado icono Anular datos definidos de campo significa que se puede asociar el campo con datos en el elemento del mapa o utilizar expresiones. Estos son particularmente útiles con la generación de atlas (vea atlas_data_defined_overrides)

19.2 Modo de representación

Ahora QGIS permite representación avanzada para elementos del Diseñador al igual que capas vectoriales y rásters.

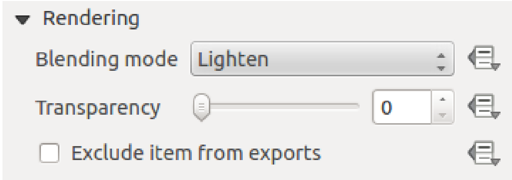


Figura 19.3: Modo de representación

- *Transparencia* : Puede hacer que el elemento subyacente en el diseñador visible con esta herramienta. Utilice el control deslizante para adaptar la visibilidad de su elemento a sus necesidades. También puede hacer una definición precisa del porcentaje de visibilidad en el menú al lado de la barra de desplazamiento.
- *Excluir elementos de las exportaciones*: Puede decidir hacer un elemento no visible en todas las exportaciones. Después de activar esta casilla, el elemento no se incluirá en PDF's, impresiones, etc.
- *Modo de mezcla*: Puede lograr efectos de representación especial con estas herramientas que antes solo se puede saber de programas de gráficos. Los píxeles de sus elementos sobrepuestos y subyacentes se mezclan a través de los ajustes descritos anteriormente.
  - Normal: Este es el modo de mezcla estándar, que utiliza el canal alfa del píxel superior para mezclarse con los pixeles debajo de el; los colores no se mezclan.
  - Iluminado: Este selecciona el máximo de cada componente del primer y segundo plano de píxeles. Tenga en cuenta que los resultados tienden a ser irregulares y rigurosos.
  - Pantalla: píxeles de luz de la fuente se pintan sobre el destino, mientras que los píxeles oscuros no lo son. Este modo es muy útil para la mezcla de la textura de una capa con otra (por ejemplo, puede utilizar un sombreado para texturizar otra capa).
  - Esquivar: aclarará y saturar píxeles subyacentes en base a la ligereza del punto de imagen superior. Así, los píxeles superiores más brillantes provocan la saturación y el brillo de los píxeles subyacentes a aumentar. Esto funciona mejor si los píxeles superiores no son demasiado brillantes; de lo contrario el efecto sera demasiado extremo.
  - Suma: Este modo de mezcla simplemente añade valores de píxeles de una capa con valores de píxeles de otra. En caso de que los valores superiores a 1 (como en el caso de RGB), mientras es mostrado. Este modo es adecuado para resaltar objetos.
  - Oscurecido: Este crea un píxel resultante que conserva el componente mas pequeño del primero y segundo plano de pixeles. Como el iluminado, los resultados tienden a ser irregulares y rigurosos.
  - Multiplicar: Aquí los números de cada píxel de la capa superior están multiplicados con los números del píxel correspondiente de la capa inferior. Los resultados son imágenes más oscuras.
  - Quemar: Los colores más oscuros en la capa superior hacen que las capas subyacentes para oscurecer. Quemar se pueden utilizar para ajustar y colorear las capas subyacentes.
  - Superposición: Este modo combina los modos de mescla multiplicar y pantalla. En la imagen resultante, partes de la luz se vuelven más ligeras y partes oscuras se oscurecen.
  - Luz suave: Esto es muy similar a superponer, pero en lugar de utilizar multiplicar/pantalla que utiliza el color quemar/esquivar. Este modo se supone que debe emular el brillo de una luz suave en una imagen.
  - Iluminar fuerte: Ilumina fuerte es muy similar a la del modo de superposición. Se supone que es emular a la proyección de una luz muy intensa en una imagen.

- Diferencia: Diferencia resta el píxel superior de la parte inferior de píxeles, o al revés, para obtener siempre un valor positivo. La mezcla con negro no produce ningún cambio, ya que la diferencia con todos los colores es cero.
- Restar: Este modo de mezcla simplemente resta valores de los píxeles de una capa con valores de píxel de otra. En caso de valores negativos, el negro se muestra.

19.3 Elementos de diseño

19.3.1 El elemento del mapa

Haga clic en el botón de la barra de herramientas Añadir nuevo mapa en la barra de herramientas del Diseñador de impresión para agregar una vista del mapa de QGIS. Ahora, arrastre un rectángulo sobre el lienzo del Diseñador con el botón izquierdo del ratón para añadir el mapa. Para mostrar el mapa actual, se puede elegir entre tres modos diferentes en el mapa, la pestaña *Propiedades del elemento*:

- **Rectángulo** es la configuración predeterminada. Solo muestra una caja vacía con un mensaje 'El mapa será impreso aquí'.
- **Cache** representa el mapa en la resolución de la pantalla actual. Si se acerca o aleja el zum en la ventana del Diseñado, el mapa no representara de nuevo pero la imagen será escalada.
- **Representar** quiere decir que si se acerca o aleja el zum en la ventana del Diseñador, el mapa será representado de nuevo, pero por razones de espacio sólo hasta una resolución máxima.

Cache es el modo de vista previa predeterminado para añadir los recientes mapas al Diseñador de impresión.

Puede cambiar el tamaño del elemento del mapa al hacer clic en el botón Seleccionar/Mover elemento, seleccione el elemento, y arrastre una de las asas de color azul en la esquina del mapa. Con el mapa seleccionado, ahora se puede ajustar más propiedades en el mapa, en la pestaña *Propiedades del elemento*.

Para desplazar capas dentro del elemento del mapa, seleccione el mapa, haga clic en el icono Mover contenido del elemento y mueva las capas dentro del marco del elemento mapa con el botón izquierdo del ratón. Después de encontrar el lugar apropiado para un elemento, puede bloquear la posición dentro del lienzo del Diseñador de impresión. Seleccione el elemento mapa y utilice la barra de herramientas Bloquear elementos seleccionados o la pestaña *Elementos*. Una vez seleccionado puede utilizar la pestaña *Elementos* para desbloquear elementos individuales. El icono Desbloquear todos los elementos desbloqueará todos los elementos del diseñador bloqueados.

Propiedades principales

El diálogo *Propiedades principales* del mapa, la pestaña *Propiedades del mapa* proporciona las siguientes funcionalidades (vea figure_composer_map_1)

- La zona **Vista preliminar** le permite definir los modos de vista previa 'Rectángulo', 'Caché', y 'Representar', como se describió antes. Si se cambia la vista en la vista del mapa QGIS al cambiar las propiedades del vector o ráster, puede actualizar la vista del Diseñador de impresión al seleccionar el elemento mapa en el Diseñador y al hacer clic en el botón **[Actualizar vista preliminar]**
- El campo *Escala* 1,00 establece una escala manual
- El campo *Rotación* 1,00 le permite rotar el contenido del elemento mapa hacia las manecillas del reloj en grados. Tenga en cuenta que una coordenada sólo se añade el valor predeterminado 0.
- *Dibujar elementos de la vista del mapa* le deja mostrar anotaciones que se pueden ubicar en la vista del mapa en la ventana principal de QGIS.
- Se puede elegir bloquear las capas mostradas en un elemento mapa. Activar *Bloquear capas para el elemento del mapa*. Después de que este activo, cualquier capa que se mustra u oculta en la ventana principal

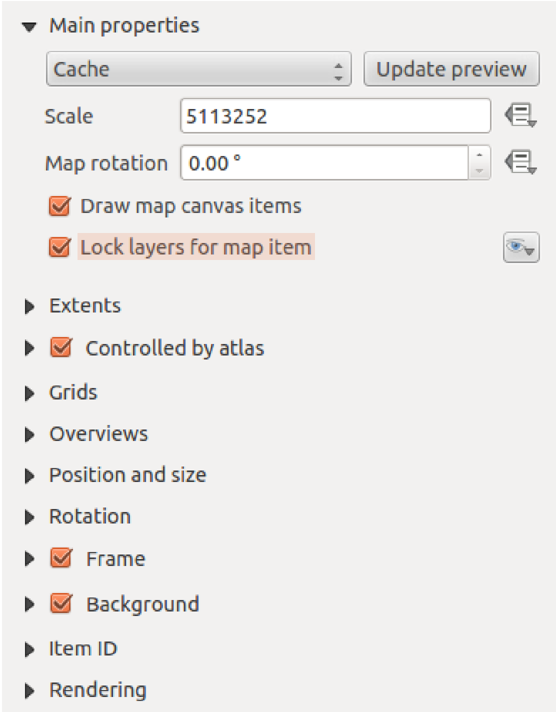


Figura 19.4: Pestaña de propiedades de elementos del mapa

de QGIS, no aparecerá o se ocultara en el elemento mapa del Diseñador. Pero el estilo y las etiquetas de una capa bloqueada todavía se actualizan de acuerdo a la interfaz principal de QGIS.

- El botón le permite añadir más rápido las vistas predeterminadas que ha preparado en QGIS. Al Hacer clic en el botón verá la lista de todas las vistas preestablecidas: sólo seleccione el preestablecido que se desea mostrar. La vista del mapa automáticamente bloqueará la capa preestablecida al activar *Bloquear las capas para el elemento del mapa*: si se desea deseleccionar el preestablecido, sólo desactive y presione el botón . Vea *Leyenda del mapa* para averiguar cómo crear vistas preestablecidas.

Extensión

El diálogo *Extensión* de la pestaña del elemento mapa proporciona las funcionalidades siguientes (ver figure_composer_map_2):

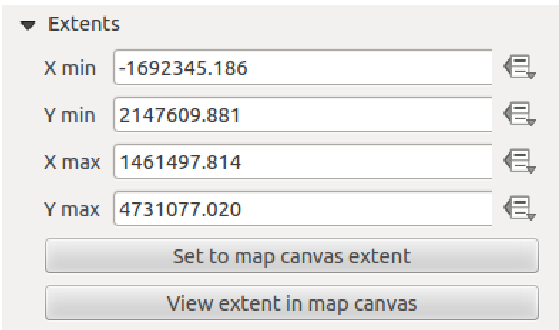


Figura 19.5: Diálogo de Extensión de Mapa

- La zona **Extensión del Mapa** le permite especificar la extensión del mapa utilizando los valores X y Y máximos y mínimos al hacer clic en el botón **[Establecer a la extensión de la vista del mapa]**. Este botón establece la extensión del elemento mapa del diseñador a la extensión de la vista del mapa actual en la aplicación principal QGIS. El botón **[Extender vista en la vista del mapa]** hace exactamente lo opuesto, actualiza la extensión de la vista del mapa en la aplicación QGIS a la extensión del elemento mapa del diseñador.

Si se cambia la vista en la vista del mapa QGIS al cambiar al cambiar las propiedades vectoriales o ráster. se puede actualizar la vista del Diseñador de impresión seleccionando el elemento mapa en el Diseñador y al hacer clic en el botón **[Actualizar vista preliminar]**en la pestaña del mapa *Propiedades del elemento* (ver figure_composer_map_1).

Cuadrículas

El diálogo *Cuadrículas* de la pestaña del mapa *Propiedades del elemento* provee la posibilidad de añadir varias cuadrículas para un elemento mapa.

- Con los botón de más y menos se puede añadir o eliminar una rejilla seleccionada
- Con el botón de arriba y abajo se puede mover una rejilla en la lista y establecer la prioridad del dibujo

Al hacer doble clic sobre la rejilla seleccionada se le puede dar otro nombre.

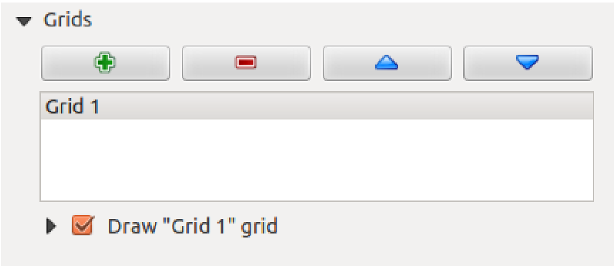


Figura 19.6: Diálogo de cuadrículas del mapa

Después de agregar una rejilla, se puede activar la casilla de verificación *Mostrar rejilla* para sobreponer una rejilla sobre el elemento del mapa. Ampliar esta opción proporciona muchas opciones de configuración, consulte Figure_composer_map_4.

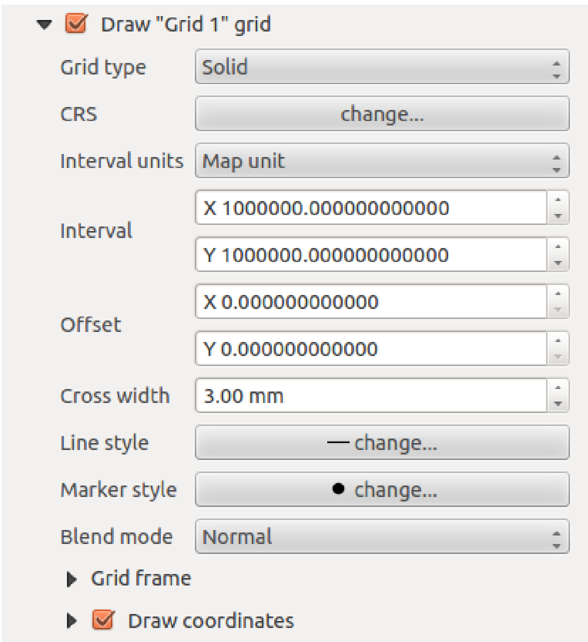


Figura 19.7: Diálogo para dibujar rejilla

Como tipo de rejilla, se puede especificar para utiliza línea sólida o cruz. La simbología de la cuadrícula se puede elegir. Consulte la sección Rendering_Mode. Además, se puede definir un intervalo en las direcciones X y Y, una X y Y compensados, y el ancho se utiliza para la cruz o linea de tipo rejilla.

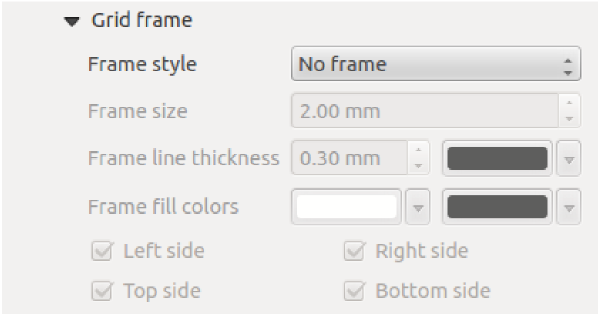


Figura 19.8: Diálogo de marco de rejilla

- Hay diferentes opciones para estilos del marco que sostiene el mapa. Las siguientes opciones están disponibles: Sin marco, Zebra, ticks interiores, ticks exteriores, Stick interior y exterior, línea de borde.
- Modo de representación avanzada también esta disponible para cuadriculas (consulte sección Rendering_mode).
- The *Draw coordinates* checkbox allows you to add coordinates to the map frame. The annotation can be drawn inside or outside the map frame. The annotation direction can be defined as horizontal, vertical, horizontal and vertical, or boundary direction, for each border individually. Units can be in meters or in degrees. Finally, you can define the grid color, the annotation font, the annotation distance from the map frame and the precision of the drawn coordinates.

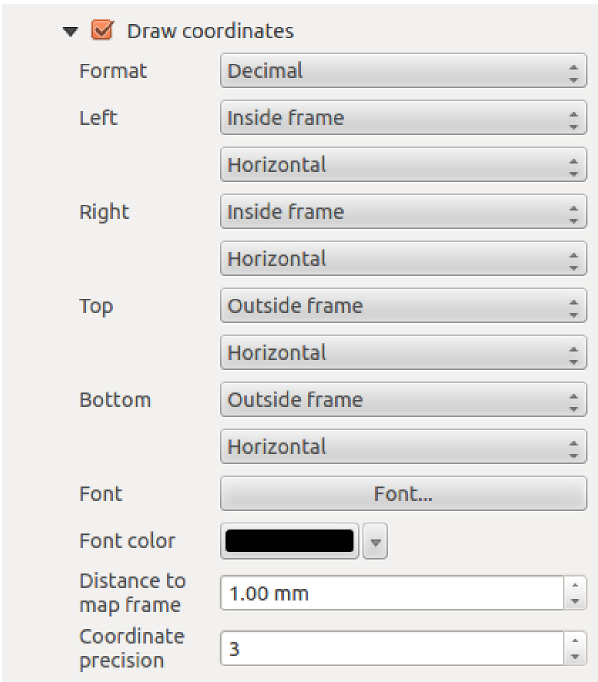


Figura 19.9: Diálogo Coordenadas para dibujo de rejilla

Vistas generales

The *Overviews* dialog of the map *Item Properties* tab provides the following functionalities:

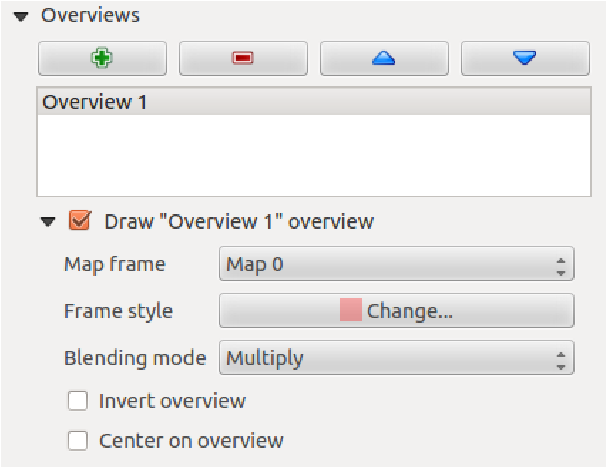


Figura 19.10: Diálogo de vista general del mapa

You can choose to create an overview map, which shows the extents of the other map(s) that are available in the composer. First you need to create the map(s) you want to include in the overview map. Next you create the map you want to use as the overview map, just like a normal map.

- Con el botón más y menos se puede añadir o borrar una vista general.
- Con el botón arriba y abajo se puede mover una vista general en el listado y establecer la prioridad del dibujo.

Open *Overviews* and press the green plus icon-button to add an overview. Initially this overview is named 'Overview 1' (see Figure_composer_map_7). You can change the name when you double-click on the overview item in the list named 'Overview 1' and change it to another name.

Cuando seleccione el elemento de vista general en la lista se puede personalizar.

- El *Dibujar"<name_overview>" vista general* necesita estar activado para dibujar la extensión del marco de mapa seleccionado.
- La lista desplegable *Marco de mapa* se puede utilizar para seleccionar el elemento mapa, cuya extensión será dibujada en el elemento de mapa presente.
- El *Estilo de marco* le permite cambiar el estilo de del marco de vista general.
- El *Modo de mezcla* le permite establecer diferentes modos de mezcla de transparencia. Consulte Rendering_Mode.
- The *Invert overview* creates a mask around the extents when activated: the referenced map extents are shown clearly, whereas everything else is blended with the frame color.
- The *Center on overview* puts the extent of the overview frame in the center of the overview map. You can only activate one overview item to center, when you have added several overviews.

19.3.2 El elemento etiqueta

To add a label, click the Add label icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the label *Item Properties* tab.

The *Item Properties* tab of a label item provides the following functionality for the label item (see Figure_composer_label):

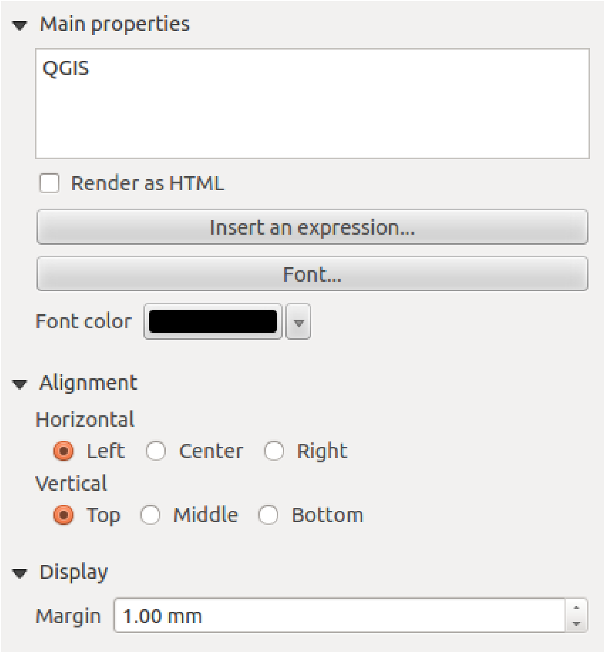


Figura 19.11: Pestaña de propiedades de elemento de etiqueta

Propiedades principales

- The main properties dialog is where the text (HTML or not) or the expression needed to fill the label is added to the Composer canvas.
- Labels can be interpreted as HTML code: check *Render as HTML*. You can now insert a URL, a clickable image that links to a web page or something more complex.
- You can also insert an expression. Click on **[Insert an expression]** to open a new dialog. Build an expression by clicking the functions available in the left side of the panel. Two special categories can be useful, particularly associated with the atlas functionality: geometry functions and records functions. At the bottom, a preview of the expression is shown.
- Define *Font* by clicking on the **[Font...]** button or a *Font color* selecting a color using the color selection tool.

Alineación y visualización

- You can define the horizontal and vertical alignment in the *Alignment* zone.
- In the **Display** tag, you can define a margin in mm. This is the margin from the edge of the composer item.

19.3.3 El elemento imagen

To add an image, click the Add image icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the image *Item Properties* tab.

The image *Item Properties* tab provides the following functionalities (see figure_composer_image_1):

You first have to select the image you want to display. There are several ways to set the *image source* in the **Main properties** area.

1. Use the browse button ... of *image source* to select a file on your computer using the browse dialog. The browser will start in the SVG-libraries provided with QGIS. Besides `SVG`, you can also select other image formats like `.png` or `.jpg`.

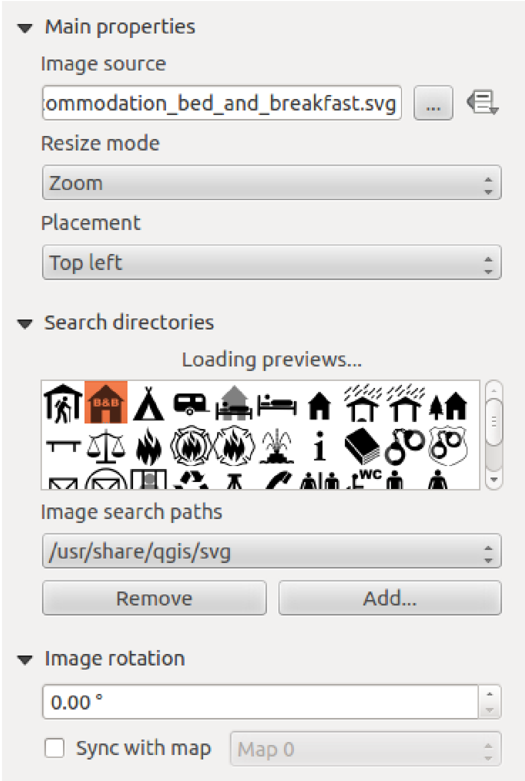


Figura 19.12: Pestaña de propiedades de elemento imagen

2. You can enter the source directly in the *image source* text field. You can even provide a remote URL-address to an image.
3. From the **Search directories** area you can also select an image from *loading preview..* to set the image source.
4. Use the data defined button to set the image source from a record or using a regular expression.

With the *Resize mode* option, you can set how the image is displayed when the frame is changed, or choose to resize the frame of the image item so it matches the original size of the image.

Se puede seleccionar uno de los siguientes modos:

- Zoom: Enlarges the image to the frame while maintaining aspect ratio of picture.
- Stretch: Stretches image to fit inside the frame, ignores aspect ratio.
- Clip: Use this mode for raster images only, it sets the size of the image to original image size without scaling and the frame is used to clip the image, so only the part of the image inside the frame is visible.
- Zoom and resize frame: Enlarges image to fit frame, then resizes frame to fit resultant image.
- Resize frame to image size: Sets size of frame to match original size of image without scaling.

Selected resize mode can disable the item options 'Placement' and 'Image rotation'. The *Image rotation* is active for the resize mode 'Zoom' and 'Clip'.

With *Placement* you can select the position of the image inside it's frame. The **Search directories** area allows you to add and remove directories with images in SVG format to the picture database. A preview of the pictures found in the selected directories is shown in a pane and can be used to select and set the image source.

Images can be rotated with the *Image rotation* field. Activating the *Sync with map* checkbox synchronizes the rotation of a picture in the QGIS map canvas (i.e., a rotated north arrow) with the appropriate Print Composer image.

It is also possible to select a north arrow directly. If you first select a north arrow image from **Search directories** and then use the browse button ... of the field *Image source*, you can now select one of the north arrow from the list as displayed in figure_composer_image_2.

Nota: Many of the north arrows do not have an 'N' added in the north arrow, this is done on purpose for languages that do not use an 'N' for North, so they can use another letter.

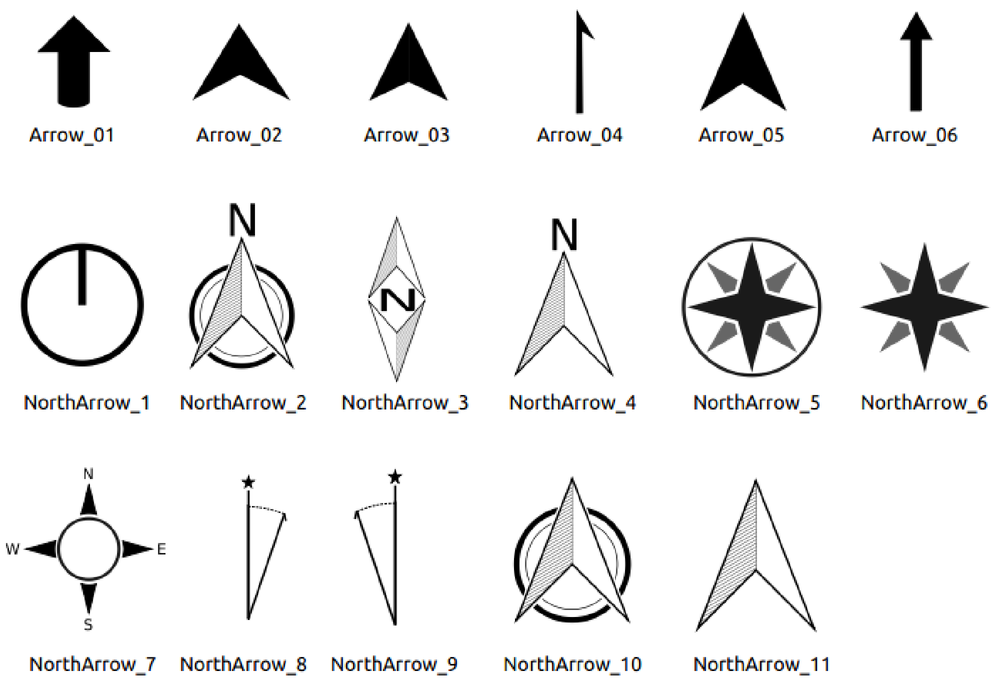


Figura 19.13: North arrows available for selection in provided SVG library

19.3.4 El elemento leyenda

To add a map legend, click the Add new legend icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the legend *Item Properties* tab.

The *Item properties* of a legend item tab provides the following functionalities (see figure_composer_legend_1):

Propiedades principales

The *Main properties* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_2):

En propiedades principales se puede:

- Cambiar el título de la leyenda.
- Establecer la alineación del título a la Izquierda, Centro o Derecha
- Puede elegir que elemento *Mapa* de la leyenda actual se referirá a la lista de selección.
- You can wrap the text of the legend title on a given character.

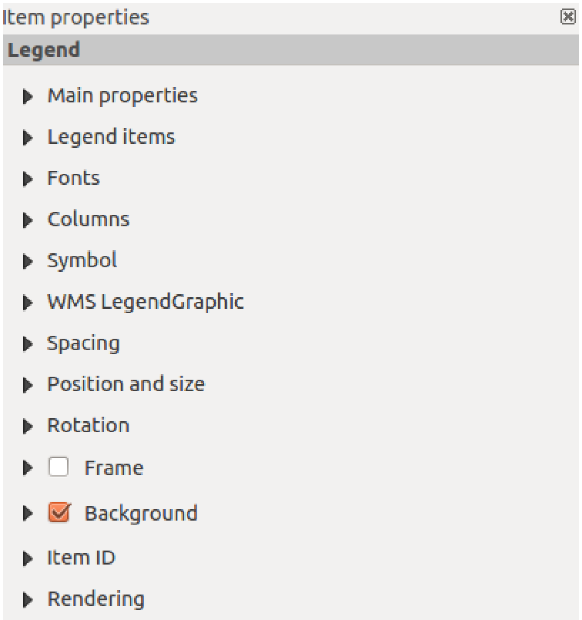


Figura 19.14: Pestaña de propiedades del elemento leyenda

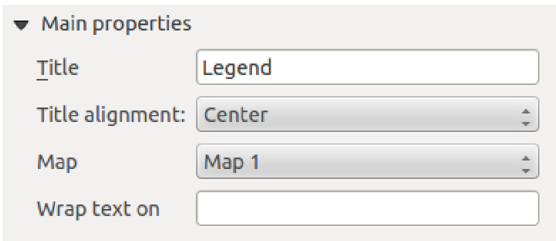


Figura 19.15: Diálogo de Propiedades de la leyenda principal

Elementos de la leyenda

The *Legend items* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_3):

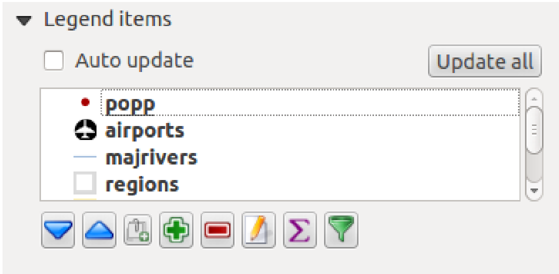


Figura 19.16: Diálogo de elementos de la leyenda

- The legend will be updated automatically if *Auto-update* is checked. When *Auto-update* is unchecked this will give you more control over the legend items. The icons below the legend items list will be activated.
- The legend items window lists all legend items and allows you to change item order, group layers, remove and restore items in the list, edit layer names and add a filter.
  - The item order can be changed using the **[Up]** and **[Down]** buttons or with 'drag-and-drop' functionality. The order can not be changed for WMS legend graphics.
  - Use the **[Add group]** button to add a legend group.
  - Use the **[plus]** and **[minus]** button to add or remove layers.
  - The **[Edit]** button is used to edit the layer-, groupname or title, first you need to select the legend item.
  - The **[Sigma]** button adds a feature count for each vector layer.
  - Use the **[filter]** button the filter the legend by map content, only the legend items visible in the map will be listed in the legend.

  After changing the symbology in the QGIS main window, you can click on **[Update]** to adapt the changes in the legend element of the Print Composer.

Fuentes, Columnas, Símbolo

The *Fonts*, *Columns* and *Symbol* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_4):

- Se puede cambiar la fuente del título de la leyenda, grupo, subgrupo y elementos (capa) en la leyenda. Haga clic en un botón de categoría para abrir un diálogo **Seleccionar fuente**.
- You provide the labels with a **Color** using the advanced color picker, however the selected color will be given to all font items in the legen..
- Legend items can be arranged over several columns. Set the number of columns in the *Count* 1,00 field.
  - *Equal column widths* sets how legend columns should be adjusted.
  - The *Split layers* option allows a categorized or a graduated layer legend to be divided between columns.
- You can change the width and height of the legend symbol in this dialog.

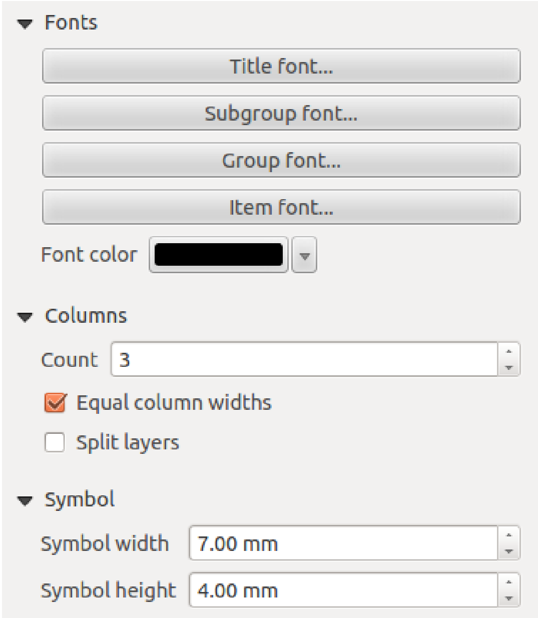


Figura 19.17: Diálogo de Fuentes de leyenda, Columnas, Símbolo y Espaciado

WMS legendGraphic and Spacing

The *WMS legendGraphic* and *Spacing* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_5):

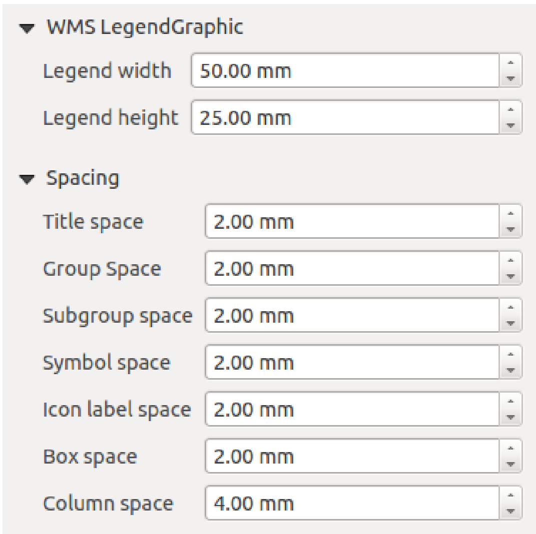


Figura 19.18: WMS legendGraphic Dialogs

When you have added a WMS layer and you insert a legend composer item, a request will be send to the WMS server to provide a WMS legend, This Legend will only be shown if the WMS server provides the GetLegendGraphic capability. The WMS legend content will be provided as a raster image.

WMS legendGraphic is used to be able to adjust the *Legend width* and the *legend hight* of the WMS legend raster image.

Spacing around title, group, subgroup, symbol, icon label, box space or column space can be customized through this dialog.

19.3.5 El elemento de barra de escala

To add a scale bar, click the Add new scalebar icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

The *Item properties* of a scale bar item tab provides the following functionalities (see figure_composer_scalebar_1):

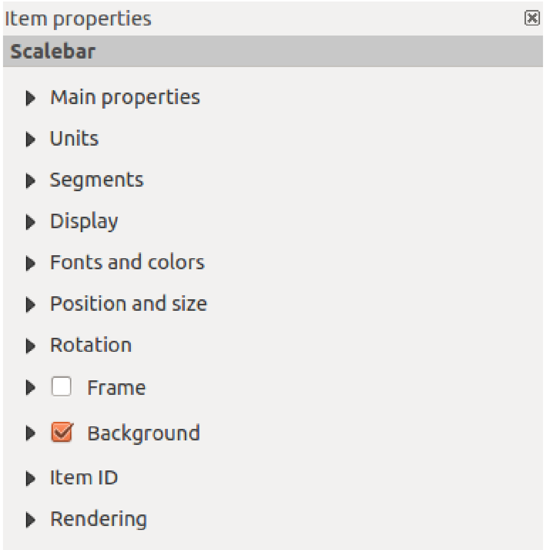


Figura 19.19: Pestaña de propiedades del elemento barra de escala

Propiedades principales

The *Main properties* dialog of the scale bar *Item Properties* tab provides the following functionalities (see figure_composer_scalebar_2):

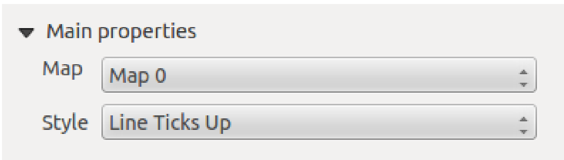


Figura 19.20: Diálogo propiedades principales de la barra de escala

- En primer lugar, se elegirá la barra de escala que se adjuntará al mapa.
- Then, choose the style of the scale bar. Six styles are available:
  - **Single box** and **Double box** styles, which contain one or two lines of boxes alternating colors.
  - **Middle**, **Up** or **Down** line ticks.
  - **Numeric**, where the scale ratio is printed (i.e., 1:50000).

Unidades y Segmentos

The *Units* and *Segments* dialogs of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_3):

In these two dialogs, you can set how the scale bar will be represented.

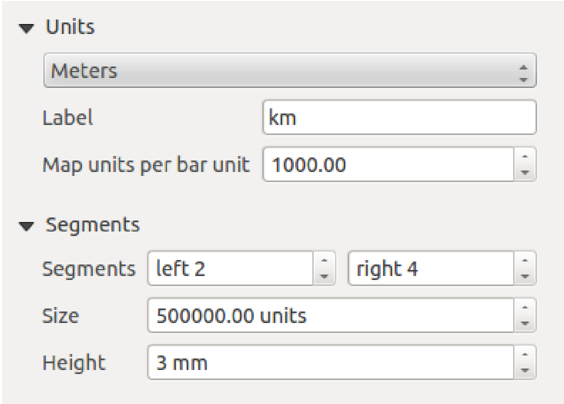


Figura 19.21: Scale Bar Units and Segments Dialogs

- Select the map units used. There are four possible choices: **Map Units** is the automated unit selection; **Meters**, **Feet** or **Nautical Miles** force unit conversions.
- The *Label* field defines the text used to describe the units of the scale bar.
- The *Map units per bar unit* allows you to fix the ratio between a map unit and its representation in the scale bar.
- You can define how many *Segments* will be drawn on the left and on the right side of the scale bar, and how long each segment will be (*Size* field). *Height* can also be defined.

Mostrar

The *Display* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_4):

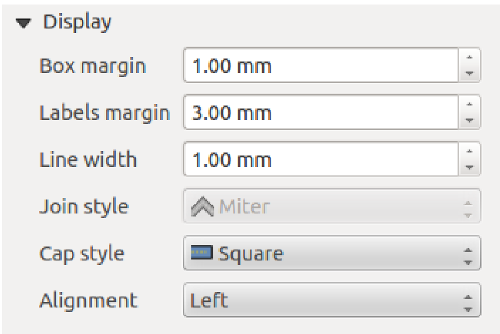


Figura 19.22: Scale Bar Display

You can define how the scale bar will be displayed in its frame.

- *Box margin* : space between text and frame borders
- *Labels margin* : space between text and scale bar drawing
- *Line width* : line widht of the scale bar drawing
- *Join style* : Corners at the end of scalebar in style Bevel, Rounded or Square (only available for Scale bar style Single Box & Double Box)
- *Cap style* : End of all lines in style Square, Round or Flat (only available for Scale bar style Line Ticks Up, Down and Middle)
- *Alignment* : Puts text on the left, middle or right side of the frame (works only for Scale bar style Numeric)

Fuentes y colores

The *Fonts and colors* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_5):

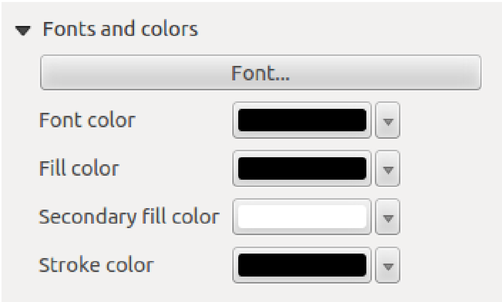


Figura 19.23: Scale Bar Fonts and colors Dialogs

You can define the fonts and colors used for the scale bar.

- Use the **[Font]** button to set the font
- *Font color*: set the font color
- *Fill color*: set the first fill color
- *Secondary fill color*: set the second fill color
- *Stroke color*: set the color of the lines of the Scale Bare

Fill colors are only used for scale box styles Single Box and Double Box. To select a color you can use the list option using the dropdown arrow to open a simple color selection option or the more advanced color selection option, that is started when you click in the colored box in the dialog.

19.3.6 El elemento de forma básica

To add a basic shape (ellipse, rectangle, triangle), click the Add basic shape icon or the Add Arrow icon, place the element holding down the left mouse. Customize the appearance in the *Item Properties* tab.

When you also hold down the `Shift` key while placing the basic shape you can create a perfect square, circle or triangle.

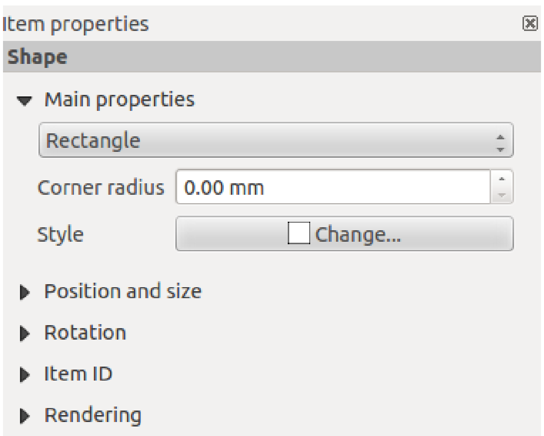


Figura 19.24: Pestaña de propiedades del elemento figura

The *Shape* item properties tab allows you to select if you want to draw an ellipse, rectangle or triangle inside the given frame.

You can set the style of the shape using the advanced symbol style dialog with which you can define its outline and fill color, fill pattern, use markers etcetera.

For the rectangle shape, you can set the value of the corner radius to round of the corners.

Nota: Unlike other items, you can not style the frame or the background color of the frame.

19.3.7 El elemento flecha

To add an arrow, click the Add Arrow icon, place the element holding down the left mouse button and drag a line to draw the arrow on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

When you also hold down the `Shift` key while placing the arrow, it is placed in an angle of exactly 45° .

The arrow item can be used to add a line or a simple arrow that can be used, for example, to show the relation between other print composer items. To create a north arrow, the image item should be considered first. QGIS has a set of North arrows in SVG format. Furthermore you can connect an image item with a map so it can rotate automatically with the map (see the_image_item).

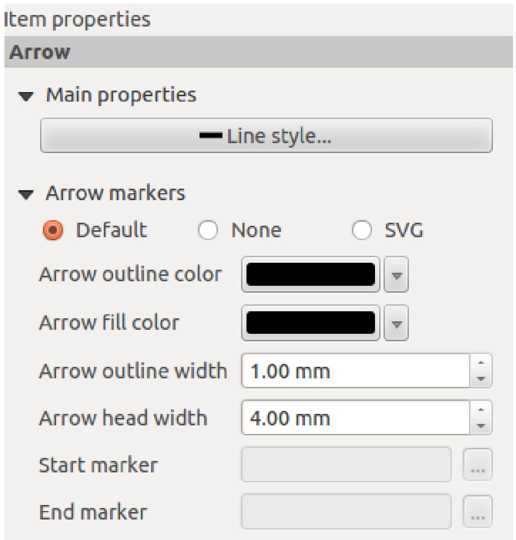


Figura 19.25: Pestaña de propiedades del elemento flecha

Propiedades del elemento

The *Arrow* item properties tab allows you to configure an arrow item.

The **[Line style ...]** button can be used to set the line style using the line style symbol editor.

In *Arrows markers* you can select one of three radio buttons.

- *Default* : To draw a regular arrow, gives you options to style the arrow head
- *None* : To draw a line without arrow head
- *SVG Marker* : To draw a line with an SVG *Start marker* and/or *End marker*

For *Default* Arrow marker you can use following options to style the arrow head.

- *Arrow outline color* : Set the outline color of the arrow head
- *Arrow fill color* : Set the fill color of the arrow head

- *Arrow outline width* : Set the outline width of the arrow head
- *Arrow head width*: Set the size of the arrow head

For *SVG Marker* you can use following options.

- *Start marker* : Choose an SVG image to draw at the beginning of the line
- *End marker* : Choose an SVG image to draw at the end of the line
- *Arrow head width*: Sets the size of Start and/or headmarker

SVG images are automatically rotated with the line. The color of the SVG image can not be changed.

19.3.8 El elemento de Tabla de Atributos

It is possible to add parts of a vector attribute table to the Print Composer canvas: Click the Add attribute table icon, place the element with the left mouse button on the Print Composer canvas, and position and customize the appearance in the *Item Properties* tab.

The *Item properties* of an attribute table item tab provides the following functionalities (see figure_composer_table_1):

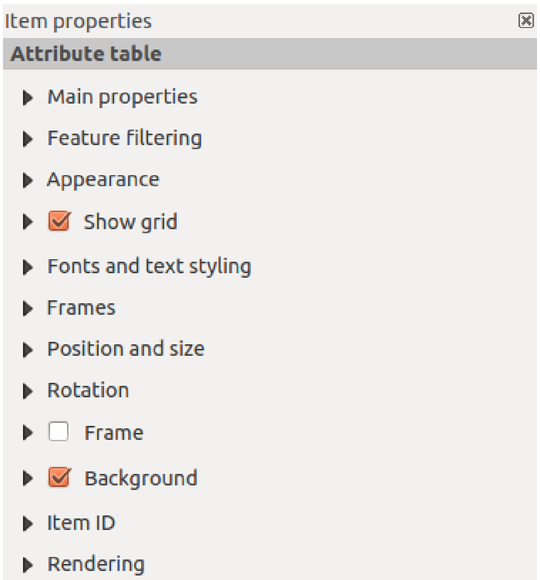


Figura 19.26: Pestaña de propiedades del elemento de Tabla de atributos

Propiedades principales

The *Main properties* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_2):

- For *Source* you can normally select only 'Layer features'.
- With *Layer* you can choose from the vector layers loaded in the project.
- The button **[Refresh table data]** can be used to refresh the table when the actual contents of the table has changed.
- The button **[Attributes...]** starts the *Select attributes* menu, see figure_composer_table_3, that can be used to change the visible contents of the table. After making changes use the **[OK]** button to apply changes to the table.

  En la sección *Columnas* se puede:

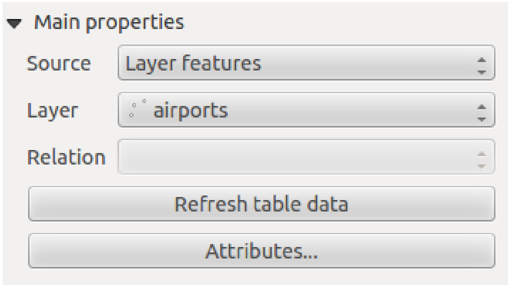


Figura 19.27: Attribute table Main properties Dialog

- Remove an attribute, just select an attribute row by clicking anywhere in a row and press the minus button to remove the selected attribute.
- Add a new attribute use the plus button. At the end a new empty row appears and you can select empty cell of the column *Attribute*. You can select a field attribute from the list or you can select to build a new attribute using a regular expression.
- Use the up and down arrows to change the order of the attributes in the table.
- Select a cel in the Headings column to change the Heading, just type a new name.
- Select a cel in the Alignment column and you can choose between Left, Center or Right alignment.
- Select a cel in the Width column and you can change it from Automatic to a width in mm, just type a number. When you want to change it back to Automatic, use the cross.
- The **[Reset]** button can allways be used to restore it to the original attribute settings.

En la sección *Ordenar* se puede:

- Add an attribute to sort the table with. Select an attribute and set the sorting order to 'Ascending' or 'Descending' and press the plus button. A new line is added to the sort order list.
- select a row in the list and use the up and down button to change the sort priority on attribute level.
- use the minus button to remove an attribute from the sort order list.

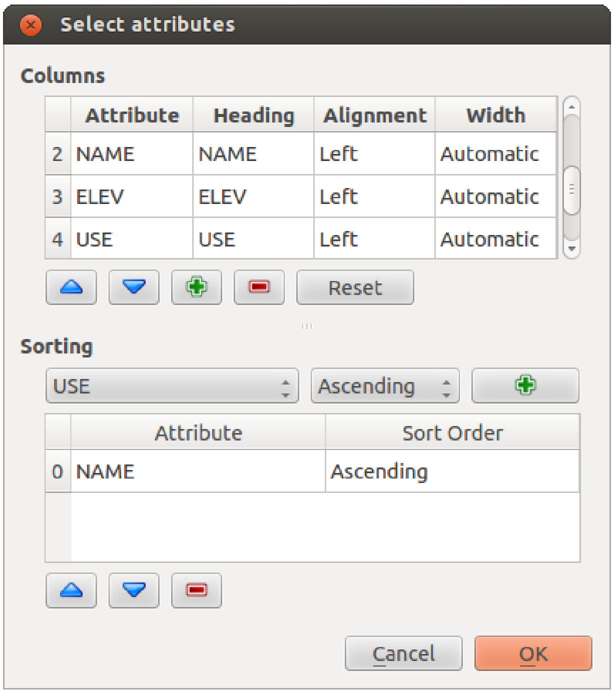


Figura 19.28: Seleccionar tabla de atributos Diálogo de atributos

Feature filtering

The *Feature filtering* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_4):

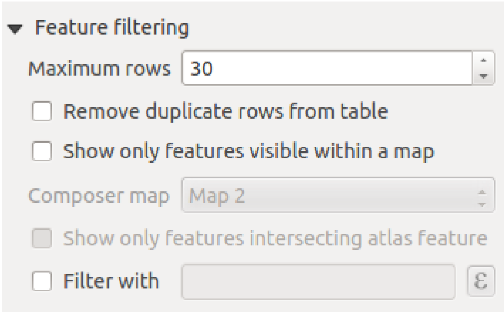


Figura 19.29: Attribute table Feature filtering Dialog

Puede:

- Define the *Maximum rows* to be displayed.
- Activate *Remove duplicate rows from table* to show unique records only.
- Activate *Show only visible features within a map* and select the corresponding *Composer map* to display the attributes of features only visible on selected map.
- Activate *Show only features intersecting Atlas feature* is only available when *Generate an atlas* is activated. When activated it will show a table with only the features shown on the map of that particular page of the atlas.
- Activate *Filter with* and provide a filter by typing in the input line or insert a regular expressing use the given expression button. A few examples of filtering statements you can use when you have loaded the airports layer from the Sample dataset:
  - `ELEV > 500`
  - `NAME = 'ANIAK'`
  - `NAME NOT LIKE 'AN%`
  - `regexp_match( attribute( $currentfeature, 'USE' ) , '[i]')`

  The last regular expression will include only the arpoirts that have a letter 'i' in the attribute field 'USE'.

Apariencia

The *Appearance* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_5):

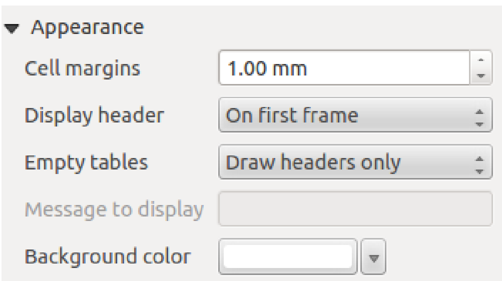


Figura 19.30: Attribute table appearance Dialog

- With *Cell margins* you can define the margin around text in each cell of the table.
- With *Display header* you can select from a list one of ‘On first frame’, ‘On all frames’ default option, or ‘No header’.
- The option *Empty table* controls what will be displayed when the result selection is empty.
  - **Draw headers only**, will only draw the header except if you have choosen ‘No header’ for *Display header*.
  - **Hide entire table**, will only draw the background of the table. You can activate *Don’t draw background if frame is empty* in *Frames* to completely hide the table.
  - **Draw empty cells**, will fill the attribute table with empty cells, this option can also be used to provide additional empty cells when you have a result to show!
  - **Show set message**, will draw the header and adds a cell spanning all columns and display a message like ‘No result’ that can be provided in the option *Message to display*
- The option *Message to display* is only activated when you have selected **Show set message** for *Empty table*. The message provided will be shown in the table in the first row, when the result is an empty table.
- With *Background color* you can set the background color of the table.

Mostrar cuadrícula

The *Show grid* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_6):

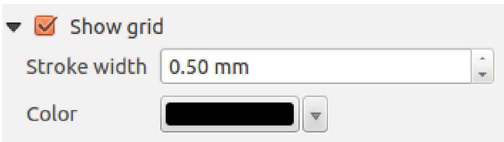


Figura 19.31: Attribute table Show grid Dialog

- Activate *Show grid* when you want to display the grid, the outlines of the table cells.
- With *Stroke width* you can set the thickness of the lines used in the grid.
- The *Color* of the grid can be set using the color selection dialog.

Fuente y estilo de texto

The *Fonts and text styling* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_7):

- You can define *Font* and *Color* for *Table heading* and *Table contents*.
- For *Table heading* you can additionally set the *Alignment* and choose from *Follow column alignment*, *Left*, *Center* or *Right*. The column alignment is set using the *Select Attributes* dialog (see Figure_composer_table_3).

Frames

The *Frames* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_8):

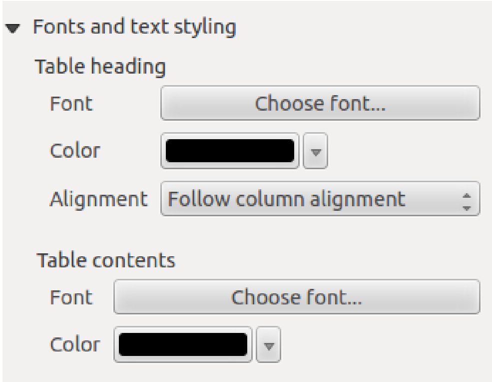


Figura 19.32: Attribute table Fonts and text styling Dialog

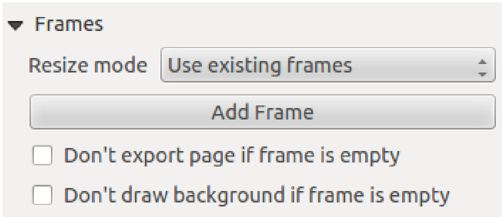


Figura 19.33: Attribute table Frames Dialog

- With *Resize mode* you can select how to render the attribute table contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to display the full selection of attribute table. Each frame can be moved around on the layout. If you resize a frame, the resulting table will be divided up between the other frames. The last frame will be trimmed to fit the table.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.
- Use the **[Add Frame]** button to add another frame with the same size as selected frame. The result of the table that will not fit in the first frame will continue in the next frame when you use the Resize mode *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the page to be exported when the table frame has no contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the background to be drawn when the table frame has no contents.

19.3.9 El elemento del marco HTML

It is possible to add a frame that displays the contents of a website or even create and style your own HTML page and display it!

Click the Add HTML frame icon, place the element by dragging a rectangle holding down the left mouse button on the Print Composer canvas and position and customize the appearance in the *Item Properties* tab (see figure_composer_html_1).

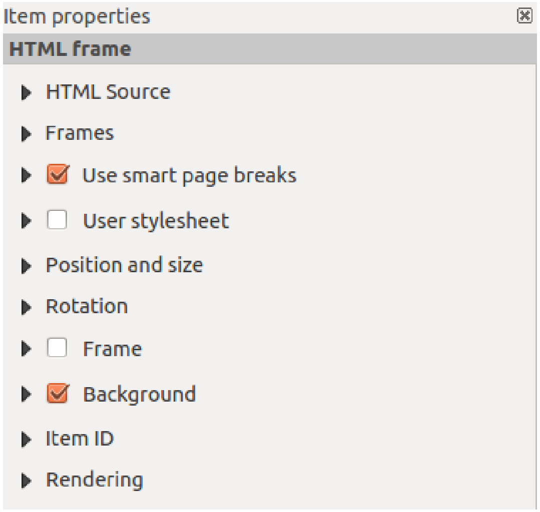


Figura 19.34: HTML frame, the item properties Tab

Fuente HTML

As an HTML source, you can either set a URL and activate the URL radiobutton or enter the HTML source directly in the textbox provided and activate the Source radiobutton.

The *HTML Source* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_2):

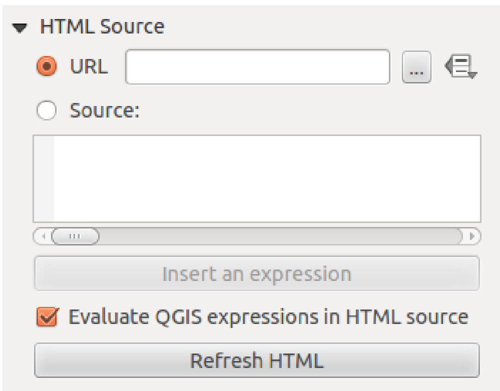


Figura 19.35: HTML frame, the HTML Source properties

- In *URL* you can enter the URL of a webpage you copied from your internet browser or select an HTML file using the browse button ... . There is also the option to use the Data defined override button, to provide an URL from the contents of an attribute field of a table or using a regular expression.
- In *Source* you can enter text in the textbox with some HTML tags or provide a full HTML page.
- The **[insert an expression]** button can be used to insert an expression like `[%Year($now)%]` in the Source textbox to display the current year. This button is only activated when radiobutton *Source* is selected. After inserting the expression click somewhere in the textbox before refreshing the HTML frame, otherwise you will lose the expression.
- Activate *Evaluate QGIS expressions in HTML code* to see the result of the expression you have included, otherwise you will see the expression instead.
- Use the **[Refresh HTML]** button to refresh the HTML frame(s) to see the result of changes.

Frames

The *Frames* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_3):

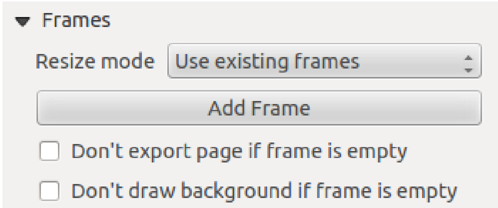


Figura 19.36: HTML frame, the Frames properties

- With *Resize mode* you can select how to render the HTML contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to render the height of the web page. Each frame can be moved around on the layout. If you resize a frame, the webpage will be divided up between the other frames. The last frame will be trimmed to fit the web page.
  - *Repeat on every page* will repeat the upper left of the web page on every page in frames of the same size.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.
- Use the **[Add Frame]** button to add another frame with the same size as selected frame. If the HTML page that will not fit in the first frame it will continue in the next frame when you use *Resize mode* or *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the map layout from being exported when the frame has no HTML contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the HTML frame being drawn if the frame is empty.

Use smart page breaks and User style sheet

The *Use smart page breaks* dialog and *Use style sheet* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_4):

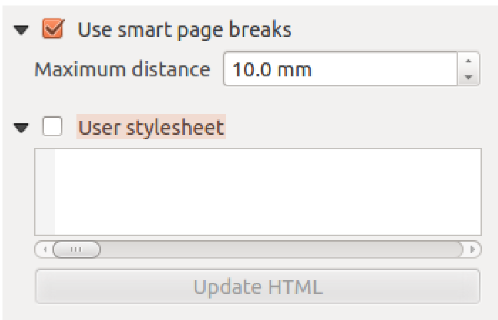


Figura 19.37: HTML frame, Use smart page breaks and User stylesheet properties

- Activate Use smart page breaks to prevent the html frame contents from breaking mid-way a line of text so it continues nice and smooth in the next frame.
- Set the *Maximum distance* allowed when calculating where to place page breaks in the html. This distance is the maximum amount of empty space allowed at the bottom of a frame after calculating the optimum break location. Setting a larger value will result in better choice of page break location, but more wasted space at the bottom of frames. This is only used when *Use smart page breaks* is activated.
- Activate *User stylesheet* to apply HTML styles that often is provided in cascading style sheets. An example of style code is provide below to set the color of `<h1>` header tag to green and set the font and fontsize of text included in paragraph tags `<p>`.

```
h1 {color: #00ff00;
}
p {font-family: "Times New Roman", Times, serif;
   font-size: 20px;
}
```

- Use the **[Update HTML]** button to see the result of the stylesheet settings.

19.4 Administrar elementos

19.4.1 Tamaño y posición

Each item inside the Composer can be moved/resized to create a perfect layout. For both operations the first step is to activate the Select/Move item tool and to click on the item; you can then move it using the mouse while holding the left button. If you need to constrain the movements to the horizontal or the vertical axis, just hold the `Shift` while moving the mouse. If you need a better precision, you can move a selected item using the `Arrow keys` on the keyboard; if the movement is too slow, you can speed up it by holding `Shift`.

A selected item will show squares on its boundaries; moving one of them with the mouse, will resize the item in the corresponding direction. While resizing, holding `Shift` will maintain the aspect ratio. Holding `Alt` will resize from the item center.

The correct position for an item can be obtained using snapping to grid or smart guides. Guides are set by clicking and dragging in the rulers. Guide are moved by clicking in the ruler, level with the guide and dragging to a new place. To delete a guide move it off the canvas. If you need to disable the snap on the fly just hold `Ctrl` while moving the mouse.

You can choose multiple items with the Select/Move item button. Just hold the `Shift` button and click on all the items you need. You can then resize/move this group just like a single item.

Once you have found the correct position for an item, you can lock it by using the items on the toolbar or ticking the box next to the item in the *Items* tab. Locked items are **not** selectable on the canvas.

Locked items can be unlocked by selecting the item in the *Items* tab and unchecking the tickbox or you can use the icons on the toolbar.

To unselect an item, just click on it holding the `Shift` button.

Inside the *Edit* menu, you can find actions to select all the items, to clear all selections or to invert the current selection.

19.4.2 Alineación

Raising or lowering functionalities for elements are inside the Raise selected items pull-down menu. Choose an element on the Print Composer canvas and select the matching functionality to raise or lower the selected element

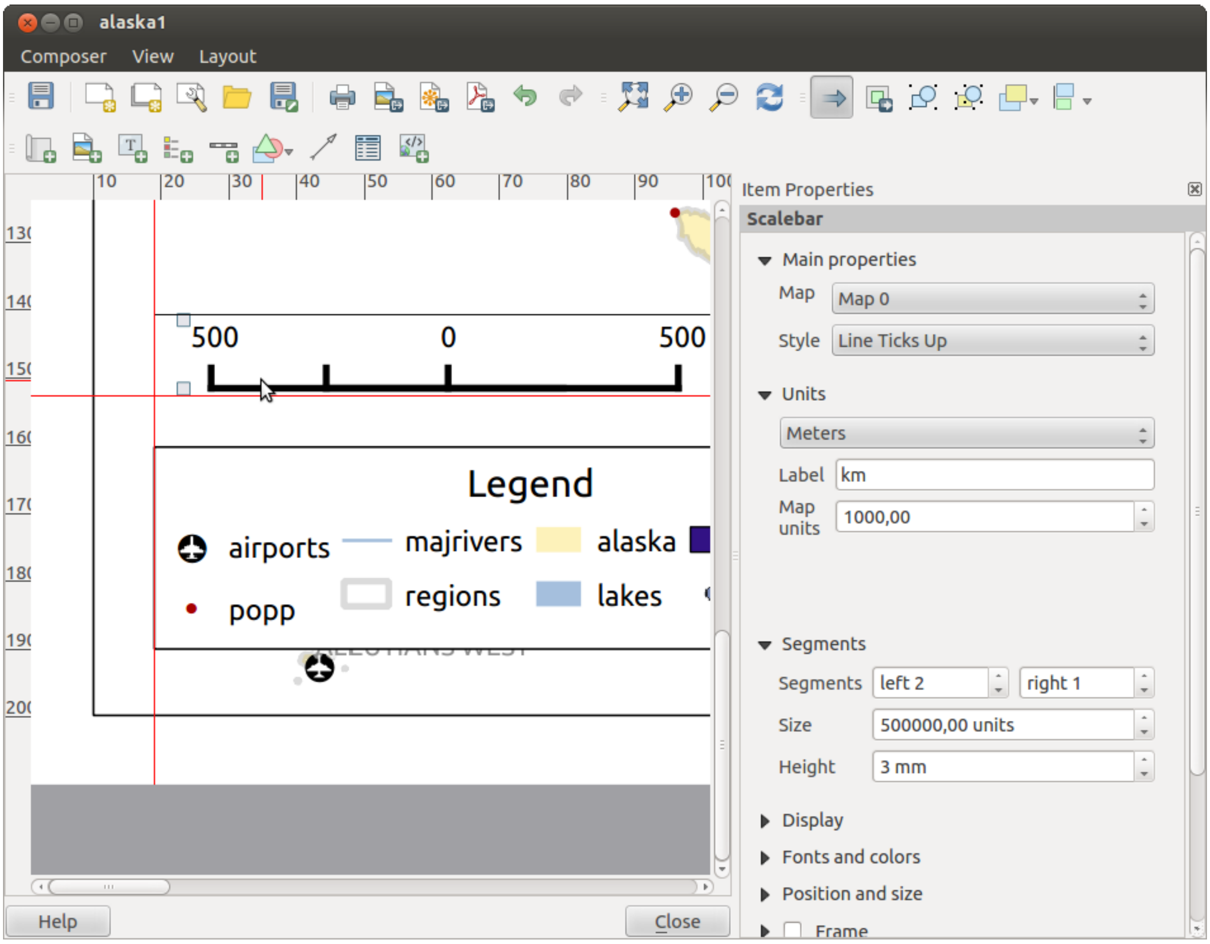


Figura 19.38: Líneas auxiliares de alineación en el diseño de impresión

compared to the other elements (see table_composer_1). This order is shown in the *Items* tab. You can also raise or lower objects in the *Items* tab by clicking and dragging an object's label in this list.

There are several alignment functionalities available within the Align selected items pull-down menu (see table_composer_1). To use an alignment functionality, you first select some elements and then click on the matching alignment icon. All selected elements will then be aligned within to their common bounding box. When moving items on the Composer canvas, alignment helper lines appear when borders, centers or corners are aligned.

19.4.3 Elementos Copiar/Cortar y Pegar

The print composer includes actions to use the common Copy/Cut/Paste functionality for the items in the layout. As usual first you need to select the items using one of the options seen above; at this point the actions can be found in the *Edit* menu. When using the Paste action, the elements will be pasted according to the current mouse position.

Nota: HTML items can not be copied in this way. As a workaround, use the **[Add Frame]** button in the *Item Properties* tab.

19.5 Revertir y Restaurar herramientas

During the layout process, it is possible to revert and restore changes. This can be done with the revert and restore tools:

- Revertir el último cambio
- Restaurar el último cambio

This can also be done by mouse click within the *Command history* tab (see figure_composer_29).

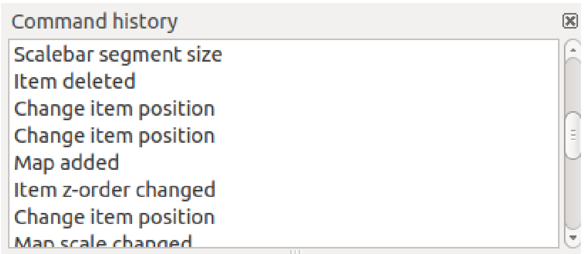


Figura 19.39: Historial de comandos en el diseñador de impresión

19.6 Generación de Atlas

The Print Composer includes generation functions that allow you to create map books in an automated way. The concept is to use a coverage layer, which contains geometries and fields. For each geometry in the coverage layer, a new output will be generated where the content of some canvas maps will be moved to highlight the current geometry. Fields associated with this geometry can be used within text labels.

Every page will be generated with each feature. To enable the generation of an atlas and access generation parameters, refer to the *Atlas generation* tab. This tab contains the following widgets (see Figure_composer_atlas):

- *Generate an atlas*, which enables or disables the atlas generation.

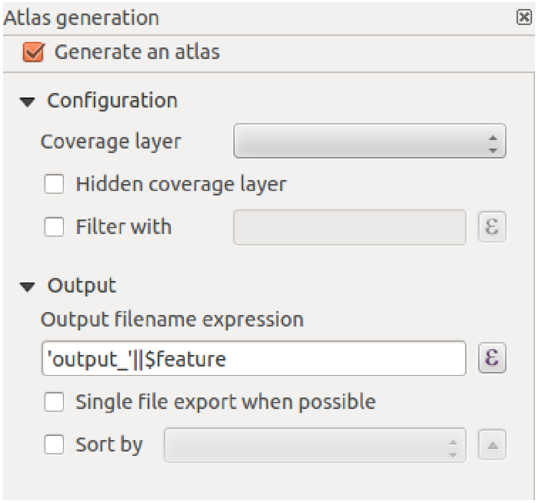


Figura 19.40: Pestaña de Generación de Atlas

- A *Coverage layer* combo box that allows you to choose the (vector) layer containing the geometries on which to iterate over.
- An optional *Hidden coverage layer* that, if checked, will hide the coverage layer (but not the other ones) during the generation.
- An optional *Filter with* text area that allows you to specify an expression for filtering features from the coverage layer. If the expression is not empty, only features that evaluate to `True` will be selected. The button on the right allows you to display the expression builder.
- Una caja de texto *Expresión de nombre de archivo de salida* que se utiliza para generar un nombre de archivo para cada geometría si es necesario. Se basa en expresiones. Este campo es significativo solo para presentar múltiples archivos.
- A *Single file export when possible* that allows you to force the generation of a single file if this is possible with the chosen output format (PDF, for instance). If this field is checked, the value of the *Output filename expression* field is meaningless.
- An optional *Sort by* that, if checked, allows you to sort features of the coverage layer. The associated combo box allows you to choose which column will be used as the sorting key. Sort order (either ascending or descending) is set by a two-state button that displays an up or a down arrow.

You can use multiple map items with the atlas generation; each map will be rendered according to the coverage features. To enable atlas generation for a specific map item, you need to check *Controlled by Atlas* under the item properties of the map item. Once checked, you can set:

- An input box *Margin around feature* that allows you to select the amount of space added around each geometry within the allocated map. Its value is meaningful only when using the auto-scaling mode.
- A *Fixed scale* that allows you to toggle between auto-scale and fixed-scale mode. In fixed-scale mode, the map will only be translated for each geometry to be centered. In auto-scale mode, the map's extents are computed in such a way that each geometry will appear in its entirety.

19.6.1 Etiquetas

In order to adapt labels to the feature the atlas plugin iterates over, you can include expressions. For example, for a city layer with fields CITY_NAME and ZIPCODE, you could insert this:

```
The area of [% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %] km2
```

The information *[% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %]* is an expression used inside the label. That would result in the generated atlas as:

The area of PARIS,75001 is 1.94 km2

19.6.2 Data Defined Override Buttons

There are several places where you can use a Data Defined Override button to override the selected setting. These options are particularly usefull with Atlas Generation.

For the following examples the *Regions* layer of the QGIS sample dataset is used and selected for Atlas Generation. We also assume the paper format *A4 (210X297)* is selected in the *Composite* tab for field *Presets*.

With a *Data Defined Override* button you can dynamically set the paper orientation. When the height (north-south) of the extents of a region is greater than it's width (east-west), you rather want to use *portrait* instead of *landscape* orientation to optimize the use of paper.

In the *Composition* you can set the field *Orientation* and select *Landscape* or *Portrait*. We want to set the orientation dynamically using an expression depending on the region geometry. press the button of field *Orientation*, select *Edit ...* so the *Expression string builder* dialog opens. Give following expression:

```
CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 'Landscape' ELSE 'Por
```

Now the paper orients itself automatically for each Region you need to reposition the location of the composer item as well. For the map item you can use the button of field *Width* to set it dynamically using following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) -
```

Use the button of field *Heigth* to provide following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 210 ELSE 297 END) -
```

When you want to give a title above map in the center of the page, insert a label item above the map. First use the item properties of the label item to set the horizontal alignment to *Center*. Next activate from *Reference point* the upper middle checkbox. You can provide following expression for field *X* :

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) /
```

For all other composer items you can set the position in a similar way so they are correctly positioned when page is automatically rotated in portrait or landscape.

Information provided is derived from the excellent blog (in english and portugese) on the Data Defined Override options Multiple_format_map_series_using_QGIS_2.6 .

This is just one example of how you can use Data Defined Overrides.

19.6.3 Vista previa

Once the atlas settings have been configured and map items selected, you can create a preview of all the pages by clicking on *Atlas* → *Preview Atlas* and using the arrows, in the same menu, to navigate through all the features.

19.6.4 Generación

The atlas generation can be done in different ways. For example, with *Atlas* → *Print Atlas*, you can directly print it. You can also create a PDF using *Atlas* → *Export Atlas as PDF*: The user will be asked for a directory for saving all the generated PDF files (except if the *Single file export when possible* has been selected). If you need to print just a page of the atlas, simply start the preview function, select the page you need and click on *Composer* → *Print* (or create a PDF).

19.7 Crear salida

Figure_composer_output shows the Print Composer with an example print layout, including each type of map item described in the sections above.

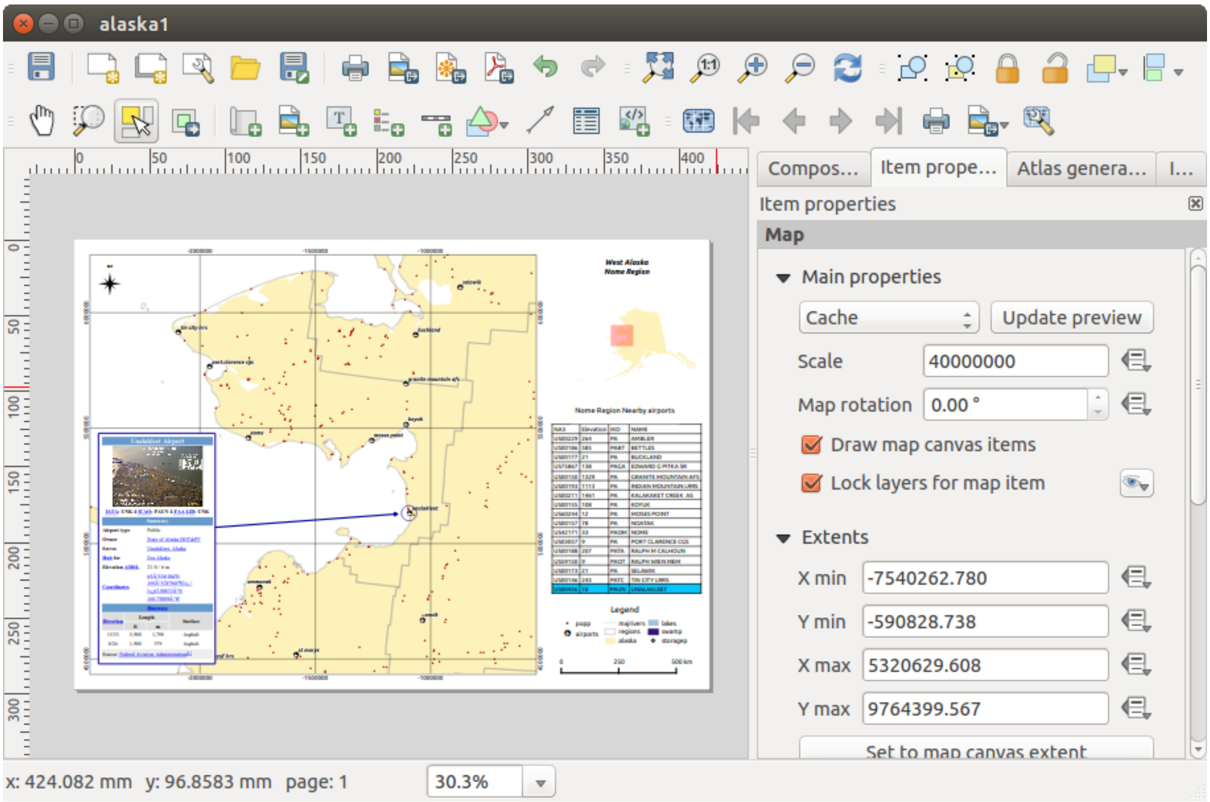


Figura 19.41: Print Composer with map view, legend, image, scale bar, coordinates, text and HTML frame added

The Print Composer allows you to create several output formats, and it is possible to define the resolution (print quality) and paper size:

- The Print icon allows you to print the layout to a connected printer or a PostScript file, depending on installed printer drivers.
- The Export as image icon exports the Composer canvas in several image formats, such as PNG, BPM, TIF, JPG,...
- Export as PDF saves the defined Print Composer canvas directly as a PDF.
- The Export as SVG icon saves the Print Composer canvas as an SVG (Scalable Vector Graphic).

If you need to export your layout as a **georeferenced image** (i.e., to load back inside QGIS), you need to enable this feature under the Composition tab. Check *World file on* and choose the map item to use. With this option, the 'Export as image' action will also create a world file.

Nota:

- Currently, the SVG output is very basic. This is not a QGIS problem, but a problem with the underlying Qt library. This will hopefully be sorted out in future versions.
- Exporting big rasters can sometimes fail, even if there seems to be enough memory. This is also a problem with the underlying Qt management of rasters.

19.8 Administrar el diseñador de impresión

With the Save as template and Add items from template icons, you can save the current state of a Print Composer session as a `.qpt` template and load the template again in another session.

The Composer Manager button in the QGIS toolbar and in *Composer* → *Composer Manager* allows you to add a new Composer template, create a new composition based on a previously saved template or to manage already existing templates.

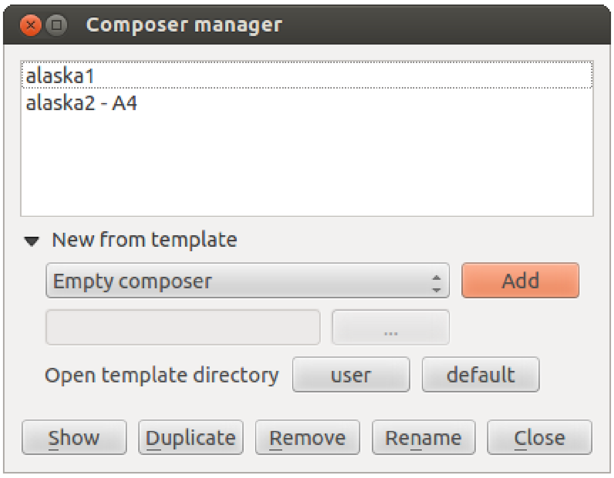


Figura 19.42: EL Administrador de diseñadores

By default, the Composer manager searches for user templates in ~/.qgis2/composer_template.

The New Composer and Duplicate Composer buttons in the QGIS toolbar and in *Composer* → *New Composer* and *Composer* → *Duplicate Composer* allow you to open a new Composer dialog, or to duplicate an existing composition from a previously created one.

Finally, you can save your print composition with the Save Project button. This is the same feature as in the QGIS main window. All changes will be saved in a QGIS project file.

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Complementos

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20.1 QGIS Complementos

QGIS ha sido diseñado con una arquitectura de complementos. Esto permite que sea fácil añadir muchas características y funciones nuevas a la aplicación. Muchas de las características de QGIS están en realidad implementadas como complementos.

Puede administrar sus complementos en el diálogo de complementos que se puede abrir con *Complementos > Administrar e instalar complementos...*.

Cuando un complemento necesita ser actualizado, y si la configuración de complementos se ha creado en consecuencia. La interfaz principal de QGIS puede mostrar un enlace en la barra de estado para decirte que hay algunos actualizaciones de complementos esperando ser aplicadas.

20.1.1 El diálogo de complementos

Los menús en el diálogo Complementos permiten al usuario instalar, desinstalar y actualizar complementos en diferentes formas. Cada complemento tiene algunos metadatos desplegados en el panel derecho:

- información si el complemento es experimental
- descripción
- voto(s) puntuación (¡puede votar por su complemento preferido!)
- etiquetas
- algunos enlaces útiles como página de inicio, rastreador y código del repositorio.
- autor(es)
- versión disponible

Puede utilizar el filtro para encontrar un complemento específico.

Todos

Aquí, todos los complementos disponibles están listados, incluyendo los complementos base y externos. Use **[Actualizar todo]** para buscar nuevas versiones de los complementos. Además, puede usar **[Instalar complemento]**, si un complemento esta listado pero no instalado, y **[Desinstalar complemento]** así como **[Reinstalar complemento]**, si un complemento esta instalado. Si uno esta instalado, puede ser desactivado o activado utilizando la casilla de verificación.

Instalado

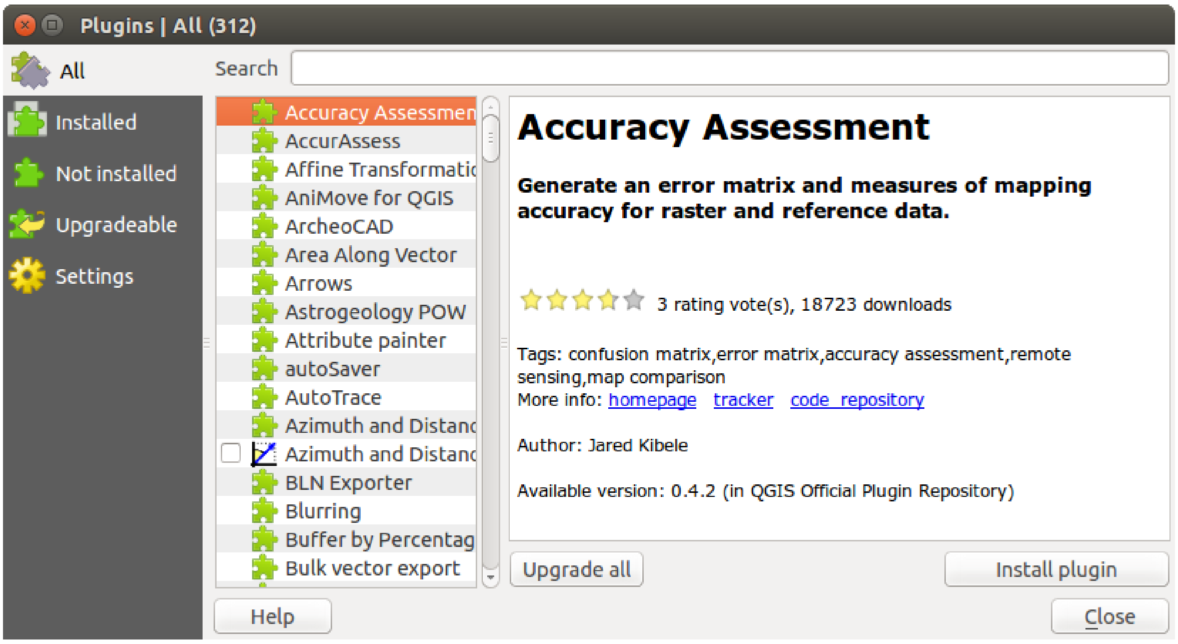

Figura 20.1: El menú *Todos*

En este menú, se pueden encontrar solo los complementos instalados. Los complementos instalados pueden ser desinstalados y reinstalados usando los botones **[Desinstalar complemento]** y **[Reinstalar complemento]**. Se puede **[Actualizar todo]** aquí también.

No instalado

Este menú lista todos los complementos disponibles que no están instalados. Se puede usar el botón **[Instalar complemento]** para ejecutar un complemento en QGIS.

Actualizable

Si se activa *Mostrar también los complementos experimentales* en el menú *Configuración*, se puede usar el menú para buscar versiones de complementos más recientes. Esto se puede hacer con los botones **[Actualizar complementos]** o **[Actualizar todos]**.

Configuración

Este menú, puede utilizar las siguientes opciones:

- *Comprobar actualizaciones al inicio*. Siempre que un nuevo complemento o actualización de complemento esta disponible, QGIS informará 'cada vez que se inicia QGIS', 'una vez al día', 'cada 3 días', 'cada semana', 'cada 2 semanas' o 'cada mes'.
- *Mostrar también los complementos experimentales*. QGIS mostrará complementos en etapas tempranas de desarrollo, que son generalmente inadecuados para su uso en producción.
- *Mostrar también complementos obsoletos*. Estos complementos están en desuso y generalmente no aptos para uso en producción.

Para añadir un repositorio de un autor externo, haga clic **[Añadir...]** en la sección *Repositorios de complementos*. Si no desea uno o más de los repositorios añadidos, se pueden deshabilitar con el botón **[Editar...]**, o eliminar completamente con el botón **[Borrar]**

La función *Buscar* esta disponible en casi cada menú (excepto *Configuración*). Aquí, se pueden buscar complemento específicos.

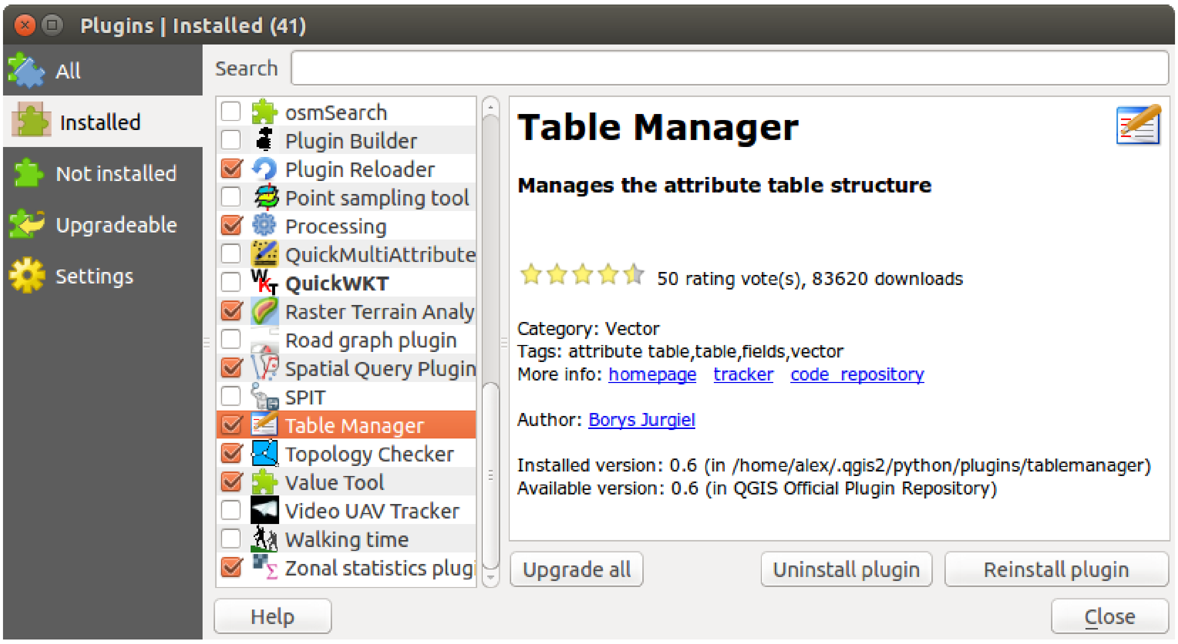

Figura 20.2: El menú *Instalado*

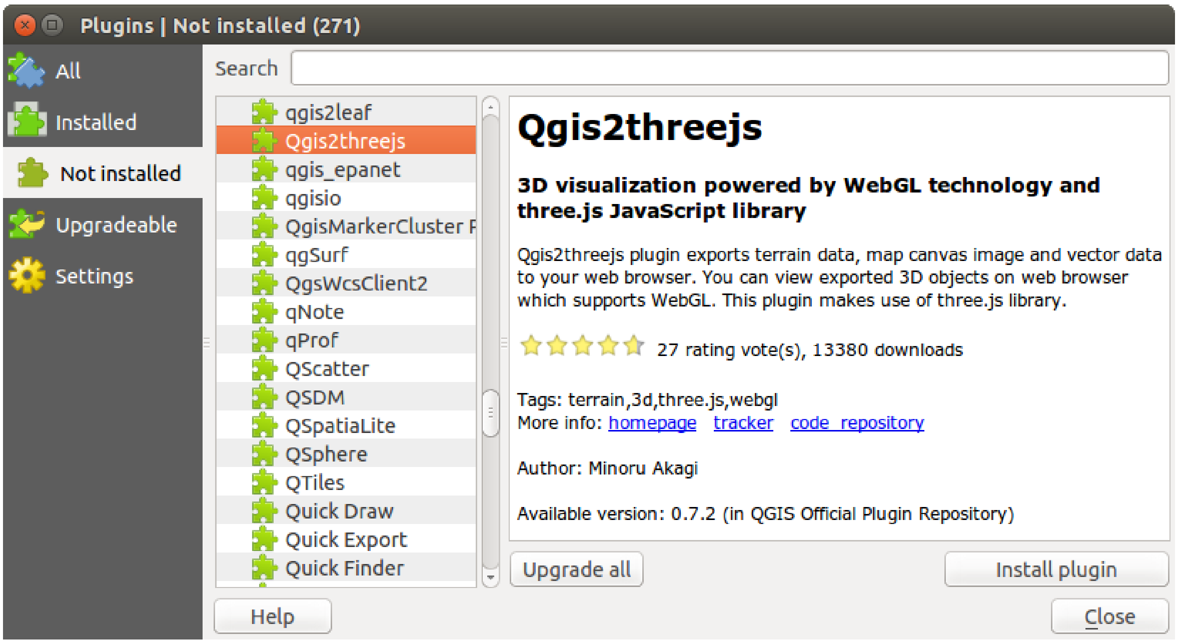

Figura 20.3: El menú *No instalado*

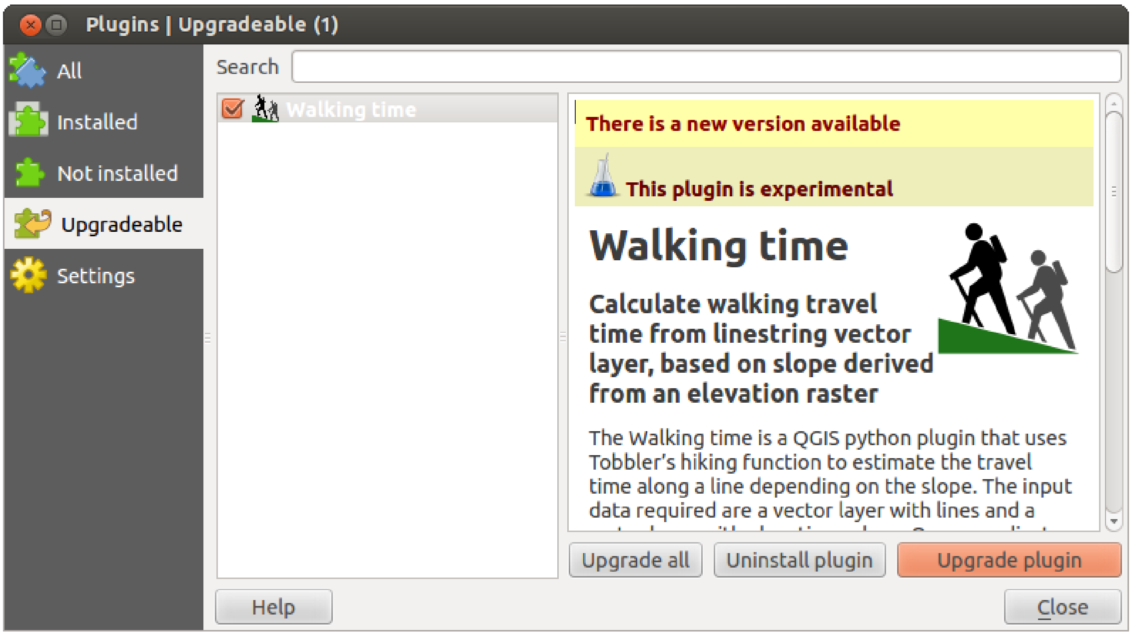

Figura 20.4: El menú *Actualizable*

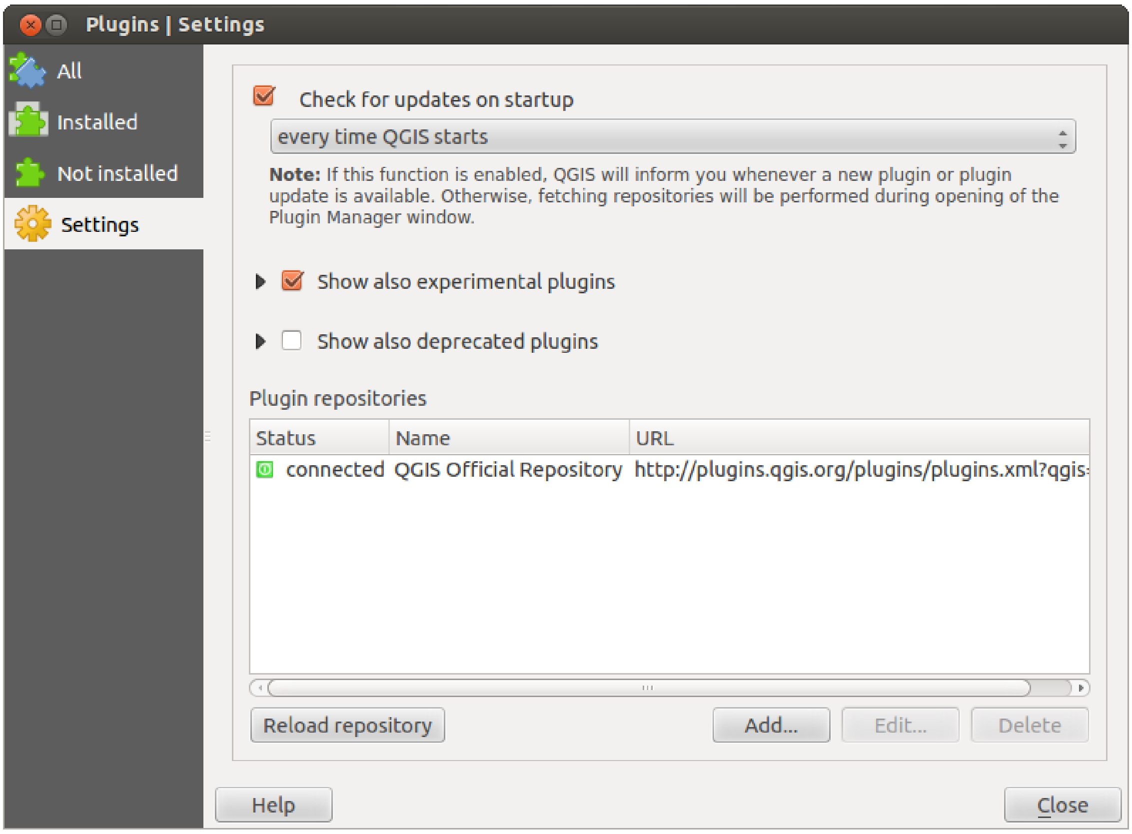

Figura 20.5: El menú *Configuración*

Truco: Complementos base y externos

Los complementos de QGIS se ejecutan, ya sea como **Complementos base** o **Complementos Externos**. Los **Complementos Base** son mantenidos por el equipo de desarrollo QGIS y son automáticamente parte de cada distribución de QGIS. Están escritas en uno de los dos lenguajes: C++ o Python. Los **Complementos Externos** actualmente todo esta escrito en Python. Se almacenan en repositorios externos y son mantenidos por autores individuales.

La documentación detallada sobre el uso, mínimo de la versión de QGIS, página de inicio, autores, y otra información importante se proporcionan para el repositorio 'Oficial' de QGIS en http://plugins.qgis.org/plugins/. Para otros repositorios externos, puede haber documentación en los propios complementos externos. En general, no se incluye en este manual.

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20.2 Usar complementos núcleo de QGIS

Icono	Complemento	Descripción	Manual de referencia
	Captura de coordenadas	Captura de coordenadas del ratón en diferentes SRC	*Complemento Captura de coordenadas*
	DB Manager	Administrar la base de datos dentro de QGIS	*Complemento administrador de BBDD*
	Conversor DXF2Shp	Convertir de archivo DXF a formato SHP	*Complemento Conversor DxfaShp*
	eVis	Herramienta de visualización de eventos	*Complemento Visualización de Eventos*
	fTools	Un conjunto de herramientas vectoriales	*Complemento fTools*
	Herramientas de GPS	Herramientas para cargar e importar datos GPS	*GPS Plugin*
	GRASS	Funcionalidad GRASS	*GRASS GIS Integration*
	Herramientas GDAL	Funcionalidad ráster GDAL	*Complemento Herramientas de GDAL*
	Georreferenciador GDAL	Georeferenciación de rásteres con GDAL	*Complemento Georreferenciador*
	Mapa de calor	Crear mapa de calor de un capa de puntos de entrada.	*Complemento Mapa de calor*
	Complemento de interpolación	Interpolación en base a vétices de una capa vectorial	*Complemento de interpolación*
	Edición fuera de línea	Edición fuera de línea y sincronización con la base de datos	*Complemento Edición fuera de linea*
	Georaster Espacial de Oracle	Acceso a Georasters Espaciales de Oracle	*Complemento GeoRaster espacial de Oracle*
	Administrar complementos	Administrar complementos núcleo y externos	*El diálogo de complementos*
	Análisis del terreno ráster	Calcular entidades geomorfológica de un DEMs	*Complemento Análisis de Terreno*
	Complemento Grafo de rutas	Análisis de la ruta más corta	*Complemento Grafo de rutas*
	Complemento SQL Anywhere	Acceso a BD SQL anywhere	*Complemento SQL Anywhere*
	Consulta espacial	Consulta espacial en vectores	*Complemento Consulta espacial*
	SPIT	Herramienta para importar archivo shape a PostGIS	*Complemento SPIT*
	Estadísticas de zona	Calcular estadísticas de ráster para polígonos.	*Complemento de Estadísticas de zona*
	MetaSearch	Interactuar con metadata catalogue services (CSW)	*MetaSearch Catalogue Client*

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20.3 Complemento Captura de coordenadas

El complemento de captura de coordenadas es fácil de usar y proporciona la capacidad de mostrar coordenadas en la vista del mapa para dos sistemas de referencia de coordenadas (SRC).

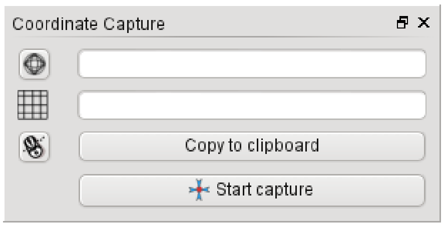

Figura 20.6: Complemento Captura de coordenadas

1. Inicie QGIS, seleccione *Propiedades del proyecto* del menú *Configuración* (KDE, Windows) o *Archivo* (Gnome, OSX) y pulse la pestaña *Proyección*. Como alternativa, también puede pulsar el icono Estado del SRC en la esquina inferior derecha de la barra de estado.
2. Pulse en la casilla de verificación *Activar transformación de SRC al vuelo* y seleccione un sistema de coordenadas proyectadas de su elección (vea también *Working with Projections*)
3. Activar el complemento de Captura de coordenadas en el Administrador de complementos (vea *El diálogo de complementos*) y asegúrese que el diálogo es visible, vaya a *Ver* → *Paneles* y y asegúrese que *Captura de coordenadas* está habilitada. El diálogo de captura de coordenadas aparece como se muestra en la Figura figure_coordinate_capture_1. Alternativamente, también puede ir a *Vectorial* → *Captura de coordenadas* y vea si *Captura de coordenadas* está habilitada.
4. Haga clic en el icono Pulse para seleccionar el SRC a usar para la visualización de coordenadas y elija un SRC diferente al que seleccionó anteriormente.
5. Para empezar a capturar coordenadas, pulse **[Comenzar captura]**. Ahora puede hacer clic en cualquier lugar de la vista del mapa y el complemento mostrará las coordenadas en ambos SRC seleccionados.
6. Para habilitar el seguimiento de coordenadas del ratón, pulse el icono Seguimiento del ratón.
7. También se pueden copiar las coordenadas seleccionadas al portapapeles.

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20.4 Complemento administrador de BBDD

El complemento administrador de BBDD es oficialmente parte del núcleo de QGIS y tiene por objeto sustituir el complemento SPIT y además, para integrar otros formatos de base de datos soportados por QGIS en una interfaz de usuario. El complemento Administrador de BBDD proporciona varias características. Se pueden arrastrar capas desde el navegador de QGIS al Administrador de BBDD y se importarán a la base de datos espacial. Se puede arrastrar y soltar capas entre base de datos espacial y se importarán. Se puede usar también el Administrador de BBDD para ejecutar consultas SQL contra su base de datos espacial y luego ver la salida espacial de las consultas al agregar el resultado a QGIS como una capa de consulta.

El menú *Base de datos* permite conectar a una base de datos existente, para iniciar la ventana de SQL y para finalizar el componente de Administrador de BBDD. Una vez que este conectado a la base de datos existente, los menús *Esquema* y *Tabla* aparecerá de forma adicional.

EL menú *Esquema* incluye herramientas para crear y eliminar (vaciar) esquemas y, si la topología esta disponible (e.j., PostGIS 2), iniciar un *TopoViewer*.

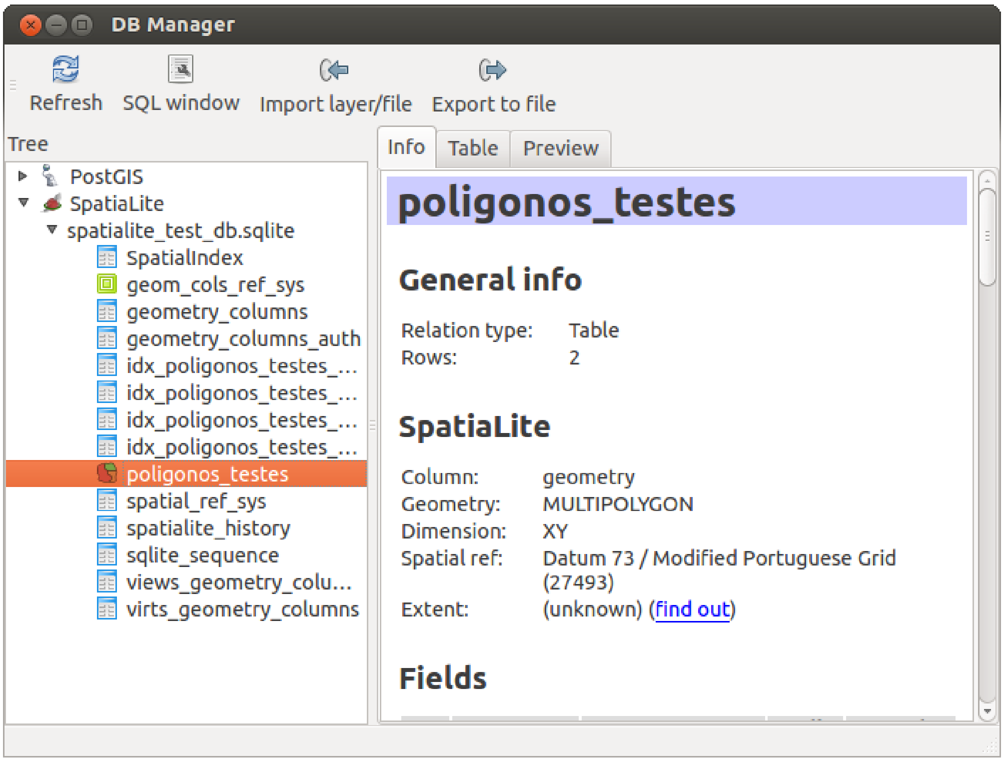

Figura 20.7: Diálogo del complemento administrador de BBDD

El menú *Tabla* permite crear y editar tablas y eliminar tablas y vistas. También es posible vaciar tablas y moverlas de un esquema a otro. Como función adicional, se puede realizar un VACUUM y luego un ANALYZE para cada tabla seleccionada. VACUUM simplemente recupera espacio y hace que este disponible para reusarlo. ANALYZE actualiza las estadisticas para determinar la forma más eficiente de ejecutar una consulta. Finalmente, se pueden importar capas/archivos, si estan cargados en QGIS o existen en el sistema de archivos. Y se puede exportar tablas de la base de datos a archivo vectorial con la función "Exportar archivo".

La ventana *Árbol* muestra todas las bases de datos soportadas por QGIS. Con un doble-clic, se puede conectar a la base de datos. Con el botón derecho del ratón, se puede cambiar el nombre y eliminar las tablas y esquemas existentes. Las tablas también se pueden agregar al lienzo de QGIS con el menú contextual.

Si se está conectado a una base de datos, la ventana **principal** del Administrador de BBDD ofrece tres pestañas. La pestaña *Info* proporciona información acerca de la tabla y su geometría, así como de los campos existentes, limitaciones e índices. También permite que ejecute Vacuum Analyze y crear índices espaciales en una tabla seleccionada, si no está ya hecho. La pestaña de *Tabla* muestra todos los atributos y la pestaña *Vista preliminar* representa las geometrías como vista previa.

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20.5 Complemento Conversor DxfaShp

El complemento Conversor DxfaShp se puede usar para convertir datos vectoriales del formato DXF a archivo shape. Requiere que se especifiquen los siguientes parámetros antes de ejecutarlo:

- **Archivo DXF de entrada**: Introduzca la ruta al archivo DXF a convertir.
- **Archivo shp de salida**: Introduzca el nombre deseado para el archivo shape a crear.
- **Tipo de archivo de salida**: Especificar el tipo de geometría del archivo de salida. Actualmente los tipos soportados son polilíneas, polígonos y puntos.
- **Exportar etiquetas de texto**: Cuando esta casilla de verificación esta habilitada, se creará una capa de puntos adicional, y la tabla DBF asociada contendrá información sobre los campos "texto" que se encuentran

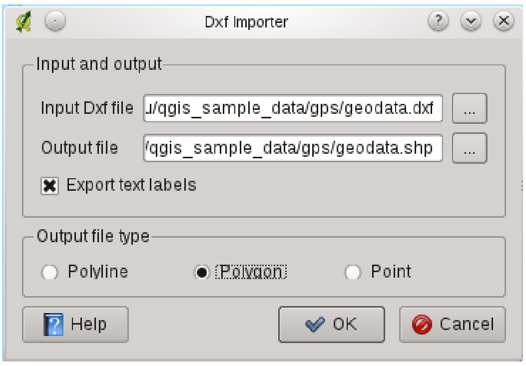

Figura 20.8: Complemento Conversor DxfaShp

en el archivo DXF y las cadenas de texto en sí.

20.5.1 Usar el complemento

1. Iniciar QGIS, cargar el complemento DxfaShape en el Administrador de complementos (vea *El diálogo de complementos*) y hacer clic en el icono Conversor DxfaShp, que aparece en el menú de barras de herramientas de QGIS. El diálogo del complemento Dxf2Shape aparece, como se muestra en Figure_dxf2shape_1.
2. Introduzca el archivo DXF de entrada, un nombre para el archivo shape de salida y el tipo de archivo shape.
3. Habilitar la casilla de verificación *Exportar etiquetas de texto* si desea crear una capa extra de puntos con etiquetas.
4. Hacer clic en **[Aceptar]**

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20.6 Complemento Visualización de Eventos

(En esta sección se deriva de Horning, N., K, Koy, P. Ersts. 2009. eVis (v1.1.0) Guía de Usuario. Museo Americano de Historia Natural, Centro para la Biodiversidad y Conservación. Disponible de http://biodiversityinformatics.amnh.org/, y realizado bajo GNU FDL.)

El mecanismo de información sobre biodiversidad en el Museo Americano de Historia Natural(AMNH) Centro para la Biodiversidad y la Conservación (CBC) ha desarrollado la herramienta de visualización de eventos (eVis), otra herramienta de software para añadir al suite de monitoreo de conservación y herramienta de apoyo a las decisiones para guiar un área protegida y la planificación del paisaje. Este complemento permite a los usuarios enlazar fácilmente la geocodificación (es decir., se hacer referencia con latitud y longitud o coordenadas X y Y) de fotografías, y otros documentos de apoyo, a los datos vectoriales en QGIS.

eVis ahora esta automáticamente instalado y habilitado en nuevas versiones de QGIS, y como todos los demás complementos, se puede habilitar y deshabilitar utilizando el Administrador de Complementos (ver *El diálogo de complementos*).

El complemento de visualización de eventos se compone de tres módulos: la 'Herramienta para conexión a la base de datos', 'Herramienta de ID evento', y el 'Eventos del navegador'. Estos trabajan juntos para permitir la visualización de fotografías geocodificadas y otros documentos que están vinculados a objetos espaciales almacenados en archivo de vectores, base de datos o hojas de cálculo.

20.6.1 Explorador de Eventos

El módulo de Explorador de eventos proporciona la funcionalidad de desplegar fotografías geocodificadas que están vinculadas con un objetos espacial vectorial desplegado en la ventana de mapa de QGIS. Datos específicos, por ejemplo, puede ser desde un archivo vectorial que se puede ingresar mediante QGIS o puede ser a partir del resultado de una consulta de base de datos. El vector del objeto espacial debe tener información del atributo asociado con él para describir la ubicación y el nombre del archivo que contiene la fotografía y, opcionalmente, la dirección de la brújula de la cámara fue indicado cuando fue adquirida la imagen. Su capa vectorial se debe cargar en QGIS antes de ejecutar el explorador de eventos.

Iniciar el módulo de Explorador de eventos

Para poner en marcha el modulo Explorador de Eventos, haga clic en *Base de datos→ eVis → Explorador de Eventos eVis*. Esto abrirá la ventana *Explorador de Eventos Genérico*.

La ventana *Explorador de eventos* tiene tres pestañas desplegadas en la parte superior de la ventana. La pestaña *Visualizar* se utiliza para ver las fotografías y los datos de sus atributos asociados. La pestaña *Opciones* proporciona un número de ajustes para controlar el funcionamiento del complemento eVis. Por último, la pestaña *Configuración de aplicaciones externas* se utiliza para mantener una tabla de extensiones de archivos y su aplicación asociada para permitir a eVis desplegar documentos que no sean imágenes.

Comprender la ventana Visualizar

Para ver la ventana *Visualizar*, haga clic en la pestaña *Visualizar* en la ventana *Explorador de Eventos*. La ventana *Visualizar* se utiliza para visualizar las fotografías geocodificadas y los atributos asociados a ellas.

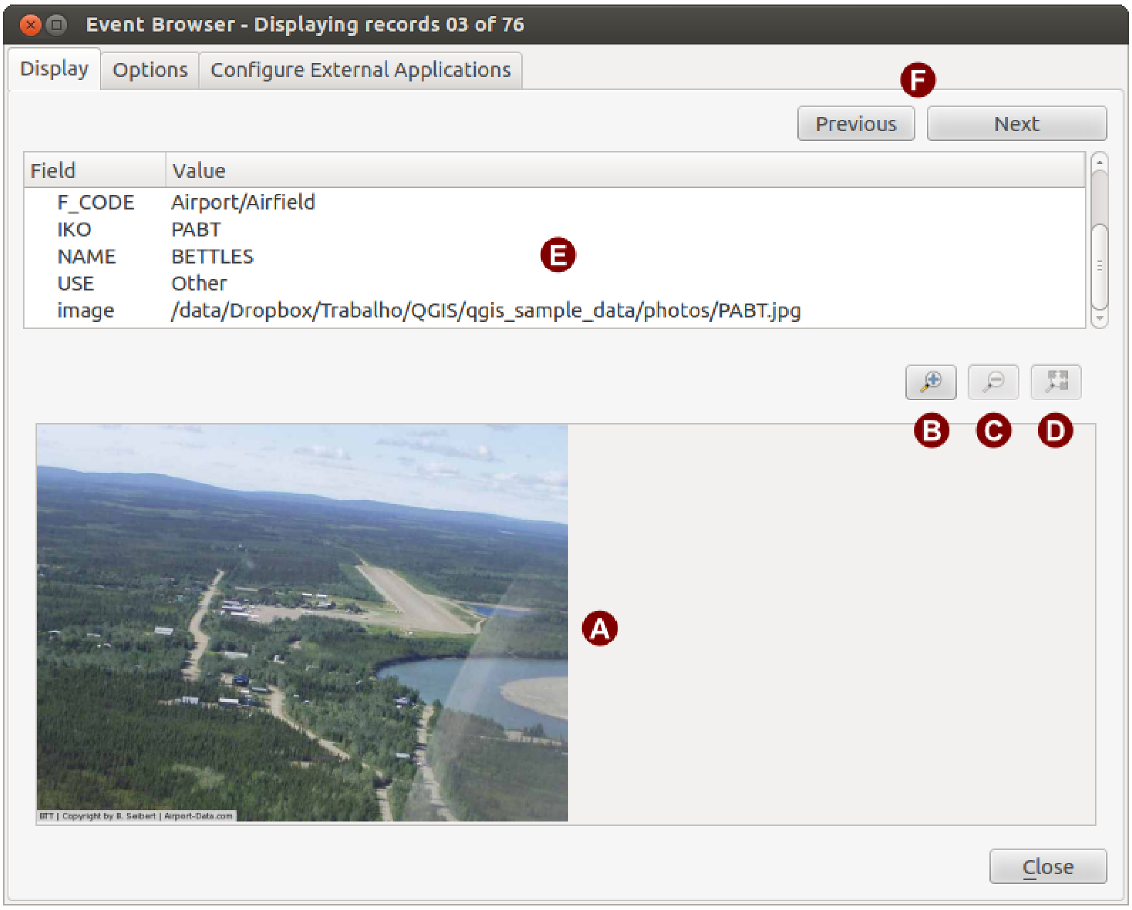

Figura 20.9: La ventana de *eVis* visualizar

1. **Ventana de Visualizar**: Una ventana donde la fotografía aparece.
2. **Botón de Acercar zoom**: Acercar zoom para ver más detalle. Si la imagen completa no puede ser visualizada en la ventana de visualizar, las barras de desplazamiento aparecerán en del lado izquierdo e inferior

de la ventana para permitirle desplazarse por la imagen.

3. **Botón de Alejar zoom**: Alejar zoom para ver más área.
4. Botón **Zum general**: Despliega la fotografía completa.
5. **Ventana de información de atributos**: Toda la información de atributos del punto asociado con la foto que se está viendo se muestra aquí. Si el tipo de archivo al que hace referencia del registro mostrado no es una imagen sino un tipo de archivo definido en la pestaña *Configurar aplicaciones externas* cuando haga doble clic en el valor del campo que contiene la ruta al archivo se abrirá la aplicación para ver u oír el contenido del archivo. Si se reconoce la extensión del archivo los datos de los atributos se mostrarán en verde.
6. **Botones de Navegación**: Utiliza el botón anterior y siguiente para cargar el objeto anterior o siguiente cuando mas de un objeto espacial esta seleccionado.

Comprender la ventana de Opciones

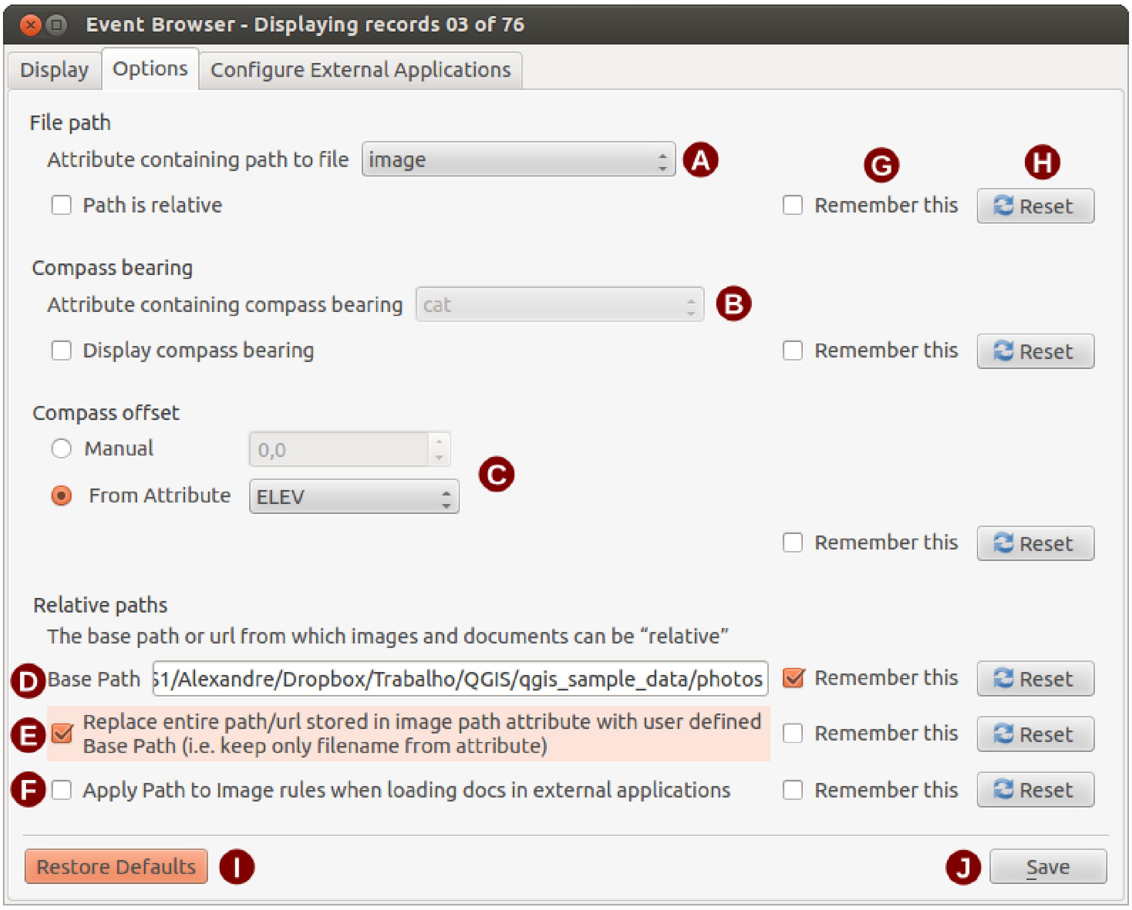

Figura 20.10: La ventana de *eVis* Opciones

1. **Ruta del archivo**: Una lista desplegable para especificar el campo de atributo que contiene la ruta del directorio o URL para las fotografías u otros documentos que se muestran. Si la ubicación es una ruta relativa, entonces la casilla de verificacion debe hacer clic. LA ruta base para una ruta relativa puede ser introducida en la caja de texto *Ruta Base* a continuación. La información sobre las diferentes opciones para especificar la ubicación del archivo se indica en la sección *Especificar la ubicación y nombre de la fotografía* a continuación.
2. **Rumbo de la brújula**: Una lista desplegable para especificar el campo de atributo que contiene el rumbo de la brújula asociado con las fotografías que se muestran. Si la información del rumbo de la brújula esta disponible, es necesario hacer clic en casilla de verificación a continuación el título del menú desplegable.

3. **Desplazamiento de la brújula**: El desplazamiento de la brújula se puede utilizar para compensar la declinación (para ajustar los rodamientos recolectados usando cojinetes magnéticos para el rumbo del norte verdadero). Haga clic en el botón de radio *Manual* para ingresar el desplazamiento en la caja de texto o haga clic en el botón de radio *De atributo* para seleccionar el campo del atributo que contiene los desplazamientos. Para ambas opciones, declinaciones del este deben introducirse utilizando valores positivos, y declinaciones al oeste deben utilizar valores negativos.
4. **Ruta del archivo**: La ruta de la base sobre la que se añadirá la ruta relativa se define en Figure_eVis_2 (A).
5. **Sustituir la ruta**: Si esta casilla de verificación esta marcada, solo el nombre del archivo de A se anexará a la ruta base.
6. **Aplicar regla a todos los documentos**: Si se marco, las mismas reglas de ruta que están definidas para las fotografías se utilizarán para los documentos sin imagen, tales como películas, documentos de texto y archivos de sonido. Si no se marca, las reglas de ruta sólo se aplicarán a las fotografías, y los otros documentos ignorarán el parámetro de la ruta base.
7. **Recordar ajustes**: Si la casilla de verificación es marcada, los valores de los parámetros asociados se guardarán para la siguiente sesión cuando la ventana se cierra o cuando el botón **[Guardar]** de abajo sea presionado.
8. **Restablecer**: Restablecer los valores en esta línea a la configuración predeterminada.
9. **Restaurar los valores predeterminados**: Esto restablecerá todos los campos a su configuración predeterminada. Tiene el mismo efecto hacer clic en todos los botones de **[Restablecer]**.
10. **Guardar**: Esto guardará los ajustes sin cerrar el panel *Opciones*.

Comprender la ventana de Configurar aplicaciones externas

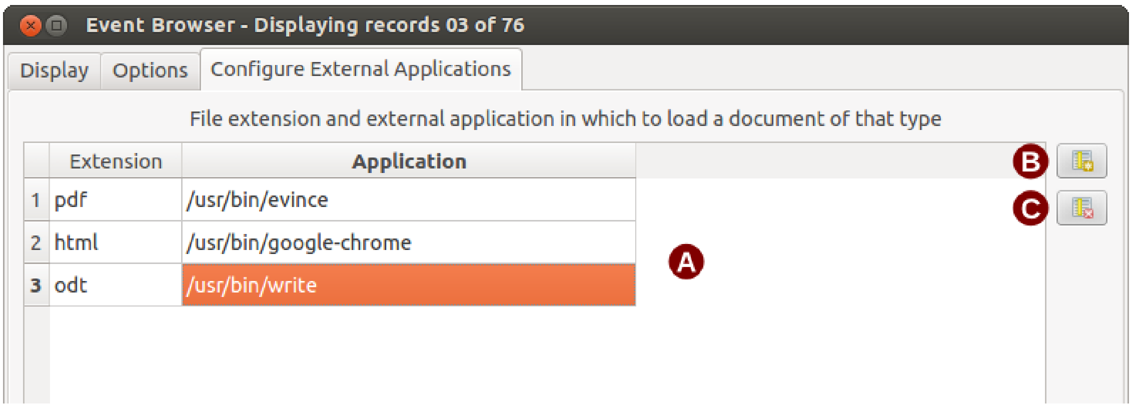

Figura 20.11: La ventana de *eVis* Aplicaciones externas

1. **Tabla de referencia de archivo**: Una tabla contiene los tipos de archivo que se pueden abrir utilizando eVis. Cada tipo de archivo necesita una extensión de archivo y la ruta de una aplicación que pueda abrir ese tipo de archivo. Esto proporciona la capacidad de abrir una amplia gama de archivos tales como películas, grabaciones sonoras y documentos de texto en lugar de solo imágenes.
2. **Añadir nuevo tipo de archivo**: Añadir un nuevo tipo de archivo con una única extensión y la ruta para la aplicación que puede abrirlo.
3. **Borrar la fila actual**: Borrar el tipo de archivo destacado en la tabla y definido por una extensión de archivo y una ruta a una aplicación asociada.

20.6.2 Especificar la ubicación y nombre de la fotografía

La ubicación y nombre de la fotografía se pueda almacenar utilizando una ruta relativa o absoluta, o una URL, si la fotografía esta disponible en el servidor web. Ejemplos de los diferentes enfoques están listados en la tabla evis_examples.

```
X         Y         FILE                                              BEARING
780596    1784017   C:\Workshop\eVis_Data\groundphotos\DSC_0168.JPG   275
780596    1784017   /groundphotos/DSC_0169.JPG                        80
780819    1784015   http://biodiversityinformatics.amnh.org/\
                    evis_testdata/DSC_0170.JPG                        10
780596    1784017   pdf:http://www.testsite.com/attachments.php?\
                    attachment_id-12                                  76
```

20.6.3 Especificar la ubicación y nombre de otros documentos soportados

Los documentos de apoyo tales como documentos de texto, videos, y clips de sonido también se pueden visualizar o reproducir por eVis. Para ello, es necesario añadir una entrada en el archivo de tabla de referencia que se puede acceder desde la ventana *Configurar Aplicaciones Externas ' en el :guilabel:'Generic Event Browser* que coincide con la extensión de archivo a una aplicación que se puede utilizar para abrir el archivo. También es necesario disponer de la ruta o URL para el archivo en la tabla de atributos de la capa vectorial. Una regla adicional que puede ser utilizada para las direcciones URL que no contienen una extensión de archivo para el documento que desea abrir es especificar la extensión del archivo antes de la URL. El formato es — `file extension:URL`. La URL es precedida por la extensión de archivo y dos puntos; esto es particularmente útil para el acceso a los mismos a partir de los wikis y otros sitios web que utilizan una base de datos para gestionar las páginas web (véase Table evis_examples).

20.6.4 Utilizar el Explorador de eventos

Cuando la ventana :guilabel: *Navegador de Eventos* se abre, una fotografía aparecerá en la pantalla si el documento se hace referencia en la tabla de atributos de archivo vectorial es una imagen y si la información de la ubicación del archivo en la ventana *Opciones* es correctamente establecida. Si se espera una fotografía y no aparece, será necesario ajustar los parámetros en la ventana :guilabel: *Opciones*.

Si un documento de apoyo (o una imagen que no tiene una extensión de archivo reconocido por eVis) se hace referencia en la tabla de atributos, el campo que contiene la ruta del archivo se resaltará en verde en la ventana de información de atributos si esa extensión de archivo se define en el archivo de la tabla de referencia se encuentra en la ventana *Configurar Aplicaciones Externas*. Para abrir el documento, haga doble clic en la línea verde resaltado en la ventana de información de atributos. Si un documento de apoyo se hace referencia en la ventana de información de atributos y la ruta del archivo no está resaltado en verde, entonces será necesario añadir una entrada para la extensión de nombre de archivo del archivo en la ventana *Configurar Aplicaciones Externas*. Si la ruta del archivo se resalta en verde, pero no se abre al hacer doble clic, será necesario ajustar los parámetros en la ventana :guilabel: *Opciones* por lo que el archivo puede ser localizado por eVis.

Si no se proporciona una brújula en la ventana :guilabel: *Opciones*, un asterisco rojo se mostrará en la parte superior de la característica de vector que se asocia con la fotografía que se muestra. Si se proporciona una brújula, a continuación, aparecerá una flecha apuntando en la dirección indicada por el valor en el campo de visualización de brújula en la ventana :guilabel: *Navegador de Eventos*. La flecha estará centrado sobre el punto que se asocia con la fotografía u otro documento.

Para cerrar la ventana *Explorador de eventos*, haga clic en el botón **[Cerrar]** de la ventana *Visualizar*.

20.6.5 Herramienta ID evento

El módulo 'Evento ID' le permite mostrar una fotografía al hacer clic en un objeto espacial mostrado en la ventana de mapa de QGIS. El objeto espacial vectorial debe tener información de atributos asociada a él para describir la ubicacion y nombre del archivo que contiene la fotografía y, opcionalmente, la dirección de la brújula de la camara se señalo cuando fue adquirida la imagen. Esta capa debe cargar QGIS antes de ejecutar la herramienta 'Evento ID'

Iniciar el módulo ID evento

Para iniciar el módulo 'Evento ID', haga clic en el icono Evento ID o bien haga clic en *Base de datos*→ *eVis* → *Herramienta de ID de evento eVis*. Esto hará que el cursor cambie a una flecha con una 'i' en la parte superior de la misma que significa que la herramienta de ID de evento está activa.

Para ver las fotografías vinculadas con entidades vectoriales en la capa vectorial activa se muestra en la ventana de mapa de QGIS, mova el cursor del Evento ID sobre el objeto espacial y hacer clic en el ratón. Después de hacer clic en el objeto, la ventana *Explorador de eventos* se abrirá y las fotografías sobre o cerca de la ubicación donde se ha hecho clic están disponibles para su visualización en el navegador. Si más de una fotografía está disponible, se puede rotar entre las distintas entidades utilizando los botones ** [Anterior] ** y ** [Siguiente] **. Los otros controles se describen en la sección ref:*evis_browser* de esta guía.

20.6.6 Conexión a base de datos

El módulo 'Conexión a base de datos' proporciona herramientas para conectar a y consultar una base de datos u otros recursos ODBC, tales como una hoja de cálculo.

eVis puede conectar directamente a los siguientes tipos de base de datos: PostgreSQL, MySQL, y SQLite; también puede leer desde conexiones ODBC (por ejemplo, MS Access). Al leer desde una base de datos ODBC (por ejemplo una hoja de Excel), es necesario configurar su driver ODBC para el sistema operativo que esté utilizando

Iniciar el módulo de Conexión a base de datos

Para iniciar el módulo 'Conexión a base de datos', haga clic en el icono apropiado Conexión a base de datos eVis o bien se hace clic en *Base de datos* → *eVis* → *Conexión a base de datos eVis*. Esto abrirá la ventana *Conexión a base de datos*. La ventana tiene tres pestañas: *Consultas predefinidas*, *Conexión a base de datos*, y *Consulta SQL*. La ventana *Consola de salida* en la parte inferior de la ventana, muestra el estado de las acciones iniciadas por las diferentes secciones de este módulo.

Conectar a una base de datos

Haga clic en la pestaña *Conexión a la base de datos* para abrir la interfaz de conexión a base de datos. A continuación, utilice la lista desplegable *Tipo de base de datos* para seleccionar el tipo de base de datos al que desea conectarse. Si una contraseña o nombre de usuario es necesario, esa información puede ser ingresada en las cajas de texto *Nombre de usuario* y *Contraseña*

Introduzca el host de base de datos en el cuadro de texto :guilabel: *Host de Base de Datos*. Esta opción no está disponible si ha seleccionado 'MS Access' como el tipo de base de datos. Si la base de datos reside en su equipo, usted debe seleccionar "localhost".

Introducir el nombre de la base de datos en la caja de texto *Nombre de la base de datos*. Si seleccionó 'ODBC' como el tipo de base de datos, es necesario introducir el nombre de la fuente de datos.

Cuando todos los parámetros están llenos, haga clic en el botón **[Conectar]**. Si la conexión es satisfactoria, un mensaje se escribirá en la ventana *Consola de salida*, inicia que la conexión fue establecida. Si una conexión no se establece, se necesita comprobar los parámetros correctos fueron insertados anteriormente.

1. **Tipo de base de datos**: Una lista desplegable para especificar el tipo de base de datos que se utilizará.
2. **Host de la base de datos**: El nombre del host de la base de datos.
3. **Puerto**: El numero de puerto si una un tipo de base de datos MySQL o PostgreSQL es seleccionado.
4. **Nombre de la base de datos**: EL nombre de la base de datos.
5. **Conectar**: Un botón para conectar a la base de datos utilizando los parámetros definidos anteriormente.
6. **Salidas a la Consola**: La ventana de consola donde los mensajes relacionados a procesos son mostrados.

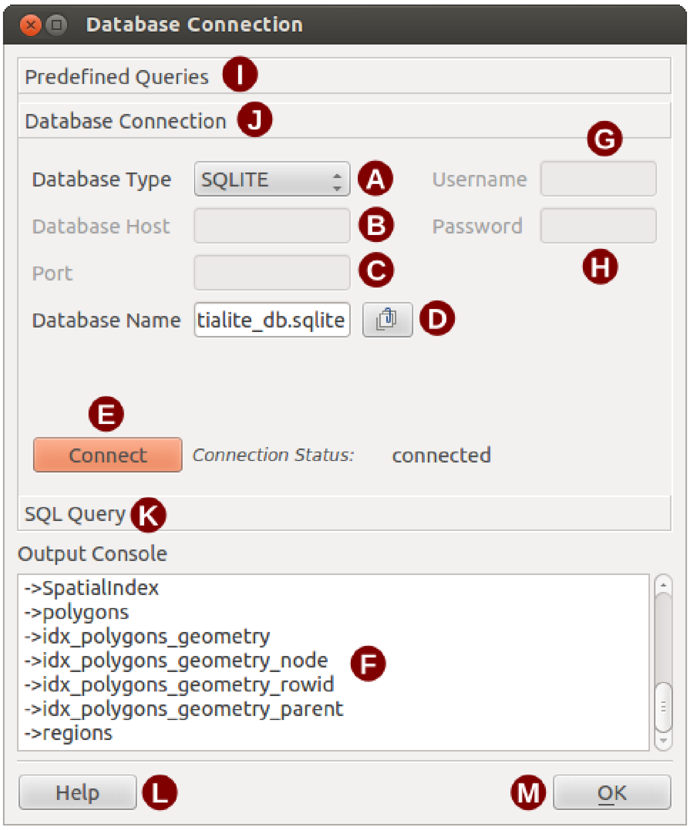

Figura 20.12: La ventana de conexión a base de datos *eVis*

7. **Nombre del Usuario**: Nombre del usuario para utilizar cuando una base de datos este protegida con contraseña.
8. **Contraseña**: Para usar cuando la base de datos esta protegida con contraseña.
9. **Consultas predefinidas**: Pestaña para abrir la ventana "Consultas Predefinidas".
10. **Conexión a base de datos**: Pestaña para abrir la ventana "Conexión a base de datos".
11. **Consulta SQL**: Pestaña para abrir la ventana "Consulta SQL".
12. **Ayuda**: Muestra la ayuda en línea.
13. **Aceptar**: Cierra la ventana principal "Conexión a Base de datos"

Ejecutar consultas SQL

Se utilizan consultas SQL para extraer información de una base de datos o un recurso ODBC. En eVis, la salida de estas consultas es una capa vectorial añadida a la ventana de mapa QGIS. Haga clic en la pestaña *Consulta SQL* para mostrar la interfaz de Consulta SQL. Los comandos SQL se pueden introducir en esta ventana de texto. Un tutotial útil sobre comandos SQL está disponible en http://www.w3schools.com/sql. Por ejemplo, para extraer todos los datos de una hoja de cálculo de un archivo Excel, `select * from [sheet1$]` donde `sheet1` es el nombre de la hoja de cálculo.

Haga clic en el botón **[Ejecutar Consulta]** para ejecutar el comando. Si la consulta es satisfactoria, una ventana *Selección de archivo de base de datos* se mostrará. Si la consulta no es satisfactoria, aparecerá un mensaje de error en la ventana *Consola de salida*.

En la ventana *Selección de archivo de base de datos*, introduzca el nombre de la capa que será creada de los resultados de la consulta en la caja de texto *Nombre de la nueva capa*

1. **Ventana de texto de consulta SQL**: Una pantalla para consultas tipo SQL.

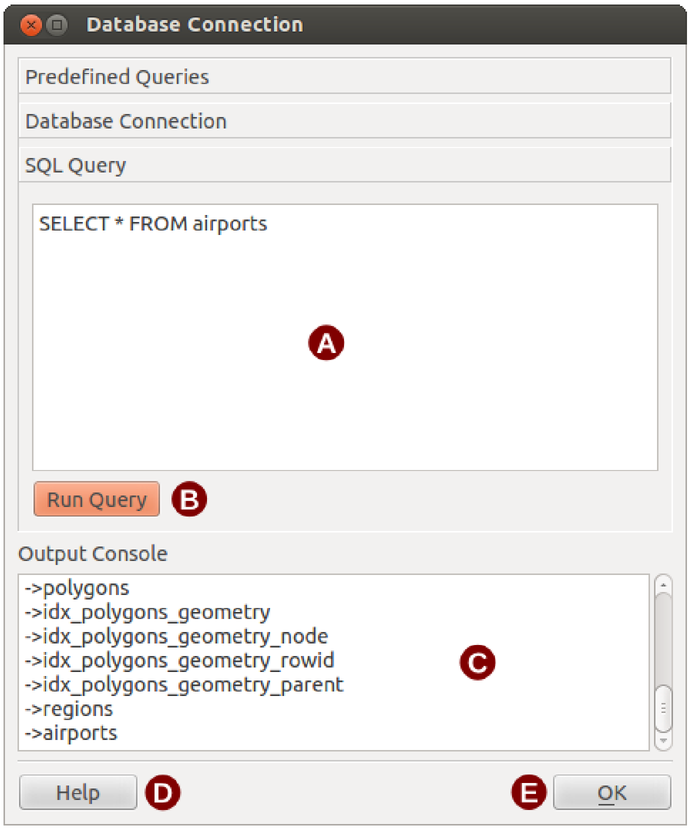

Figura 20.13: La pestaña Consulta SQL de eVis

2. **Ejecutar consulta**: El botón para ejecutar la consulta introducida en la *Consulta SQL*.
3. **Consola de salida**: La consola de salida donde se muestran los mensajes relacionados con el procesamiento.
4. **Ayuda**: Muestra la ayuda en línea.
5. **Aceptar**: Cierra la ventana principal *Conexión a base de datos*.

Utilice la lista desplegable *Coordenada X* *Coordenada Y* para seleccionar los campos de la base de datos que almacena las coordenadas `X` (o longitud) y `Y` (o latitud). Hacer clic en el botón **[Aceptar]** hace que la capa vectorial creada a partir de la consulta SQL se mostrará en la ventana de mapa QGIS.

Para guardar este archivo vectorial para usarlo en el futuro, se puede utilizar el comando de QGIS 'Guardar como...' que se accede al hacer clic derecho sobre el nombre de la capa en la leyenda del mapa de QGIS y después seleccione 'Guardar como...'

Truco: Crear una capa vectorial de una Hoja de cálculo de Microsoft Excel

Al crear una capa vectorial de una hoja de cálculo Microsoft Excel, es posible ver que los ceros no deseados ("0") han sido insertados en las filas de la tabla de atributos debajo de datos válidos. Esto puede ser causado por la supresión de los valores de estas celdas en Excel utilizando la tecla `Espacio`. Para corregir este problema, es necesario abrir el archivo de Excel (que necesita para cerrar QGIS si está conectado con el archivo, que le permite editar el archivo) y luego usar *Edición* → *Borrar* para eliminar las filas en blanco del archivo. Para evitar este problema, puede simplemente eliminar varias filas en la hoja de Excel usando *Edición* → *Borrar* antes de guardar el archivo.

Ejecutar consultas predefinidas

Con las consultas predefinidas, se pueden seleccionar consultas escritas previamente almacenadas en un archivo de formato XML. Esto es particularmente útil, si no esta familiarizado con comandos SQL. Haga clic en la pestaña

Consultas predefinidas para visualizar la interfaz de consultas predefinidas.

Para cargar un conjunto de consultas predefinidas, haga clic en el icono Abrir archivo. Este abrirá la ventana *Abrir archivo*, que se utiliza para localizar el archivo que contiene las consultas SQL. Cuando se cargan las consultas, sus títulos definidos en el archivo XML aparecerán en el menú desplegable situado justo debajo del icono Abrir archivo. La descripción completa de la consulta se mostrará en la ventana de texto en el menú desplegable.

Seleccione la consulta que desee ejecutar del menú desplegable y después haga clic en la pestaña *Consulta SQL* para ver las consultas que se han estado cargando en la ventana de consultas. Si es la primera vez puede ejecutar una consulta predefinida o esta cambiando a base de datos, necesita estar seguro para conectarse a la base de datos.

Haga clic en el botón **[Ejecutar consulta]** en la pestaña *Consulta SQL* para ejecutar el comando. Si la consulta es satisfactoria, una ventana *Selección de archivo de base de datos* se mostrará. Si la consulta no es satisfactoria, aparecerá un mensaje de error en la ventana *Consola de salida*

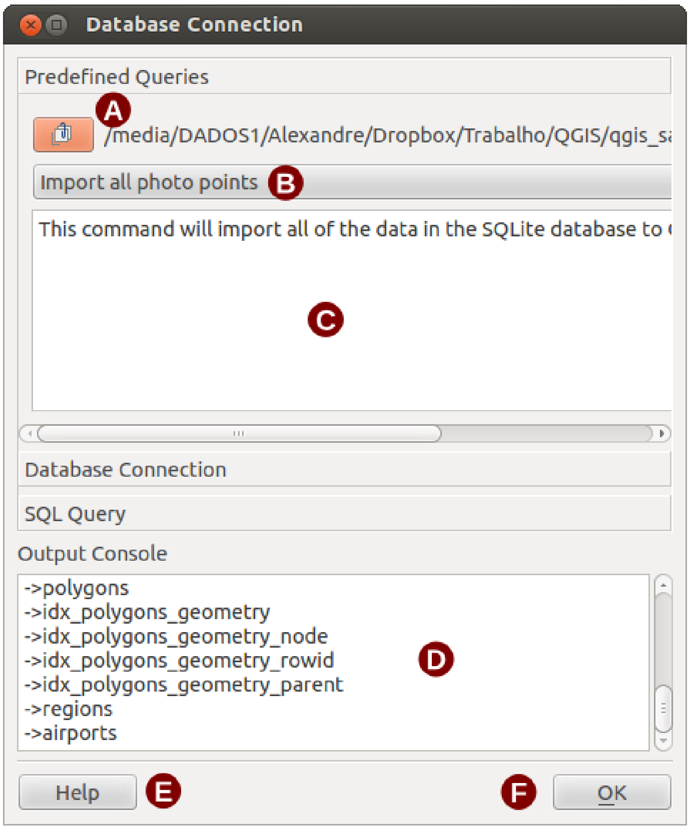

Figura 20.14: La pestaña de *eVis* Consultas predefinidas

1. **Abrir Archivo**: Iniciar el archivo "Abrir Archivo" navegar para buscar el archivo XML manteniendo las consultas predefinidas.
2. **Consultas predefinidas**: Una lista desplegable con todas las consultas definidas por el archivo XML de consultas predefinidas.
3. **Descripción de consulta**: Una descripción corta de la consulta. Esta descripción es del archivo XML de consultas predefinidas.
4. **Consola de salida**: La consola de salida donde se muestran los mensajes relacionados con el procesamiento.
5. **Ayuda**: Muestra la ayuda en línea.
6. **Aceptar**: Cierra la ventana principal "Conexión a Base de datos"

El formato XML para consultas predefinidas eVis

Las etiquetas XML leídas por eVis

Etiquetas	Descripción
Consulta	Definir el inicio y fin de una sentencia de consulta.
Descripción corta	Una descripción corta de la consulta que aparece en el menú desplegable de eVis.
Descripción	Una descripción más detallada de la consulta desplegada en la ventana de texto de consulta predefinida.
Tipo de base de datos	El tipo de la base de datos, definido en el menú desplegable de Tipo de base de datos en la pestaña de Conexión a base de datos.
Puerto	El puerto como se define en el cuadro de texto Puerto en la pestaña de Conexión a base de datos.
Nombre de la base de datos	El nombre de la base de datos como se define en el cuadro de texto en la pestaña de Conexión a base de datos.
Nombre de usuario	El nombre de usuario de la base de datos como se define en el cuadro de texto Nombre de usuario en la pestaña de Conexión a base de datos.
databasepass-word	La contraseña de la base de datos como se define en el cuadro de texto Contraseña en la pestaña Conexión a base de datos.
Sentencia sql	El comando SQL
autoconectar	Una bandera (“verdadero” o “falso”) para especificar si las etiquetas anteriores deben utilizarse para conectarse automáticamente a la base de datos sin ejecutar la rutina de conexión de base de datos en la solapa Conexión de Base de Datos.

Se muestra un archivo XML de ejemplo completo con tres preguntas a continuación:

```
<?xml version="1.0"?>
<doc>
 <query>
   <shortdescription>Import all photograph points</shortdescription>
   <description>This command will import all of the data in the SQLite database to QGIS
      </description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
   <databaseport />
   <databasename>C:\textbackslash Workshop/textbackslash
eVis\_Data\textbackslash PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID</sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
  <query>
   <shortdescription>Import photograph points "looking across Valley"</shortdescription>
   <description>This command will import only points that have photographs "looking across
      a valley" to QGIS</description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
   <databaseport />
   <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID where COMMENTS='Looking across
      valley'</sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
 <query>
   <shortdescription>Import photograph points that mention "limestone"</shortdescription>
   <description>This command will import only points that have photographs that mention
```

```
      "limestone" to QGIS</description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
   <databaseport />
   <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
   <databaseusername />
   <databasepassword />
   <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
      Points ON Points.rec_id=Attributes.point_ID where COMMENTS like '%limestone%'
      </sqlstatement>
   <autoconnect>false</autoconnect>
 </query>
</doc>
```

.

20.7 Complemento fTools

El objetivo del complemento fTools Python es proporcionar un recurso integral para muchas tareas comunes de SIG basados en vectores, sin necesidad de software adicional, bibliotecas, o complejas soluciones temporales. Proporciona un conjunto cada vez mayor de las funciones de gestión y análisis de datos espaciales que son a la vez rápidos y funcionales.

fTools esta instalado automáticamente y habilitado en nuevas versiones de QGIS, y como con todos los complementos, se puede deshabilitar y habilitar utilizando el Administrador de complementos (vea *El diálogo de complementos*). Cuando está activado, el complemento de fTools agrega un *Vectorial* a QGIS, proporcionando funciones que van desde Herramientas de Análisis, de Investigación, de Geometría y herramientas de geoprocesamiento, así como varias útiles herramientas de gestión de datos.

20.7.1 Herramientas de Análisis

Icono	Herramienta	Propósito
	Matriz de distancia	Medida de distancias entre dos puntos en la capa, y el resultado de salida como a) Matriz de distancia cuadrada, b) Matriz de distancia lineal, o c) Matriz de distancia resumen. Puede limitar las distancias de las entidades k más cercanas.
	Sumar longitud de líneas	Calcular la suma total de la longitudes de linea para cada polígono de una capa vectorial de poligonos.
	Puntos en polígonos	Contar el número de puntos que se encuentran en cada polígono de una capa vectorial de polígonos de entrada.
	Listar valores únicos	Lista de todos los valores únicos en un campo de la capa vectorial de entrada.
	Estadísticas básicas	Estadísticas básicas (media, desviación estándar, N, suma, CV)en un campo de entrada.
	Análisis del vecino más próximo	Calcular estadísticas del vecino más cercano para evaluar el nivel de agregación en una capa vectorial de puntos.
	Coordenada(s) media	Calcular el centro medio normal o ponderado de una capa vectorial completa, o múltiples entidades basadas en un campo ID único.
	Intersecciones de líneas	Localizar intersecciones entre líneas, y los resultados de salida como un archivo shape de puntos. Útil para localizar calles o intersecciones de corrientes, ignora intersecciones de línea con longitud > 0.

Tabla Ftools 1: Herramientas de Análisis fTools

20.7.2 Herramientas de investigación

Icono	Herramienta	Propósito
	Selección aleatoria	Selección aleatoria de un número n de entidades, o n porcentaje de entidades.
	Selección aleatoria dentro de subconjutos	Selección aleatoria de entidades dentro de subconjuntos basado en un campo ID único
	Puntos aleatorios	Generar puntos pseudo-aleatorios más de una capa de entrada.
	Puntos regulares	Generar una cuadrícula regular de puntos sobre una región específica y exportarlos como un archivo shape de puntos.
	Cuadrícula vectorial	Generar una cuadrícula de línea o polígono en base aun espaciado de cuadrícula especificada.
	Seleccionar por localización	Seleccionar entidades en función de su ubicación con respecto a otra capa para formar una nueva selección, o sumar o restar de la selección actual.
	Polígono de la extensión de la capa	Crear un rectángulo sencillo en la capa de polígono de extensión de una capa de entrada ráster o vectorial.

Tabla Ftools 2: Herramientas de investigación fTools

20.7.3 Herramientas de geoproceso

Icono	Herramienta	Propósito
	Envolvente(s) convexa(s)	Crear un envolvente convexo para una capa de entrada, o en función de un campo ID.
	Buffer(s)	Crear buffer(s) en torno a las entidades basado en la distancia, o un campo de distancia.
	Intersección	Sobrepone capas de manera que la salida contenga áreas donde ambas capas se cruzan.
	Unión	sobreponer capas de manera que la salida contenga las áreas intersectadas y las no intersectadas.
inter-sec-tadas	Diferencia Simétrica	Sobreponer capas de manera que la salida contenga esas zonas de las capas de entrada y diferencia que no se intersectan.
	Cortar	Sobreponer capas de tal manera que la salida contenga zonas que cruzo la capa de corte.
	Deferencia	Sobreponer capas de tal manera que la salida contenga las zonas que no intersectó la capa de corte.
	Disolver	Combinar entidades basadas en el campo de entrada. Todas los rasgos con valores de entrada idénticos se combinan para formar una solo rasgo.
	Eliminar polígonos <<astilla>>	Combinar las entidades seleccionadas con el polígono vecino con el área más grande o el límite mas grande en común.

Tabla Ftools3: Herramientas de geoproceso fTools

20.7.4 Herramientas de geometría

Icono	Herramienta	Propósito
	Comprobar validez de geometría	Comprar los polígonos para intersecciones, cerrar los agujeros y fijar el nodo de ordenamiento.
	Exportar/Añadir columnas de geometría	Añadir a capa vectorial información de geometría de la capa de punto (XCOORD, YCOORD), línea(LONGITUD), o polígono (ÁREA, PERÍMETRO) .
	Centroides de polígonos	Calcular los verdaderos centroides de cada polígono en una capa de polígonos de entrada.
	Triangulación de Delaunay	Calcular y salida (como polígonos) de la triangulación Delaunay de una capa vectorial de puntos de entrada.
	Polígonos Voronoi	Calcular polígonos Voronoi de una capa vectorial de puntos de entrada.
	Simplificar geometrías	Generalizar líneas o polígonos con un algoritmo Douglas-Peucker modificado.
	Densificar geometrías	Densificar líneas o polígonos al añadir vértices.
	Multipartes a partes sencillas	Convertir entidad multiparte a entidades múltiples de partes sencillas. Crear polígonos y líneas sencillas
	Partes sencillas a multiparte	Unir múltiples entidades a una sencilla multiparte en base a un campo ID único.
	Polígonos a líneas	Convertir polígonos a líneas, polígonos multiparte a líneas multiple de parte sencilla
	Líneas a polígonos	Convertir líneas a polígonos, líneas multiparte a polígonos de múltiple parte sencilla.
	Extraer nodos	Extraer nodos de las capas de líneas y polígonos y la salida de ellos como puntos.

Tabla Ftools 4: Herramientas de geometría fTools

Nota: La herramienta de **Simplificar geometría** se puede utilizar para borrar nodos duplicados en geometrías de líneas y polígonos. Solo tiene que establecer el parámetro de **Tolerancia de simplificado** a 0 y esto hará el truco.

20.7.5 Herramientas de gestión de datos

Icono	Herramienta	Propósito
	Definir la proyección actual	Especificar el SRC para archivos shape cuyo SRC no ha sido definido.
	Unir atributos por localización	Unir atributos adicionales a la capa de vectorial en función de su relación espacial. Los atributos de una capa vectorial se adjunta a la tabla de atributo de otra capa y se exporta como un archivo shape.
	Dividir capa vectorial	Dividir la capa de entrada en varias capas separadas basadas en el campo de entrada.
	Combinar archivos shape en uno	Combinar varios archivos shape dentro de una carpeta en un nuevo archivo shape basándose en el tipo de capa (punto, linea, polígono)
	Crear índice espacial	Crear un índice espacial para formatos OGR soportados.

Tabla Ftools 5: Herramientas de gestión de datos

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20.8 Complemento Herramientas de GDAL

20.8.1 ¿Qué son las herramientas GDAL?

El complemento de herramientas GDAL ofrece una GUI para la colección de herramientas en Geospatial Data Abstraction Library, http://gdal.osgeo.org. Estas son las herramientas de gestión ráster para consultar, re-proyecto, urdimbre y combinar una amplia variedad de formatos ráster. También se incluyen herramientas para crear una capa (vector) del contorno, o un relieve sombreado de un ráster MDT, y para hacer una VRT (Virtual Raster Tile en formato XML) a partir de una colección de uno o más archivos ráster. Estas herramientas están disponibles cuando se instala el complemento y es activado.

La biblioteca GDAL

La librería GDAL consiste en un conjunto de programas de línea de comandos, cada uno con una larga lista de opciones. Los usuarios cómodos con la ejecución de comandos desde la terminal pueden preferir la línea de comandos, con acceso a todo el conjunto de opciones. El complemento de Herramientas GDAL ofrece una interfaz fácil de las herramientas, exponiendo las opciones más populares.

20.8.2 Lista de Herramientas GDAL

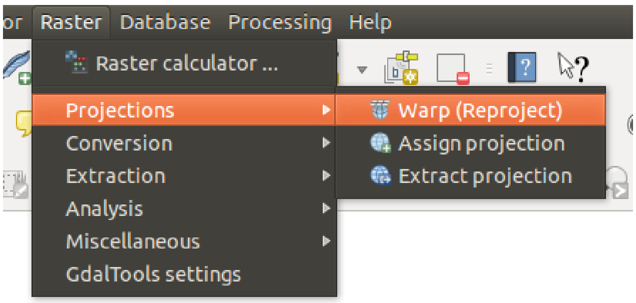

Figura 20.15: La lista del menú *Herramientas GDAL*

Projecciones

Warp (Reproject)	Esta utilidad es una imagen de mosaicos, reproyección y utilidad deformación. El programa puede reproyectar a cualquier proyección apoyada, y también se puede aplicar GCPs almacenados con la imagen si la imagen es "crudo" con información de control. Para obtener más información, se puede leer en el sitio web GDAL http://www.gdal.org/gdalwarp.html
Asignación de proyección	Esta herramienta le permite asignar proyección a rásters que ya tengan una referencia geográfica, que le falte la información de la proyección. También con su ayuda, es posible alterar las definiciones de proyección existentes. Ambos archivos simples y el modo por lotes son compatibles. Para obtener más información, por favor visite la página de utilidad en el sitio GDAL http://www.gdal.org/gdalwarp.html.
Extraer proyección	Esta utilidad te ayuda a extraer información de la proyección de un archivo de entrada. Si desea extraer información de un directorio completo, puede usar el modo por lotes. Este crea ambos archivos `.prj` and `.wld`

Conversión

Rasterizar	Este programa fusiona geometrías vectoriales (puntos, líneas y polígonos) en la banda(s) ráster de una imagen raster. Los vectores se leen de formatos vectoriales reconocidos por OGR. Tenga en cuenta que los datos vectoriales debe estar en el mismo sistema de coordenadas como los datos ráster; en la reproyección al vuelo no se proporciona. Para obtener más información, consulte http://www.gdal.org/gdal_rasterize.html.
Poligonizar	Esta utilidad crea polígonos vectoriales para todas las regiones conectadas de píxeles del ráster que comparte un valor de píxel en común. Cada polígono se crea con un atributo que indica el valor de píxel de dicho polígono. La utilidad crea el vector de salida de origen de datos si no existe ya, predeterminado a el formato de archivo shape de ESRI. Ver también http://www.gdal.org/gdal_polygonize.html.
Traducir	Esta utilidad se puede utilizar para convertir los datos ráster entre diferentes formatos, lo que podría llevar a cabo algunas operaciones como subconjuntos, remuestreo, y reescalar píxeles en el proceso. Para obtener más información se puede leer en http://www.gdal.org/gdal_translate.html.
RGB a PCT	Esta utilidad calculará una tabla de pseudocolor óptima para una imagen RGB determinada, utilizando un algoritmo de corte medio de un histograma RGB downsampled. Luego se convierte la imagen en una imagen pseudocoloreada usando la tabla de colores. Esta conversión utiliza Floyd-Steinberg (difusión de errores) para maximizar la imagen de salida de calidad visual. La utilidad también se describe en http://www.gdal.org/rgb2pct.html.
PCT a RGB	Esta utilidad convertirá una banda pseudocolor en el archivo de entrada en un archivo RGB de salida del formato deseado. Para mayor información, vea http://www.gdal.org/pct2rgb.html.

Extracción

Curvas de nivel	Este programa genera un archivo vectorial de curvas de nivel del modelo del terreno ráster (MDT). En http://www.gdal.org/gdal_contour.html, se puede encontrar más información.
Clipper	Esta utilidad le permite que acorte rásteres (extraer un subconjunto) utilizando una extensión seleccionada o en base a límites de la capa de máscara.. Más información se puede encontrar en http://www.gdal.org/gdal_translate.html.

Análisis

Filtrado	Esta utilidad elimina polígonos ráster más pequeños que un tamaño umbral previsto (en píxeles) y los reemplaza con el valor del píxel del polígono vecino más grande. El resultado se puede escribir de nuevo a la banda del ráster existente, o copiado en un nuevo archivo. Para mayor información, vea http://www.gdal.org/gdal_sieve.html.
Casi Negro	Esta utilidad escaneará una imagen y tratar de establecer todos los píxeles que son casi negros (o casi blancos) alrededor del borde para exactamente negro (o blanco). Esto se utiliza a menudo para "arreglar" comprimir pérdidas de fotos aéreas de modo que los píxeles de color se pueden tratar como transparentes cuando se hace el mosaico. También vea http://www.gdal.org/nearblack.html.
Rellenar sin datos	Esta utilidad rellena regiones de ráster seleccionadas (generalmente áreas sin datos) por interpolación de píxeles válidos alrededor de los bordes de las áreas. En http://www.gdal.org/gdal_fillnodata.html, se puede encontrar más información.
Proximidad	Esta utilidad genera un mapa ráster de proximidad que indica la distancia desde el centro de cada píxel al centro del píxel más cercano identificado como un píxel objetivo. Los pixeles objetivo son los del ráster fuente para la cual el valor de píxel del ráster está en el conjunto de valores de píxel objetivo. Para obtener más información, consulte http://www.gdal.org/gdal_proximity.html.
Cuadrícula (Interpolación)	Esta utilidad crea una cuadrícula regular (ráster) a partir de los datos dispersos leídos desde la fuente de datos OGR. Los datos de entrada serán interpolados para rellenar nodos de la cuadrícula con los valores, y puede elegir entre varios métodos de interpolación. La utilidad también se describe en el el sitio web GDAL, http://www.gdal.org/gdal_grid.html.
MDT(Modelos de Terreno)	Herramientas para analizar y visualizar DEMs. Esto puede crear un relieve sombreado, pendiente, orientación, color de relieve y un indice de irregularidad del terreno, un indice de posición topográfica y un mapa de irregularidad de algún ráster de elevación reconocido GDAL. Para mayor información , vea http://www.gdal.org/gdaldem.html.

Miscelánea

Construir ráster virtual (Catálogo)	Este programa crea un VRT (Conjunto de datos virtual) que es un mosaico de la lista de conjunto de datos GDAL de entrada. Vea también http://www.gdal.org/gdalbuildvrt.html.
Combinar	Esta utilidad automáticamente hará el mosaico un conjunto de imágenes. Todas las imágenes deben estar en el mismo sistema de coordenadas y tener un número correspondiente de bandas, pero pueden ser superpuestas, y en diferentes resoluciones. En áreas de superposición, la última imagen se copiará en las anteriores. La utilidad también se describe en http://www.gdal.org/gdal_merge.html.
Información	Esta utilidad muestra diversa información acerca de un conjunto de datos ráster GDAL-implementado. En http://www.gdal.org/gdalinfo.html, puede encontrar más información.
Generar vistas generales	La utilidad gdaladdo se puede utilizar para construir o reconstruir las vistas generales para los formatos más compatibles con un de varios algoritmos de disminución de resolución. Para obtener más información, vea http://www.gdal.org/gdaladdo.html.
Tile Index	Esta utilidad crea un archivo shape con un registro para cada archivo de entrada ráster, un atributo contiene el nombre del archivo y una geometría de polígono delineando el ráster. Vea también http://www.gdal.org/gdaltindex.html.

Configuración de herramientas GDAL

Utilice este diálogo para integrar las variables GDAL.

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20.9 Complemento Georreferenciador

El complemento Georreferenciador es una herramienta para generar archivos de referencia de ráster. Permite referenciar los ráster a sistemas de coordenadas geográficas o proyectadas mediante la creación de un nuevo GeoTiff o añadiendo un archivo de referencia a la imagen existente. El enfoque básico para georreferenciar un ráster es localizar puntos del ráster para los que se puedan determinar con precisión las coordenadas.

Características

Icono	Propósito	Icono	Propósito
	Abrir ráster		Comenzar georreferenciado
	Generar script de GDAL		Cargar puntos PCT
	Guardar puntos PCT como		Configuración de la transformación
	Añadir punto		Borrar punto
	Mover punto PCT		Desplazar
	Acercar zum		Alejar zum
	Zum a la capa		Zum anterior
	Zum siguiente		Enlazar Georreferenciador a QGIS
	Enlazar QGIS a Georreferenciador		Estiramiento total del histograma
	Estiramiento local del histograma		

Tabla Georreferenciador 1: Herramientas de Georreferenciador

20.9.1 Procedimiento habitual

Como coordenadas X e Y (GMS (gg mm ss.ss), GG (gg.gg) o coordenadas proyectadas (mmmm.mm)), que correspondan al punto seleccionado en la imagen, se pueden usar dos procedimientos alternativos:

- El propio ráster a veces proporciona cruces con coordenadas "escritas" sobre la imagen. En este caso se pueden introducir las coordenadas manualmente.
- Usando capas ya georreferenciadas. Esto pueden ser datos vectoriales o ráster que contengan los mismos objetos/entidades que tenga en la imagen que desea georreferenciar y con la proyección que desee para su imagen. En este caso puede introducir las coordenadas haciendo clic en el conjunto de datos de referencia cargado en el lienzo del mapa de QGIS.

El procedimiento habitual para georreferenciar una imagen consiste en seleccionar múltiples puntos en el ráster, especificando sus coordenadas, y elegir un tipo de transformación adecuado. Sobre la base de los parámetros y datos de entrada, el complemento calculará los parámetros del archivo de referencia. Cuantas más coordenadas suministre, mejor será el resultado.

El primer paso es iniciar QGIS, cargar el complemento Georreferenciador (vea *El diálogo de complementos*) y hacer clic en *Ráster* → *Georeferenciador*, el cual aparece en la barra de menú de QGIS. El diálogo del complemento Georreferenciador aparece como se muestra en figure_georeferencer_1.

Para este ejemplo usaremos una hoja topográfica de Dakota del Sur del SDGS. Más tarde se puede visualizar junto con los datos de la localización `spearfish60` de GRASS. Puede descargar la hoja topográfica aquí: http://grass.osgeo.org/sampledata/spearfish_toposheet.tar.gz.

Introducir puntos de control sobre el terreno (PCT)

1. Para empezar a georreferenciar un ráster no referenciado, debemos cargarlo utilizando el botón . El ráster aparecerá en la zona de trabajo principal del diálogo. Una vez que el ráster esté cargado, podemos empezar a introducir los puntos de referencia.
2. Añada puntos a la zona principal de trabajo usando el botón Añadir punto e introduzca sus coordenadas (vea la Figura figure_georeferencer_2). Para este procedimiento tiene tres opciones:
   - Hacer clic en un punto de la imagen ráster e introducir las coordenadas X e Y manualmente.
   - Haga clic en un punto de la imagen ráster y elija el botón Desde lienzo del mapa para añadir las coordenadas X e Y con la ayuda de un mapa ya georreferenciado cargado en el lienzo del mapa de QGIS.

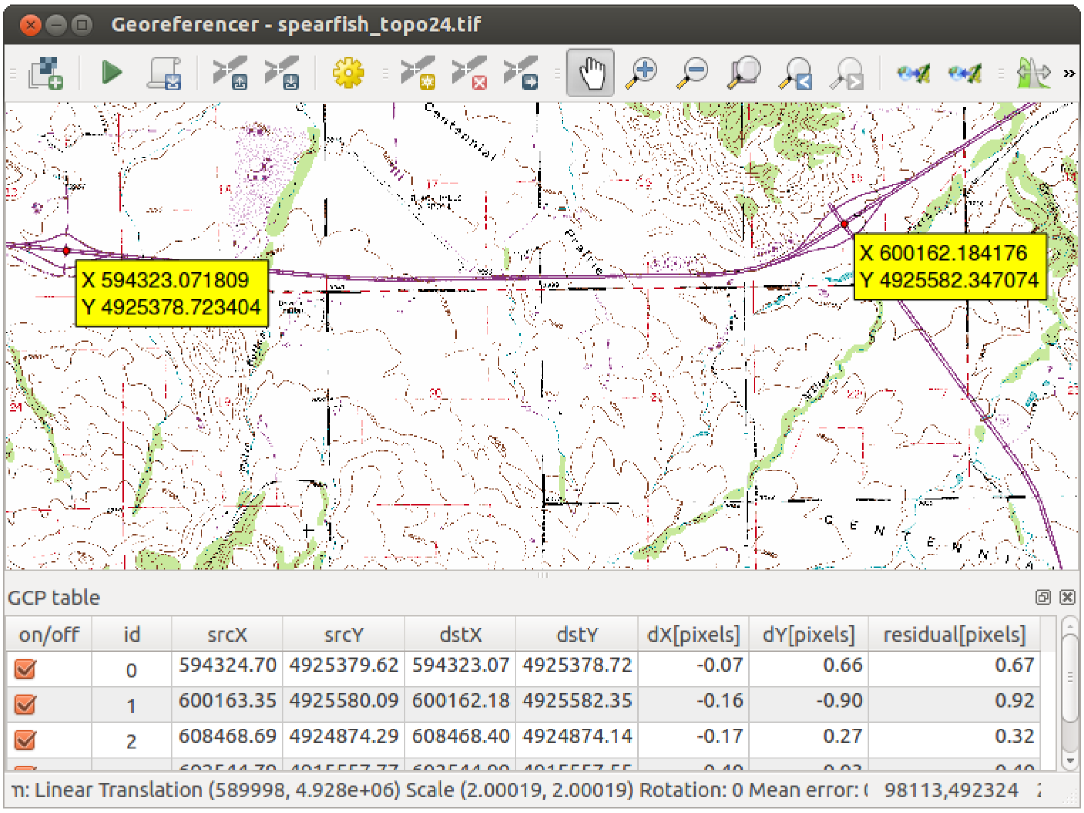


Figura 20.16: Diálogo del complemento Georreferenciador

- Con el botón puede mover los PCT en ambas ventanas, si están en un lugar incorrecto.

3. Continuar introduciendo puntos. Debe tener por lo menos cuatro puntos y cuantas más coordenadas pueda proporcionar mejor será el resultado. Existen herramientas adicionales en el cuadro de diálogo del complemento para hacer zum o desplazar la zona de trabajo con el fin de localizar un conjunto relevante de puntos PCT.

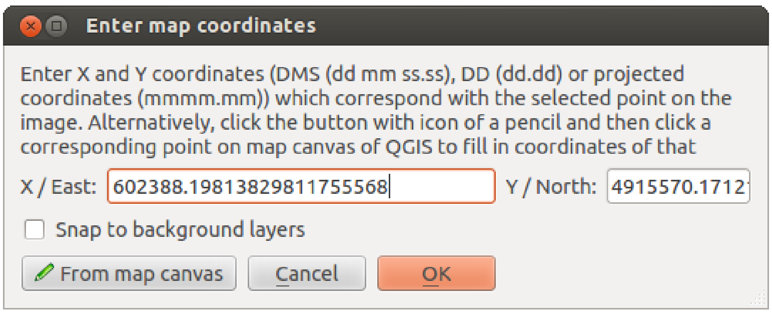


Figura 20.17: Añadir puntos a la imagen ráster

Los puntos que se agregan al mapa se almacenarán en un archivo de texto separado (`[nombre de archivo].points`) generalmente junto con la imagen ráster. Esto nos permite reabrir el complemento Georeferenciador en una fecha posterior y añadir nuevos puntos o eliminar los ya existentes para optimizar el resultado. El archivo contiene los valores de los puntos de la forma: `mapX, mapY, pixelX, pixelY`. Puede utilizar los botones Cargar puntos PCT y Guardar puntos PCT como para gestionar los archivos.

Definir la configuración de la transformación

Después de añadir los PCT a la imagen ráster, debe definir la configuración de la transformación para el proceso de georreferenciación.

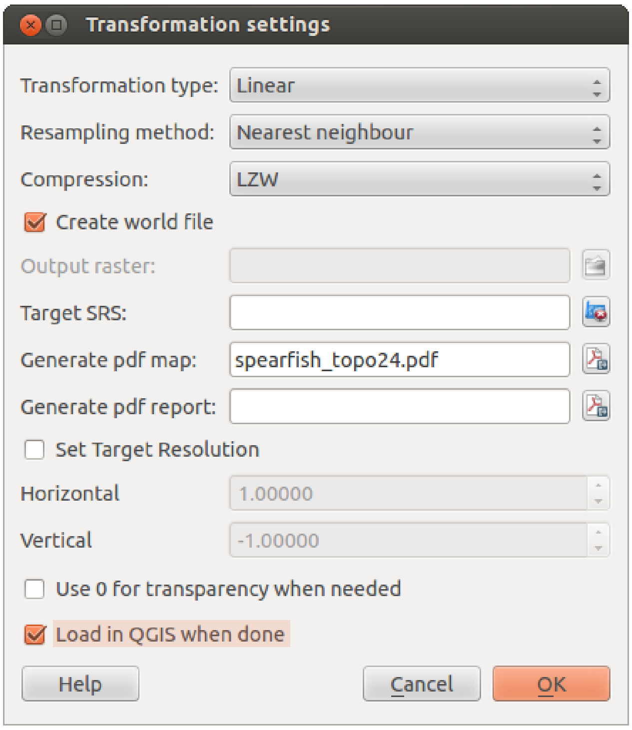


Figura 20.18: Definir la configuración de la transformación del georreferenciador

Algoritmos de transformación disponibles

Dependiendo del número de puntos de control sobre el terreno que haya capturado, es posible que desee utilizar diferentes algoritmos de transformación. La elección del algoritmo de transformación también depende del tipo y la calidad de los datos de entrada y la cantidad de distorsión geométrica que está dispuesto a introducir en el resultado final.

Actualmente están disponibles los siguientes *Tipos de transformación*:

- El algoritmo **Lineal** se utiliza para crear un archivo de referencia y es diferente de los otros algoritmos, ya que realmente no trasforma el ráster. Este algoritmo probablemente no será suficiente si se trata de material escaneado.
- La trasformación **Helmert** realiza un escalado sencillo y trasformaciones de rotación.
- Los algoritmos **Polinomial** 1-3 son algunos de los algoritmos más utilizados introducidas para que coincidan los puntos de control sobre el terreno de origen y destino. El algoritmo polinomial más ampliamente usado es la transformación polinomial de segundo orden, que permite cierta curvatura. La transformación polinomial de primer orden (afín) preserva la colinealidad y permite escalado, traslación y rotación solamente.
- El algoritmo **Thin Plate Spline** (TPS) es un método de georreferenciación más moderno, que es capaz de introducir deformaciones locales en los datos. Este algoritmo es útil cuando se georreferencian originales de muy baja calidad.
- La trasformación **Proyectiva** es una rotación lineal y traducción de coordenadas.

Definir el método de remuestreo

El tipo de remuestreo que elija probablemente dependerá de los datos de entrada y el objetivo último del ejercicio. Si no se desea cambiar las estadísticas de la imagen, es posible que desee elegir "Vecino más próximo", mientras que un 'Remuestreo cúbico' probablemente proporcionará un resultado más suavizado.

Es posible elegir entre cinco diferentes métodos de remuestreo:

1. Vecino más próximo
2. Lineal
3. Cúbica
4. Spline cúbica
5. Lanczos

Definir la configuración de la trasformación

Hay varias opciones que deben definirse para el ráster de salida georreferenciado.

- La casilla de verificación checkbox| *Crear archivo de referencia* esta disponible solo si se decide utilizar la transformación lineal, porque esto quiere decir que la imagen ráster no será transformada realmente. En este caso, el campo *Ráster de salida* no se activa, porque solo se creará el nuevo archivo de referencia.
- Para todos los otros tipos de transformación hay que definir un *Ráster de salida*. Por omisión se creará un nuevo archivo ([nombre de archivo] _modificado) en la misma carpeta junto con la imagen ráster original.
- Como siguiente paso, tiene que definir el *SRE de destino* (Sistema de Referencia Espacial) para la imagen georeferenciada (vea *Working with Projections*).
- Si lo desea, puede **generar un mapa en pdf** y también **un informe en pdf**. El informe incluye información acerca de los parámetros de trasformación utilizados, una imagen de los residuos y una lista con todos los PCT y sus errores RMS.
- Además, puede activar la casilla de verificación *Establecer resolución de destino* y definir la resolución del píxel del archivo de salida. Por omisión la resolución horizontal y vertical es 1.
- Se puede activar la casilla *Usar 0 para transparencia cuando sea necesario*, si los píxeles con valor 0 deben visualizarse trasparentes. En nuestra hoja topográfica de ejemplo todas las áreas blancas serían transparentes.
- Finalmente, la casilla *Cargar en QGIS cuando esté hecho* carga el ráster de salida automáticamente en el lienzo del mapa de QGIS cuando la transformación está hecha.

Mostrar y adaptar las propiedades del ráster

Al hacer clic en el diálogo *Propiedades del ráster* en el menú *Configuración* se abren las propiedades del ráster de la capa que desea georreferenciar.

Configurar el georreferenciador

- Puede definir si quiere mostrar las coordenadas y/o las ID de los PCT.
- Como unidades residuales se pueden elegir píxeles y unidades del mapa.
- Para el informe PDF puede definir un margen izquierdo y derecho y también puede establecer el tamaño del papel para el mapa PDF.
- Finalmente, puede activar *Mostrar la ventana del Georeferenciador adosada*.

Ejecutar la transformación

Una vez se hayan recopilado todos los PCT y se hayan definido todos los ajustes de transformación, basta con pulsar el botón Comenzar gerreferenciado para crear el nuevo ráster georreferenciado.

.

20.10 Complemento de interpolación

El complemento de interpolación se puede utilizar para generar una interpolación TIN o IDW de una capa vectorial de puntos. Es muy fácil de usar y proporciona una interfaz gráfica de usuario intuitiva para crear capas ráster interpoladas (ver Figure_interpolation_1). El complemento requiere que se especifiquen los siguientes parámetros antes de ejecutarlo:

- **Capas vectoriales** de entrada: Especificar la(s) capa(s) vectorial(es) de puntos de entrada a partir de una lista de capas de puntos cargadas. Si se especifican varias capas, entonces se usarán los datos de todas ellas para la interpolación. Nota: es posible insertar lineas o polígonos como restricción para la triangulación, especificando "puntos", "líneas de estructura" o "líneas de ruptura" en el cuadro combinado *Tipo*
- **Atributo de interpolación**: Seleccionar la columna de atributos a usar para la interpolación o habilitar la casilla *Usar coordenada-Z* para usar los valores Z almacenados en la capa.
- **Método de interpolación**: Seleccionar el método de interpolación. Este puede ser 'Red Irregular Triangulada (Triangulated Irregular Network-TIN)' o 'Distancia Inversa Ponderada (Inverse Distance Weighted-IDW)'.
- **Número de columnas/filas**: Especificar el número de filasy columnas para el archivo ráster de salida.
- **Archivo de salida**: Especifica un nombre para el fichero ráster de salida.
- *Añadir el resultado al proyecto* para cargar el resultado en la vista del mapa.

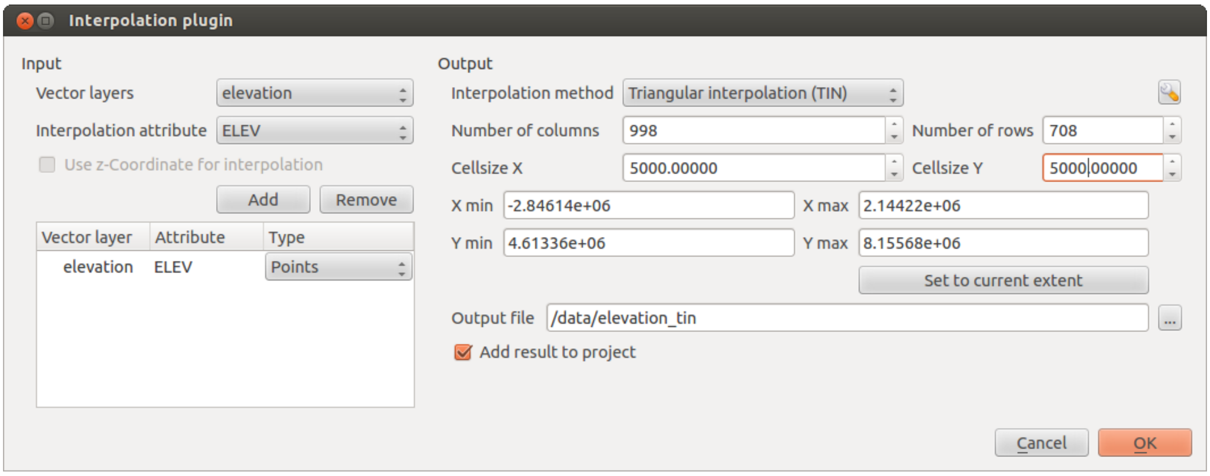


Figura 20.19: Complemento de Interpolación

20.10.1 Usar el complemento

1. Comenzar QGIS y cargar una capa vectorial de puntos (ej. `elevp.csv`).
2. Cargar el Complemento de interpolación en el Administrador de complementos (ver *El diálogo de complementos*) y dar clic sobre *Ráster* → *Interpolación* → *Interpolación*, que aparece en la barra de menú de QGIS. La ventana de diálogo del complemento de interpolación aparece como se muestra en la Figure_interpolation_1.

3. Seleccione una capa de entrada (ej. *elvep*) y una columna (ej. `ELEV`) para interpolación.
4. Seleccionar un método de interpolación(ej. 'Red Irregular Triangulada (Triangulated Irregular Network-TIN)') y especificar un tamaño de celda de 5000 así como el nombre del archivo ráster de salida (ej.:file:*elevation_tin*).
5. Pulse **[Aceptar]**.

.

20.11 Complemento Edición fuera de linea

Para la recolección de datos, es una situación común para trabajar con un ordenador portátil o una línea de teléfono celular en el campo. A su regreso a la red, los cambios tienen que ser sincronizados con el origen de datos principal (ej., una base de datos PostGIS). Si varias personas están trabajando simultáneamente en los mismos conjuntos de datos, es difícil fusionar los cambios a mano, incluso si la gente no cambia los mismo elementos.

El complemento Edición fuera de linea automatiza la sincronización al copiar el contenido de una fuente de datos (en general PostGIS o WFS-T) a una base de datos SpatialLite y almacena la edición fuera de linea en tablas dedicadas, Después ser conectado a la red de nuevo, es posible aplicar la edición fuera de linea al conjunto de datos maestro.

20.11.1 Usar el complemento

- Abrir algunas capas vectoriales (e.j. de una fuente de datos PostGIS o WFS-T).
- Guardarlo como un proyecto.
- Ir a *Base de datos* → *Edición fuera de linea* → *Convertir en proyecto fuera de linea* y seleccionar las capas a guardar. El contenido de las capas se guarda en tablas SpatiaLite.
- Editar las capas fuera de linea.
- Después de ser conectado de nuevo, cargar los cambios usando *Base de datos* → *Edición fuera de linea*→ *Sincronizar*.

.

20.12 Complemento GeoRaster espacial de Oracle

En las bases de datos de Oracle, los datos raster se pueden almacenar como objetos SDO_GEORASTER disponibles con la extensión de Oracle Spatial. En QGIS, el complemento GeoRaster espacial de Oracle Spatial es admitido por GDAL y depende de que tenga instalado y funcionando en su equipo el producto de bases de datos de Oracle. Aunque Oracle es software propietario, proporciona de forma gratuita su software con fines de desarrollo y prueba. Aquí hay un ejemplo de cómo cargar imágenes raster a GeoRaster:

```
$ gdal_translate -of georaster input_file.tif geor:scott/tiger@orcl
```

Esto cargará el raster en la tabla predeterminada GDAL_IMPORT, como una columna llamada "RASTER"

20.12.1 Administrar conexiones

En primer lugar, se debe habilitar el complemento GeoRaster de Oracle, usando el Administrador de complementos (ver *El diálogo de complementos*). La primera vez que cargue un GeoRaster in QGIS, debe crear una conexión a la base de datos de Oracle que contiene los datos. Para hacer esto, inicie con clic sobre el botón de la barra

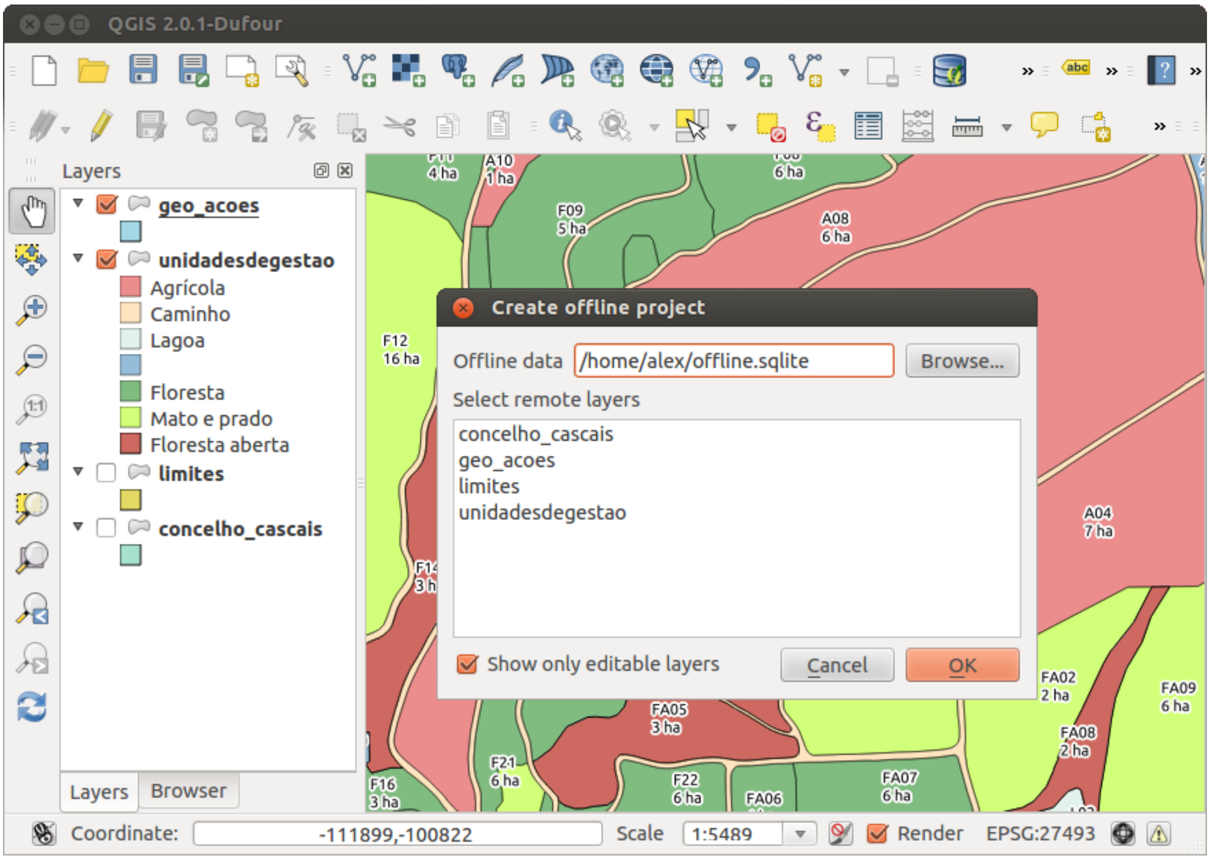


Figura 20.20: Crear un proyecto fuera de linea de capas PostGIS o WFS

de herramientas Añadir capa GeoRaster de Oracle –esto abrirá la ventana de diálogo *Seleccionar GeoRaster espacial de Oracle*. Clic sobre **[Nuevo]** para abrir la ventana de dialogo y especificar los parámetros de conexión (Ver Figure_oracle_raster_1_1):

- **Nombre**: Introduzca un nombre para al conexión a la base de datos.
- **Instancia de la base de datos**: Introduzca el nombre de la base de datos a la que desea conectarse.
- **Nombre de usuario**: Especificar su nombre de usuario que usará para acceder a la base de datos.
- **Contraseña**: Proporcionar la contraseña asociada con su usuario que es requerida para el acceso a la base de datos.

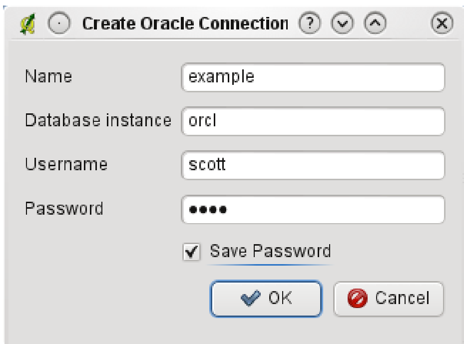


Figura 20.21: Crear dialogo de conexión de Oracle

Ahora, de vuelta en la ventana principal de *GeoRaster espacial de Oracle* (vea la Figure_oracle_raster_2), utilice la lista desplegable para elegir una conexión y utilice el botón **[Conectar]** para establecer la conexión. También puede **[Editar]** la conexión abriendo el dialogo previo y haciendo cambios en la información de la conexión, o usar el botón **[Borrar]** para eliminar la conexión desde la lista desplegable.

20.12.2 Seleccionar un GeoRaster

Una vez que la conexión se ha establecido, la ventana de subconjuntos de datos mostrará los nombres de todas las tablas que contengan columnas GeoRaster en esa base de datos en el formato de un nombre del subconjunto de datos GDAL.

Haga clic en uno de los subconjuntos de datos listados y después haga en **[Seleccionar]** para elegir el nombre de la tabla. Ahora se mostrará otra lista de subconjuntos de datos con los nombres de las columnas del GeoRaster en la tabla. Normalmente es una lista corta, ya que la mayoría de los usuarios no tendrán mas de una o dos columnas de GeoRaster en la misma tabla.

Clic sobre uno de los subconjuntos de datos en listados y después sobre **[Seleccionar]** para elegir una de las combinaciones tabla/columna. El dialogo mostrará ahora todos los registros que contengan objetos GeoRaster. Note que la lista de subconjunto de datos mostrará ahora las parejas de tablas de datos raster e Id de raster.

En cualquier momento, la entrada seleccionada se puede ser editar para ir directamente a un GeoRaster conocido o para regresar al inicio y seleccionar otro nombre de tabla.

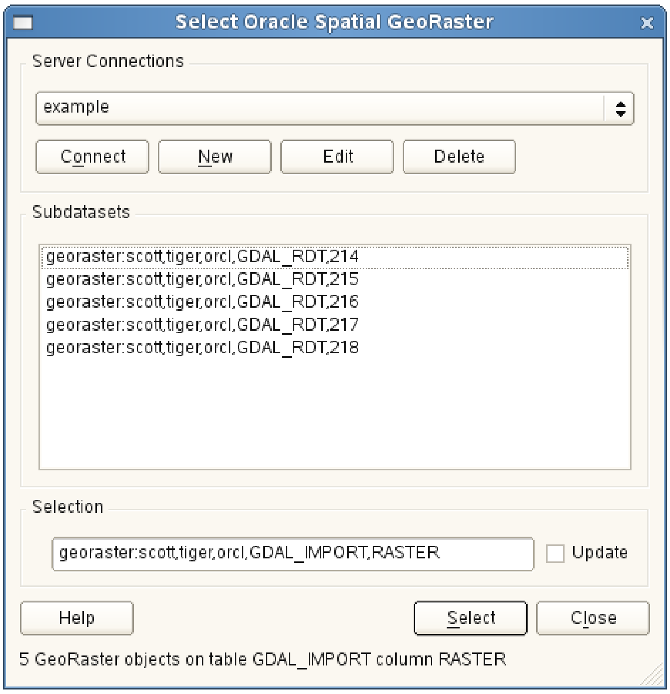


Figura 20.22: Diálogo de selección de GeoRaster de Oracle

La entrada de datos seleccionados también puede usarse para introducir una cláusula `WHERE` al final de la cadena de identificación (ej. `geor:scott/tiger@orcl,gdal_import,raster,geoid=`). Vea http://www.gdal.org/frmt_georaster.html para mayor información.

20.12.3 Mostrar GeoRaster

Finalmente, al seleccionar un GeoRaster de la lista de tablas de datos raster e Id raster, la imagen raster se cargará en QGIS.

El dialogo *Seleccionar GeoRaster espacial de Oracle* puede cerrarse ahora y la siguiente ocasión en que se abra mantendrá la misma conexión y mostrará la misma lista previa de subconjuntos de datos, haciendo muy fácil abrir otra imagen del mismo contexto.

Nota: Los GeoRaster que contienen pirámides se mostrarán mucho más rápido, pero las pirámides se deben generar fuera de QGIS usando PL/SQL o gdaladdo.

Lo siguiente es un ejemplo usando `gdaladdo`:

```
gdaladdo georaster:scott/tiger@orcl,georaster\_table,georaster,georid=6 -r
nearest 2 4 6 8 16 32
```

Este es un ejemplo usando PL/SQL:

```
$ sqlplus scott/tiger
SQL> DECLARE
 gr sdo_georaster;
BEGIN
    SELECT image INTO gr FROM cities WHERE id = 1 FOR UPDATE;
    sdo_geor.generatePyramid(gr, 'rLevel=5, resampling=NN');
    UPDATE cities SET image = gr WHERE id = 1;
    COMMIT;
END;
```

.

20.13 Complemento Análisis de Terreno

El complemento de Análisis de Terreno se puede utilizar para calcular la pendiente, orientación, mapa de sombras, índice de irregularidad y relieve para un modelo digital de elevación (DEM). Es muy sencillo el manejo y proporciona una interfaz de usuario gráfica intuitiva para crear nuevas capas ráster (vea Figure_raster_terrain_1).

Descripción del análisis:

- **Pendiente**: Calcula el ángulo de la pendiente de cada celda en grados (basado en primer orden estimación derivada).
- **Orientación**: Exposición (iniciar con 0 para la dirección norte, en grados antihorario).
- **Mapa de sombras**: Crea un mapa de sombra utilizando la luz y sombra que proporciona un aspecto más tridimensional para u mapa de relieve sombreado.
- **Índice de irregularidad**: Una medición cuantitativa de la heterogeneidad del terreno tal como se describe por Riley et al. (1999). Se calcula para cada lugar con un resumen de los cambios en la elevación dentro de la cuadrícula de 3x3 píxeles.
- **Relieve**: Crea un mapa de relieve sombreado de los datos digitales de elevación. Implementado es un método para elegir los colores de elevación mediante el análisis de la distribución de frecuencias.

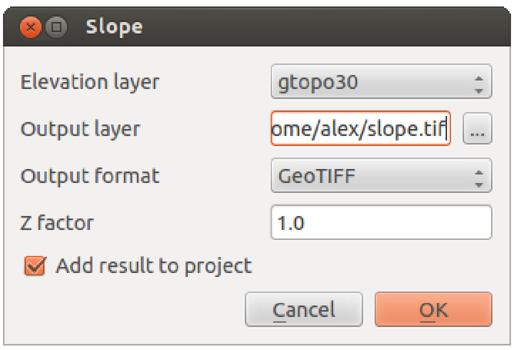


Figura 20.23: Complemento de Modelado de Terreno (Cálculo de la pendiente)

20.13.1 Usar el complemento

1. Inicie QGIS y cargue las capas raster `gtopo30` de la ubicación de ejemplo de GRASS.
2. Cargar el complemento de Análisis de Terreno en el Administrador de Complementos (vea *El diálogo de complementos*).
3. Seleccione un método de análisis del menú (e.j., *Ráster* → *Análisis de Terreno* → *Pendiente*). El diálogo *Pendiente* aparece como se muestra en Figure_raster_terrain_1.
4. Especificar una ruta , y un tipo de archivo de salida
5. Haga clic en **[Aceptar]**.

.

20.14 Complemento Mapa de calor

El complemento *Mapa de calor* usa Estimación de Densidad de Kernel para crear un ráster de densidad (mapa de calor) de una capa de puntos de entrada. La densidad se calcula en base al número de puntos en una ubicación, de forma que un mayor número de puntos agrupados resulta en valores mayores. Los mapas de calor permiten una fácil identificación de los "puntos calientes" y la agrupación de los puntos.

20.14.1 Activar el complemento Mapa de calor

En primer lugar este complemento núcleo necesita ser activado utilizando el Administrador de Complementos (véase *El diálogo de complementos*). Después de activarlo, el icono de mapa de calor se puede encontrar en la barra de herramientas de Ráster, y bajo el menú *Ráster* → *Mapa de calor*.

Seleccione el menú *Ver* → *Barras de herramientas* → *Ráster* para mostrar la barra de herramientas Ráster, si no está visible.

20.14.2 Usar el complemento de Mapa de calor

Haga clic en el botón de la herramienta *Mapa de calor* para abrir el diálogo del complemento Mapa de calor (vea figure_heatmap_2).

El diálogo tiene las siguientes opciones:

- **Capa de puntos de entrada**: Lista todas las capas vectoriales de puntos del proyecto actual y se usa para seleccionar la capa a analizar.
- **Ráster de salida**: Permite usar el botón ... para seleccionar la carpeta y el nombre de archivo del ráster de salida que genera el complemento Mapa de calor. La extensión del archivo no es necesaria.
- **Formato de salida**: Selecciona el formato de salida. Aunque se pueden elegir todos los formatos soportados por GDAL, en la mayoría de los casos GeoTIFF es el mejor formato para elegir.
- **Radio**: Se usa para especificar el radio de búsqueda del mapa de calor (o ancho de banda del kernel) en metros o unidades del mapa. El radio especifica la distancia alrededor de un punto a la que se notará la influencia del punto. Los valores más altos dan lugar a un mayor suavizado, mientras que los valores más pequeños pueden mostrar detalles y variación más finos en la densidad de puntos.

Cuando la casilla de verificación *Avanzado* está marcada, hay disponibles opciones adicionales:

- **Filas** y **Columnas**: Utilizado para cambiar las dimensiones del ráster de salida. Estos valores también están ligados a los valores de **Tamaño X de celda** y **Tamaño Y de celda**. Incrementar el número de filas y columnas disminuirá el tamaño de la celda e incrementará el tamaño del archivo de salida. Los valores en Filas y Columnas también están vinculados, por lo que duplicar el número de filas duplicará automáticamente el número de columnas y el tamaño de las celdas también se reducirá a la mitad. ¡El área geográfica del ráster de salida seguirá siendo el mismo!

- **Tamaño X de celda** y **Tamaño Y de celda**: Controlan el tamaño geográfico de cada píxel en el ráster de salida. Cambiar estos valores también cambiará el número de filas y columnas en el ráster de salida.
- **Forma del kernel**: La forma del kernel controla la proporción en la que la influencia de un punto disminuye a medida que aumenta la distancia desde el punto. Los diferentes kernels disminuyen en distintas proporciones, por lo que un kernel triweight da mayor peso a las entidades más próximas al punto de lo que hace el kernel Epanechnikov. En consecuencia, triweight de como resultado puntos calientes "más afilados" y Epanechnikov da puntos calientes "más suaves". Hay disponible una serie de funciones estándar del kernel en QGIS, que se describen e ilustran en Wikipedia.
- **Relación de decadencia**: Se puede utilizar con kernel Triangulares para un mayor control de cómo disminuye el calor de una entidad con la distancia a la misma.
  - Un valor de 0 (= mínimo) indica que el calor estará concentrado en el centro del radio dado y se extinguirá por completo en el borde.
  - Un valor de 0.5 indica que a los píxeles del borde del radio se les dará la mitad del calor que a los píxeles del centro del radio de búsqueda.
  - Un valor de 1 significa que el calor se distribuye uniformemente por todo el círculo del radio de búsqueda. (Esto es equivalente al kernel 'Uniforme'.)
  - Un valor mayor que 1 indica que el calor es mayor hacia el borde del radio de búsqueda que en el centro.

La capa de puntos de entrada también puede tener campos de atributos que pueden afectar la forma en que influyen en el mapa de calor:

- **Usar radio a partir de campo**: Establece el radio de búsqueda para cada entidad a partir de un campo de atributos de la capa de entrada.
- **Usar peso a partir de campo**: Permite ponderar las entidades de entrada por un campo de atributos. Esto se puede utilizar para aumentar la influencia que ciertas entidades tienen en el mapa de calor resultante.

Cuando se especifica un nombre para el archivo ráster de salida se puede utilizar el botón **[Aceptar]** para crear el mapa de calor.

20.14.3 Tutorial: crear un mapa de calor

Para el siguiente ejemplo usaremos la capa vectorial de puntos `airports` del conjunto de datos de ejemplo de QGIS (vea *Datos de ejemplo*). Otro excelente tutorial de QGIS sobre hacer mapas de calor se puede encontrar en http://qgis.spatialthoughts.com.

En Figure_Heatmap_1, se muestran los aeropuertos de Alaska.

1. Seleccione el botón de la herramienta *Mapa de calor* para abrir el diálogo de Mapa de calor (vea Figure_Heatmap_2).
2. En el campo *Capa de puntos de entrada* , seleccione `airports` de la lista de capas de puntos cargadas en el proyecto actual.
3. Especifique un nombre para el archivo de salida haciendo clic en el botón próximo al campo *Ráster de salida*. Escriba el nombre del archivo `heatmap_airports` (no es necesaria extensión de archivo).
4. Deje el *Formato de salida* como el formato predeterminado, `GeoTIFF`.
5. Cambie el *Radio* a `1000000` metros.
6. Haga clic en **[Aceptar]** para crear y cargar el mapa de calor de aeropuertos (vea Figure_Heatmap_3).

QGIS generará el mapa de calor y añadirá el resultado a la ventana del mapa. Por omisión, el mapa de calor está sombreado en escala de grises, con las zonas más claras mostrando una mayor concentración de aeropuertos. Al mapa de calor se le puede aplicar ahora un estilo en QGIS para mejorar su apariencia.

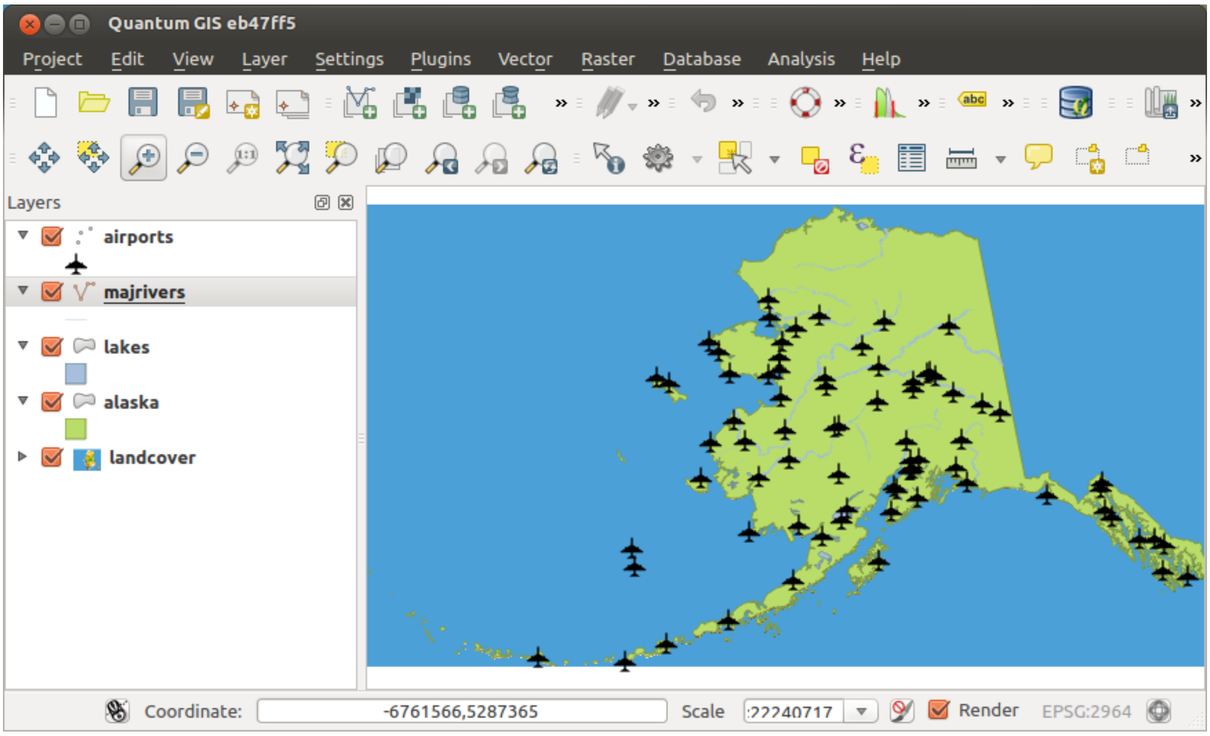


Figura 20.24: Aeropuertos de Alaska

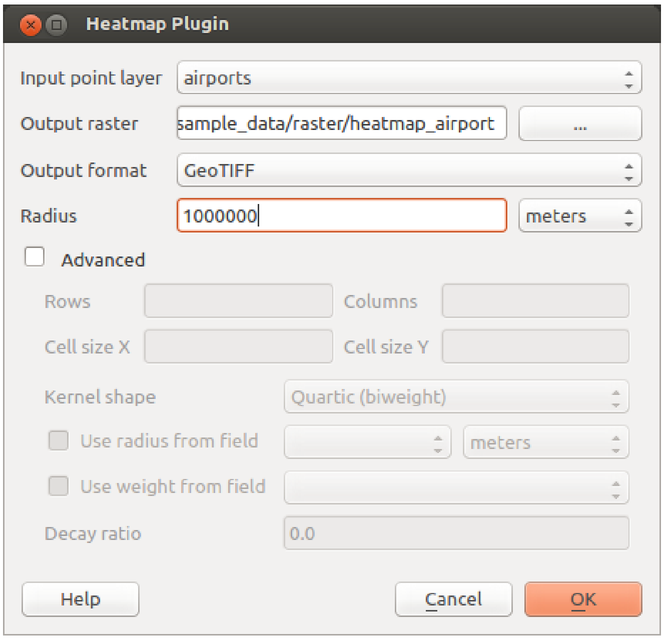


Figura 20.25: El diálogo de Mapa de calor

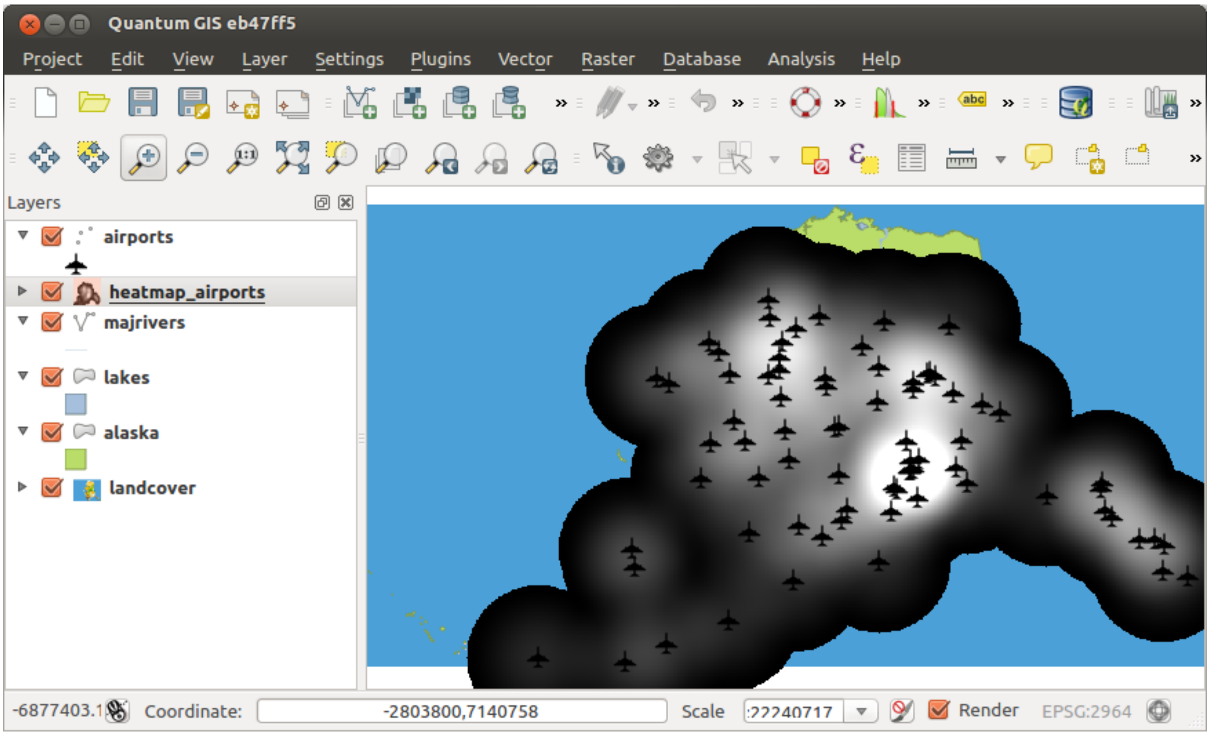


Figura 20.26: Después de cargar el mapa de calor se ve como una superficie gris

1. Abra el diálogo de propiedades de la capa `heatmap_airports` (seleccione la capa `heatmap_airports`, abra el menú contextual con el botón derecho del ratón y seleccione *Propiedades*).
2. Seleccione la pestaña *Estilo*.
3. Cambie el *Tipo de representación* a 'Pseudocolor de una sola banda'.
4. Seleccione un *Mapa de color* adecuado, por ejemplo `YlOrRed`.
5. Haga clic en el botón **[Cargar]** para recabar los valores mínimo y máximo del ráster, después pulse el botón **[Clasificar]**.
6. Pulse **[Aceptar]** para actualizar la capa.

El resultado final se muestra en Figure_Heatmap_4.

.

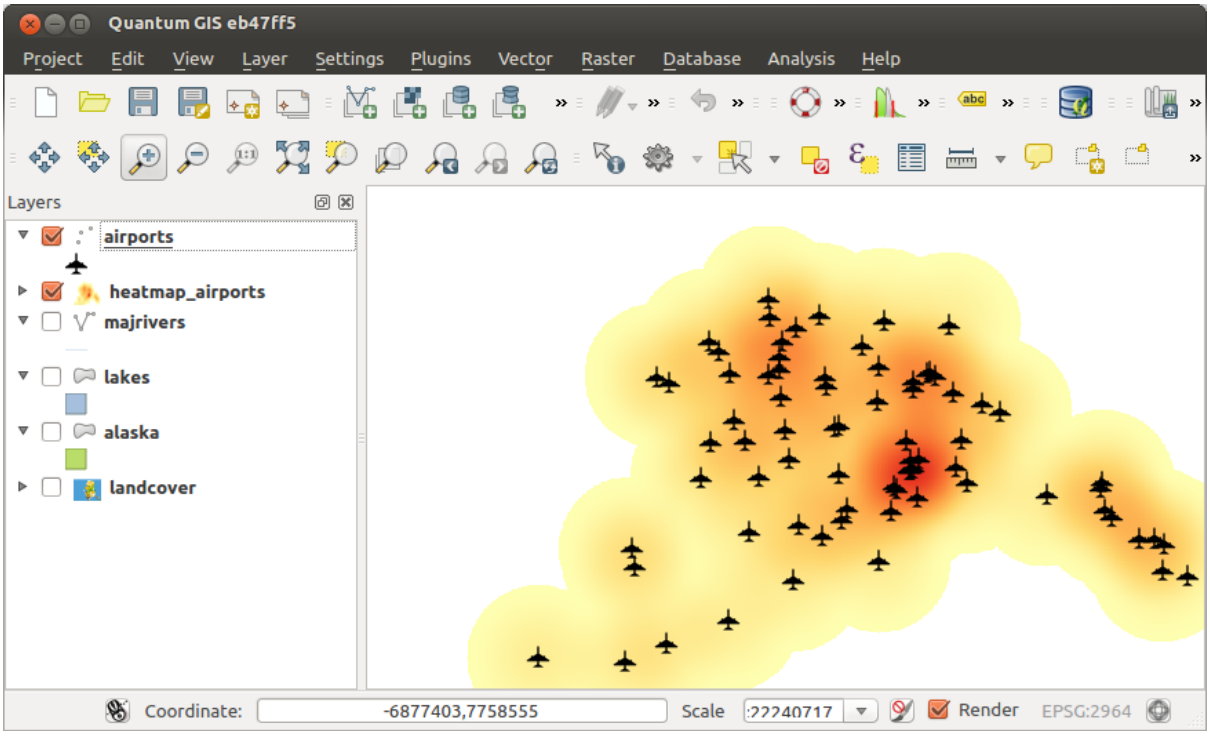
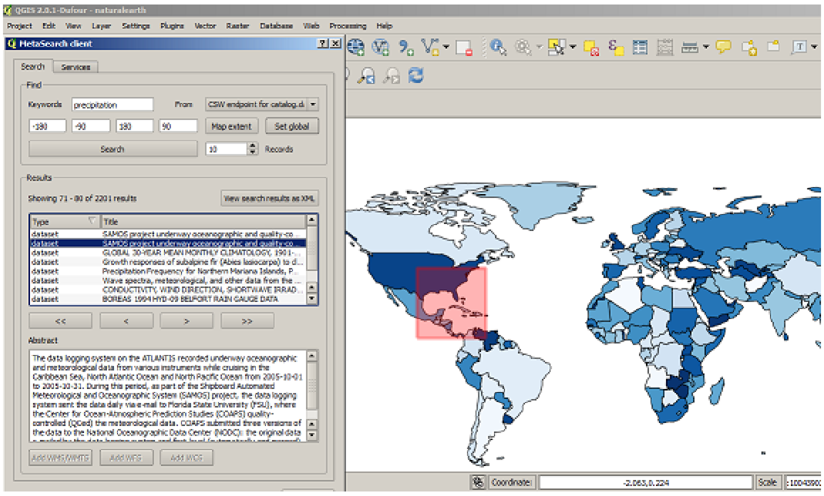


Figura 20.27: Mapa de calor de los aeropuertos de Alaska con estilo aplicado

20.15 MetaSearch Catalogue Client



20.15.1 Introduction

MetaSearch is a QGIS plugin to interact with metadata catalogue services, supporting the OGC Catalogue Service for the Web (CSW) standard.

MetaSearch provides an easy and intuitive approach and user-friendly interface to searching metadata catalogues within QGIS.

20.15.2 Installation

MetaSearch is included by default with QGIS 2.0 and higher. All dependencies are included within MetaSearch.

Install MetaSearch from the QGIS plugin manager, or manually from http://plugins.qgis.org/plugins/MetaSearch.

20.15.3 Working with Metadata Catalogues in QGIS

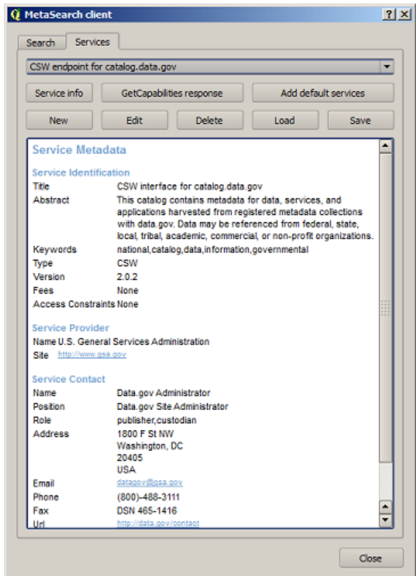
CSW (Catalogue Service for the Web)

CSW (Catalogue Service for the Web) is an OGC (Open Geospatial Consortium) specification, that defines common interfaces to discover, browse, and query metadata about data, services, and other potential resources.

Startup

To start MetaSearch, click the MetaSearch icon or select Web / MetaSearch / MetaSearch via the QGIS main menu. The MetaSearch dialog will appear. The main GUI consists of two tabs: 'Services' and 'Search'.

Managing Catalogue Services



The 'Services' tab allows the user to manage all available catalogue services. MetaSearch provides a default list of Catalogue Services, which can be added by pressing 'Add default services' button.

To all listed Catalogue Service entries, click the dropdown select box.

To add a Catalogue Service entry, click the 'New' button, and enter a Name for the service, as well as the URL/endpoint. Note that only the base URL is required (not a full GetCapabilities URL). Clicking ok will add the service to the list of entries.

To edit an existing Catalogue Service entry, select the entry you would like to edit and click the 'Edit' button, and modify the Name or URL values, then click ok.

To delete a Catalogue Service entry, select the entry you would like to delete and click the 'Delete' button. You will be asked to confirm deleting the entry.

MetaSearch allows for loading and saving connections to an XML file. This is useful when you need to share settings between applications. Below is an example of the XML file format.

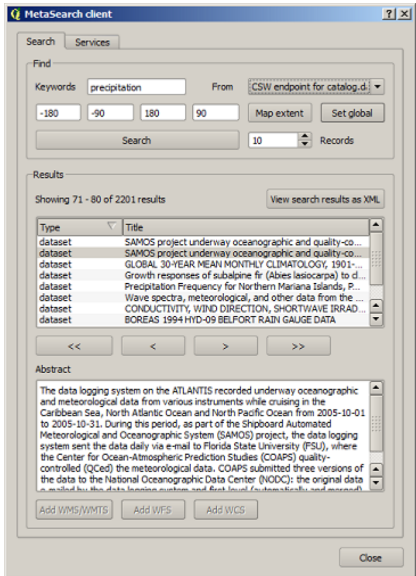
```
<?xml version="1.0" encoding="UTF-8"?>
<qgsCSWConnections version="1.0">
    <csw name="Data.gov CSW" url="http://catalog.data.gov/csw-all"/>
    <csw name="Geonorge - National CSW service for Norway" url="http://www.geonorge.no/geonetwork
    <csw name="Geoportale Nazionale - Servizio di ricerca Italiano" url="http://www.pcn.minambient
    <csw name="LINZ Data Service" url="http://data.linz.govt.nz/feeds/csw"/>
```

```
    <csw name="Nationaal Georegister (Nederland)" url="http://www.nationaalgeoregister.nl/geonetw
    <csw name="RNDT - Repertorio Nazionale dei Dati Territoriali - Servizio di ricerca" url="http
    <csw name="UK Location Catalogue Publishing Service" url="http://csw.data.gov.uk/geonetwork/s
    <csw name="UNEP/GRID-Geneva Metadata Catalog" url="http://metadata.grid.unep.ch:8080/geonetwo
</qgsCSWConnections>
```

To load a list of entries, click the 'Load' button. A new window will appear; click the 'Browse' button and navigate to the XML file of entries you wish to load and click 'Open'. The list of entries will be displayed. Select the entries you wish to add from the list and click 'Load'.

The 'Service info' button displays information about the selected Catalogue Service such as service identification, service provider and contact information. If you would like to view the raw XML response, click the 'GetCapabilities response' button. A separate window will open displaying Capabilities XML.

Searching Catalogue Services



The 'Search' tab allows the user to query Catalogue Services for data and services, set various search parameters and view results.

The following search parameters are available:

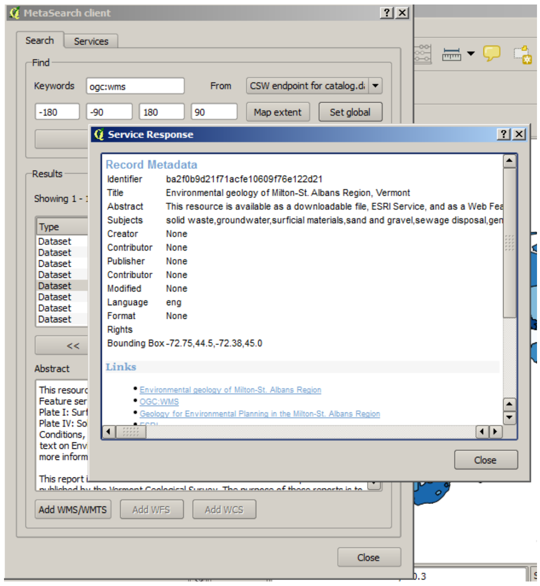
- **Keywords**: free text search keywords
- **From**: the Catalogue Service to perform the query against
- **Bounding box**: the spatial area of interest to filter on. The default bounding box is the map view / canvas. Click 'Set global' to do a global search, or enter custom values as desired
- **Records**: the number of records to return when searching. Default is 10 records

Clicking the 'Search' button will search the selected Metadata Catalogue. Search results are displayed in a list and are sortable by clicking on the column title. You can navigate through search results with the directional buttons below the search results. Clicking the 'View search results as XML' button opens a window with the service response in raw XML format.

Clicking a result will show the record's abstract in the 'Abstract' window and provides the following options:

- if the metadata record has an associated bounding box, a footprint of the bounding box will be displayed on the map
- double-clicking the record displays the record metadata with any associated access links. Clicking the links opens the link in the user's web browser

- if the record is an OGC web service (WMS/WMTS, WFS, WCS), the appropriate 'Add to WMS/WMTS|WFS|WCS' buttons will be enabled for the user to add to QGIS. When clicking this button, MetaSearch will verify if this is a valid OWS. The OWS will then be added to the appropriate QGIS connection list, and the appropriate WMS/WMTS|WFS|WCS connection dialogue will then appear



Settings

You can fine tune MetaSearch with the following settings:

- **Results paging**: when searching metadata catalogues, the number of results to show per page
- **Timeout**: when searching metadata catalogues, the number of seconds for blocking connection attempt. Default value is 10

.

20.16 Complemento Grafo de rutas

Grafo de rutas es un complemento en C++ para QGIS que calcula la ruta más corta entre dos puntos de una capa de polilíneas y traza esta ruta sobre la red de carreteras.

Características principales:

- Calcula la ruta, así como la longitud y el tiempo de viaje.
- Optimiza la longitud o el tiempo de viaje.
- Exporta la ruta a una capa vectorial.
- Resalta la dirección de las carreteras (esto es lento y se utiliza principalmente para fines de depuración y para pruebas de configuración)

Como una capa de carreteras, se puede usar cualquier capa vectorial de polilíneas en cualquier formato admitido por QGIS. Dos líneas con un punto en común se consideran conectadas. Tenga en cuenta que es necesario usar el SRC de la capa como SRC del proyecto mientras edita una capa de carreteras. Esto es debido al hecho de que recalcular las coordenadas entre diferentes SRC introduce algunos errores que pueden resultar en discontinuidades, incluso cuando se utiliza el 'autoensamblado'.

En la tabla de atributos de la capa, se pueden usar los siguientes campos:

- Velocidad en una sección de la carretera (campo numérico).

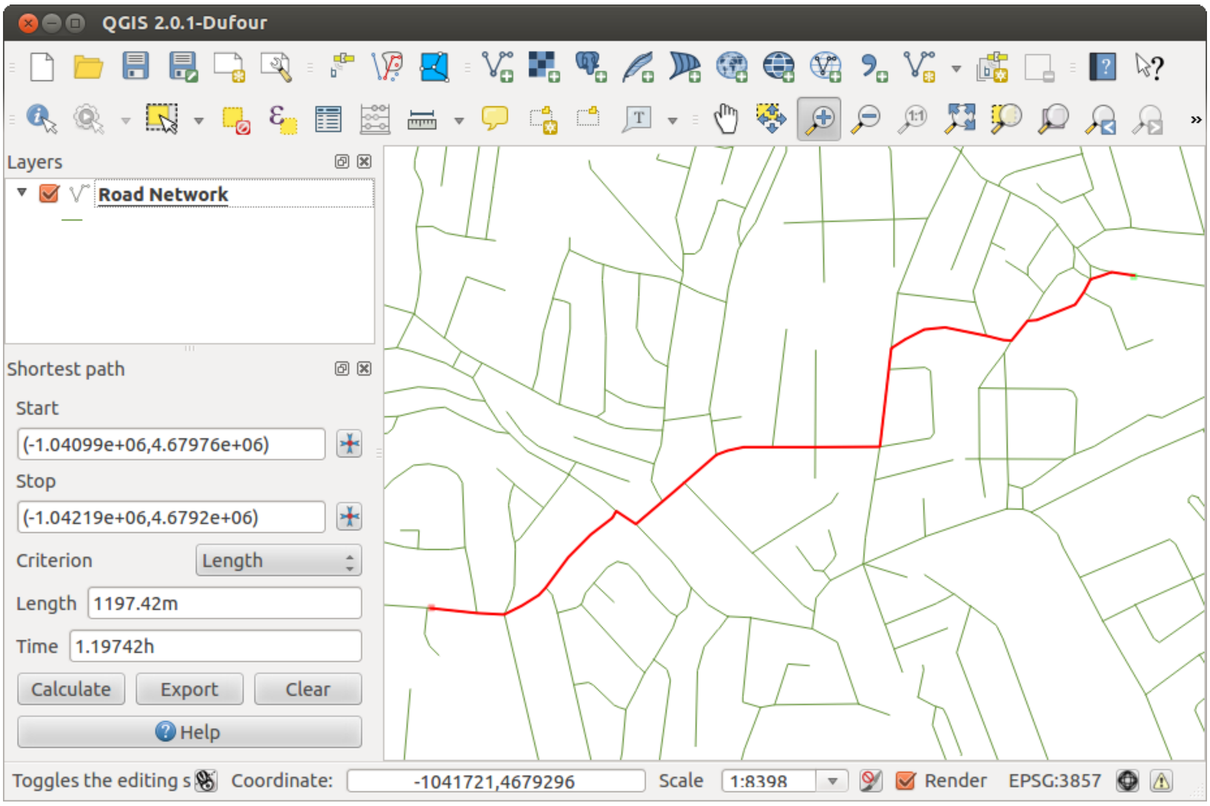


Figura 20.28: Complemento Grafo de rutas 

- Dirección (cualquier tipo que se pueda convertir en texto). Las direcciones de avance y retroceso corresponden a una carretera de un solo sentido, ambas direcciones indican una carretera de doble sentidos.

Si algunos campos no tienen ningún valor o no existen, se usan los valores predeterminados. Puede cambiar lo predeterminado y algunas configuraciones del complemento en el diálogo de configuración del complemento.

20.16.1 Usar el componente

Después de activar el complemento verá un panel adicional en el lado izquierdo de la ventana principal de QGIS. Ahora, escriba algunos parámetros en el diálogo *Configuración del complemento Grafos de rutas* en el menú *Vectorial* → *Grafo de rutas* (vea figure_road_graph_2).

Después de configurar *Unidad de tiempo*, *Unidad de distancia* y *Tolerancia de topología*, puede seleccionar la capa vectorial en la pestaña *Capa de transporte*. Aquí también puede seleccionar el *Campo de sentido* y el *Campo de velocidad*. En la pestaña *Configuración predeterminada*, puede establecer el *Sentido* para el calculo.

Finalmente, en el panel *Ruta más corta*, seleccione un punto de Inicio y un punto Final en la capa de red de carreteras y pulse **[Calcular]**.

.

20.17 Complemento Consulta espacial

El  Complemento Consulta espacial permite hacer una consulta espacial (ej., seleccionar rasgos) en una capa de destino con referencia a otra capa. La funcionalidad se basa en la librería de GEOS y depende de la capa de rasgos de origen seleccionado.

Operadores posibles son:

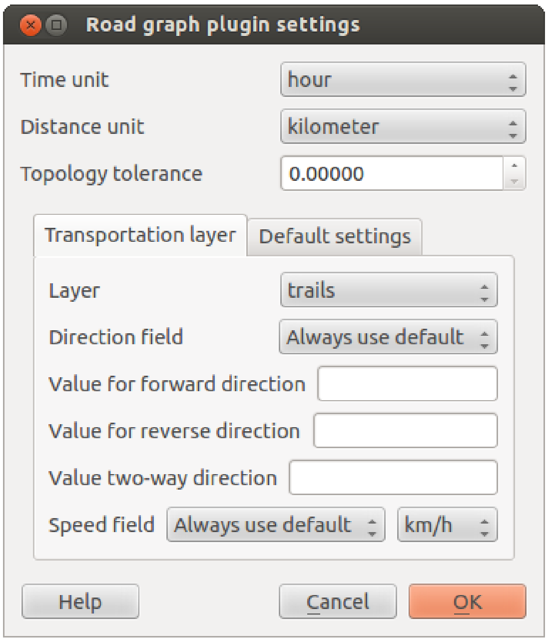


Figura 20.29: Configuración del complemento Grafo de rutas

- Contiene
- Igual
- Solapa
- Cruzar
- Intersecta
- Está inconexo
- Toca
- Dentro

20.17.1 Usar el complemento

Como un ejemplo, queremos encontrar regiones en el conjunto de datos de Alaska que contenga aeropuertos. Los siguientes pasos son necesarios:

1. Iniciar QGIS y cargar las capas vectoriales `regions.shp` y `airports.shp`.
2. Cargue el complemento de Consulta espacial en el Administrador de Complementos (vea *El diálogo de complementos*) y haga clic en el icono Consulta espacial, que aparecerá en el menú de la barra de herramientas de QGIS. El diálogo de complemento aparece.
3. Seleccione la capa `regions` como la capa origen y `airports` como la capa de entidades de referencia.
4. Seleccione 'Contiene' como operador y haga clic en **[Aplicar]**.

Ahora obtiene una lista de IDs de entidades de la consulta y tiene varias opciones, como se muestra en figure_spatial_query_1.

- Haga clic sobre Crear capa con lista de elementos.
- Seleccione un ID de la lista y haga clic sobre Crear capa selección.
- Seleccione 'Eliminar de la selección actual' en el campo *Y utilizar el resultado para* .

- Además, se puede *Zum a los elementos* o checkbox| *Mensajes de registro*.

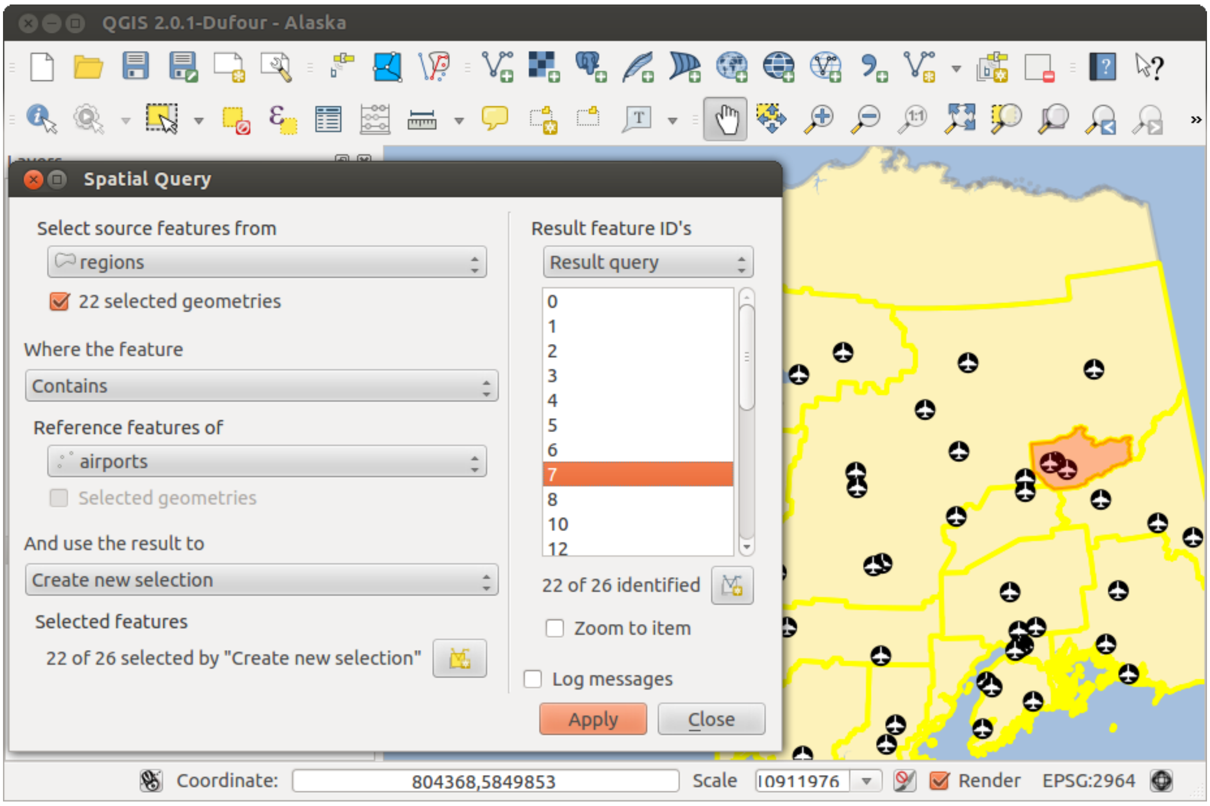


Figura 20.30: Análisis de consulta espacial - las regiones contienen aeropuertos QGIS

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20.18 Complemento SPIT

QGIS viene con un complemento llamado SPIT (Herramienta para importar archivos shape a PostGIS). SPIT se puede usar para cargar multiples archivos shape en una sola vez e incluye soporte para esquemas. Para usar SPIT, abra el Administrador de complementos desde el menú *Complementos*, en el menú *Instalado* marque la casilla junto a *SPIT* y pulse **[Aceptar]**.

Para importar un archivo shape, use de la barra de menú *Base de datos* → *Importar (SPIT)* → *Importar archivos shape a PostgreSQL* para abrir el diálogo *SPIT - Herramienta para importar archivos shape a PostGIS*. Seleccione la base de datos PostGIS a la que quiera conectar y haga clic en **[Conectar]**. Si desea puede definir o cambiar algunas opciones de importación. Ahora puede agregar uno o más archivos a la cola haciendo clic en el botón **[Añadir]**. Para procesar los archivos, haga clic en el botón **[Aceptar]**. El proceso de importación, así como cualquier error/advertencia, se mostrará a medida que se procesa cada archivo shape. .

20.19 Complemento SQL Anywhere

SQL Anywhere es un sistema administrador de base de datos relacional (RDBMS) propietario de Sybase. SQL Anywhere proporciona soporte espacial, incluyendo OGC, archivos shape y funciones incorporadas para exportar a formatos KML, GML y SVG.

SQL Anywhere permite conectarte a base de datos espaciales de SQL Anywhere. La ventana de diálogo :guilabel:'Añadir capa de SQL Anywhere ' es similar en funcionalidad a las de PostGIS y SpatialLite.

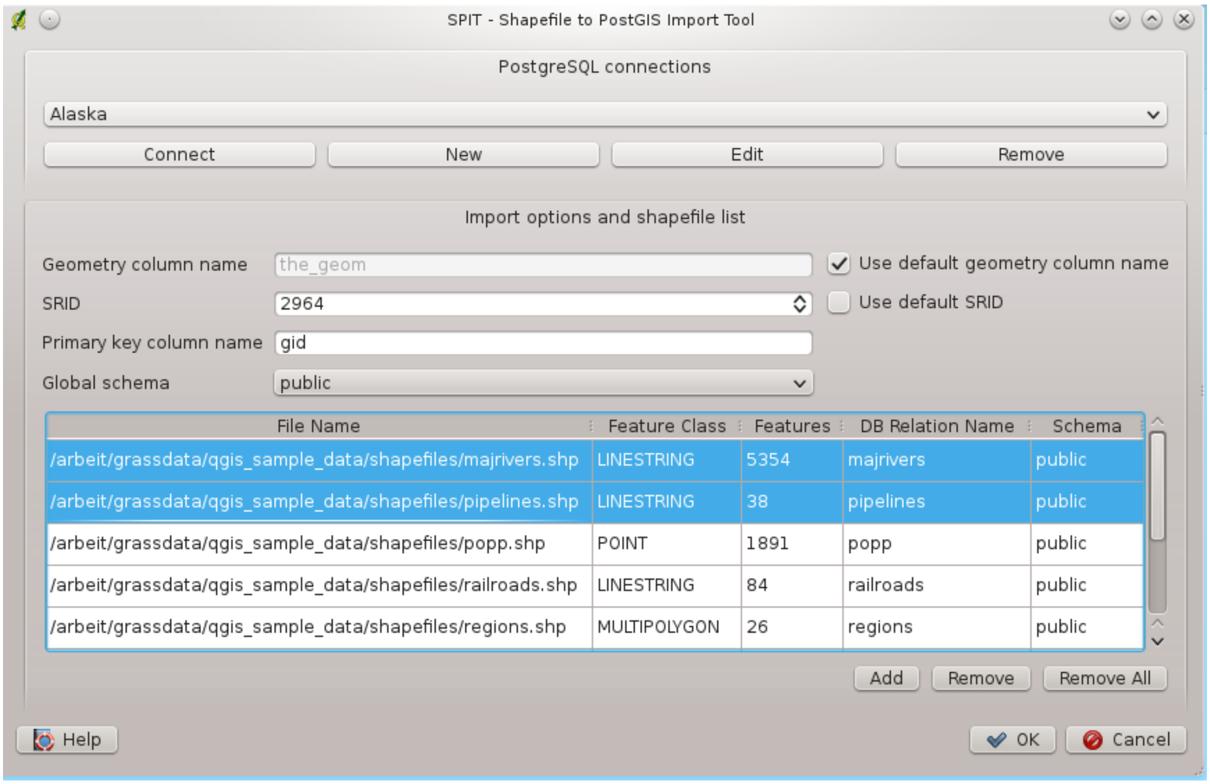

Figura 20.31: Usar el complemento SPIT para importar archivos shape a PostGIS

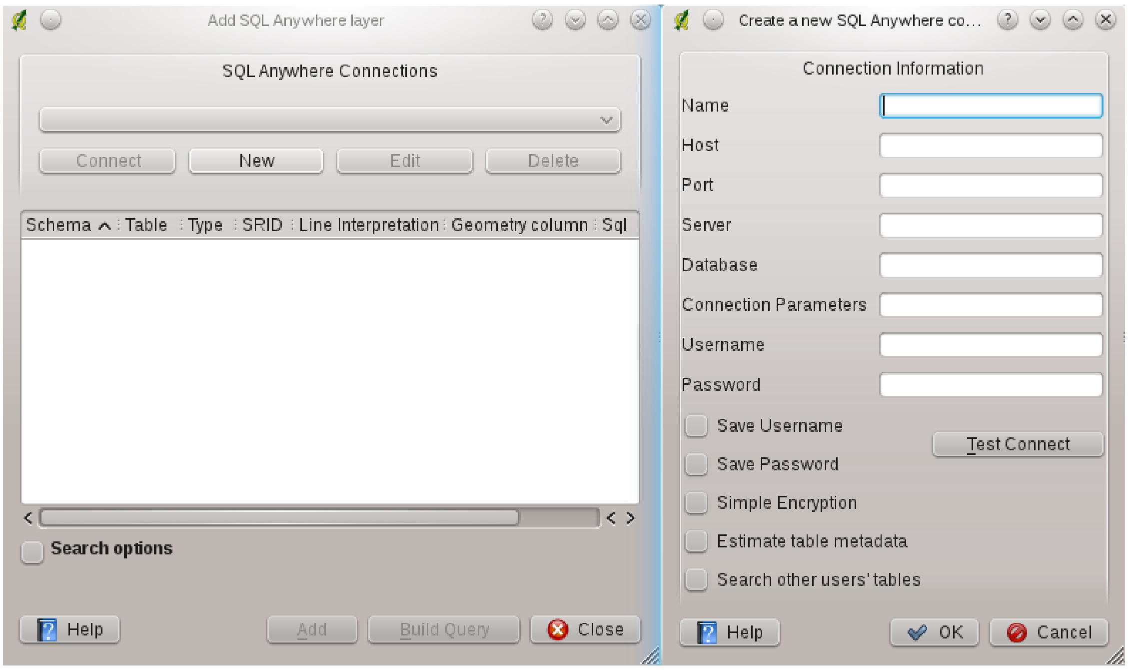

Figura 20.32: Cuadro de diálogo de SQL Anywhere (KDE)

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20.20 Complemento Comprobador de topología.

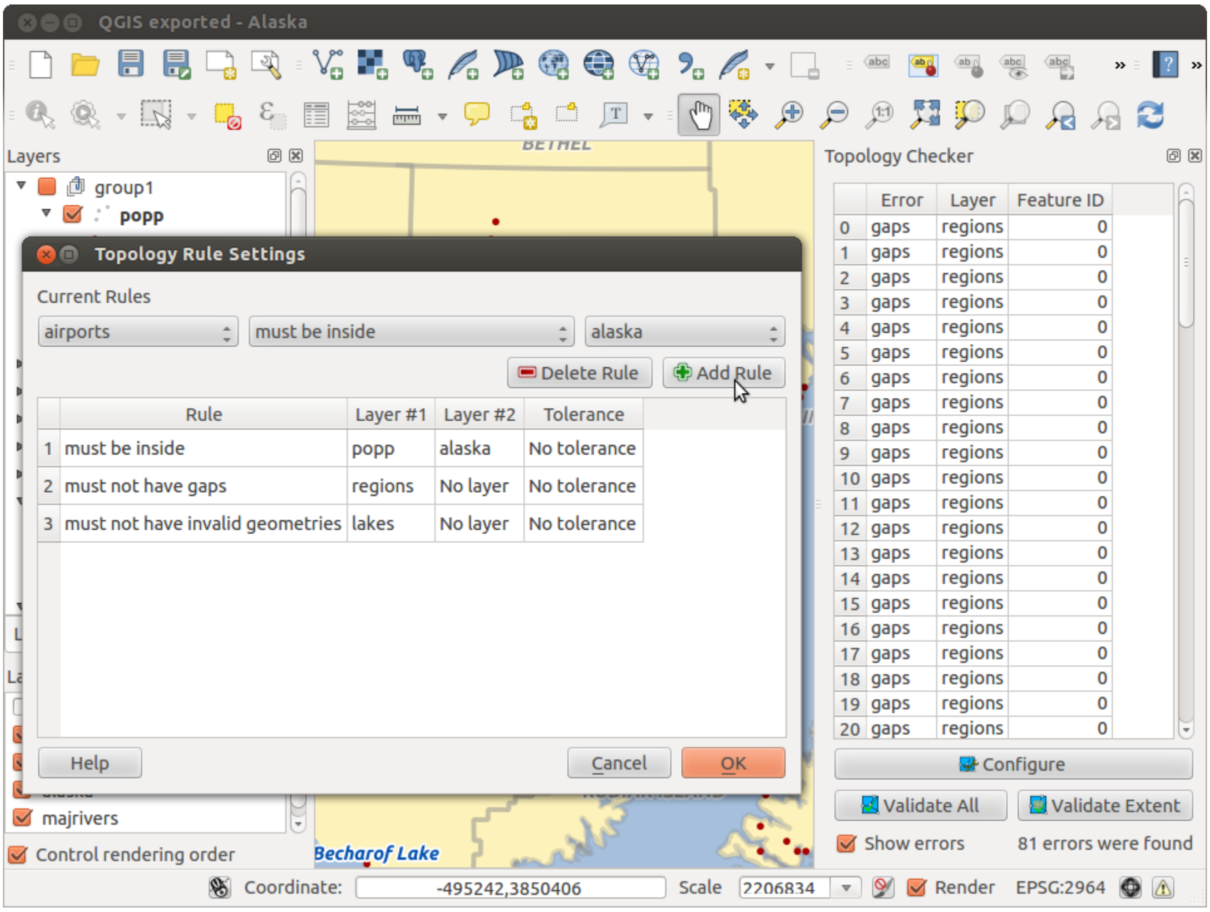

Figura 20.33: El complemento de Comprobador de Topología

La topología describe las relaciones entre puntos, líneas y polígonos que representa los objetos espaciales de una región geográfica. Con el complemento de Comprobador de Topología, puede revisar sus archivos vectoriales y verificar la topología con varias reglas topológicas. Estas reglas comprueban con relaciones espaciales si su objeto espacial es 'Equal', 'Contain', 'Cover', 'CoveredBy', 'Cross', o son 'Disjoint', 'Intersect', 'Overlap', 'Touch' o 'Within' el uno al otro. Depende de sus preguntas individuales que reglas topológicas que se aplican a los datos vectoriales (por ejemplo, normalmente no aceptará overshoots en capas de líneas, pero si ellos representan callejones sin salida que no eliminará de su capa vectorial).

QGIS tiene una característica integrada de edición topológica, que es ideal para la creación de nuevas funciones sin errores. Pero los errores de datos existentes y los errores inducidos por el usuario son difíciles de encontrar. Este complemento te ayuda a encontrar este tipo de errores a través de una lista de reglas.

Es muy simple crear reglas topológicas con el complemento Comprobador de topología.

En **capa de puntos** las siguientes reglas están disponibles:

- **Must be covered by**: Aquí puede elegir una capa vectorial de su proyecto. Los puntos que no están cubiertos por la capa vectorial dada se produce en el campo 'Error'.
- **Must be covered by endpoints of**: Aquí puede elegir una capa de líneas de su proyecto.
- **Must be inside**: Aquí puede elegir una capa de polígonos de su proyecto. Los puntos deben estar dentro del polígono. De lo contrario, QGIS escribe un 'Error' del punto.

- **Must not have duplicates**: Siempre que un punto se representa dos o más veces, se producirá el campo 'Error'.
- **Must not have invalid geometries**: Comprobar si las geometrías son validas.
- **Must not have multi-part-geometries**: Todos los puntos multi-parte se escriben en el campo 'Error'.

En **Capas de líneas**, las siguientes reglas están disponibles:

- **End points must be covered by**: Aquí se puede seleccionar una capa de puntos de su proyecto.
- **Must not have dangles**: Este mostrará los overshoots en la capa de líneas.
- **Must not have duplicates**: Siempre que un objeto línea es representado una o dos veces, se producirá en el campo 'Error'.
- **Must not have invalid geometries**: Comprobar si las geometrías son validas.
- **Must not have multi-part geometries**: A veces, una geometría es en realidad una colección de simples (una sola pieza) geometrías. Una geometría de este tipo se denomina de geometría multiparte. Si contiene sólo un tipo de geometría simple, lo llamamos multi-punto, multi-línea o multi-polígono. Todas las líneas de multi-partes se escriben en el campo 'Error'.
- **Must not have pseudos**: Un punto final de geometría de línea debe estar conectado a los extremos de otras dos geometrías. Si el punto final está conectado al punto final de otra geometría, el punto final se denomina un nodo psuedo.

En **capas de polígonos**, las siguientes reglas están disponibles:

- **Must contain**: La capa de polígonos debe contener al menos un punto de la geometría de la segunda capa.
- **Must not have duplicates**: Los polígonos de la misma capa no deben tener geometrías idénticas. Cada vez que una entidad de polígono se represente dos veces o más se producirá en el campo 'Error'.
- **Must not have gaps**: Los polígonos adyacentes no deben formar espacios entre ellos. Los límites administrativos podrían mencionarse como ejemplo (polígonos de los estados de Estados Unidos no tienen espacios entre ellos ...).
- **Must not have invalid geometries**: Comprobar si las geometrías con validas. Algunas de las reglas que definen si una geometría es valida son:
  - Anillos de polígonos deben cerrarse.
  - Los anillos que definen agujeros deben estar dentro de los anillos que definen los límites exteriores.
  - Los anillos no deben intersectarse (Ni pueden tocarse o cruzarse entre si)
  - Los anillos no puede tocar otros anillos, excepto en un punto.
- **Must not have multi-part geometries**: A veces, una geometría es en realidad una colección geometrías sencillas (parte sencilla). Una geometría de este tipo se denomina de geometría multi-parte. Si contiene sólo un tipo de geometría simple, lo llamamos multi-punto, multi-líneas o multi-polígono. Por ejemplo, un país que consta de múltiples islas se puede representar como un multi-polígono.
- **Must not overlap**: Los polígonos adyacentes no deben de compartir un área en común.
- **Must not overlap with**: Los polígonos adyacentes de una capa no deben compartir un área con los polígonos de otra.

.

20.21 Complemento de Estadísticas de zona

Con el complemento *Estadísticas de zona*, se pueden analizar los resultados de una clasificación temática. Esto permite calcular varios valores de los píxeles de una capa ráster con la ayuda de una capa vectorial de polígonos (vea figure_zonal_statistics). Puede calcular la suma, el valor medio y el total de los píxeles que están dentro de un polígono. El complemento genera columnas de salida en la capa vectorial con un prefijo definido por el usuario.

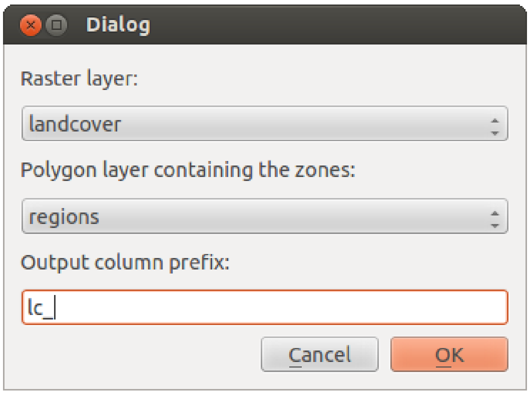

Figura 20.34: Diálogo de Estadísticas de zona (KDE)

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CAPÍTULO 21

Ayuda y apoyo

21.1 Listas de correos

QGIS se encuentra en un desarrollo activo y como tal no siempre funcionará como se espera. La mejor manera de conseguir ayuda es entrando en la lista de correo de los usuarios qgis. Las preguntas llegan a mayor audiencia y las preguntas benefician a los demás.

21.1.1 usuarios-qgis

La lista de correo se utiliza para discutir sobre QGIS en general además de otras cuestiones relacionadas con su instalación y utilización. Puedes suscribirte a la lista de correos de usuarios qgis al visitar el siguiente enlace: http://lists.osgeo.org/mailman/listinfo/qgis-user

21.1.2 fossgis-talk-liste

Para los de habla alemana, FOSSGIS e.V. ofrece la lista de correos fossgis-talk-liste. Esta lista de correo se utiliza para discutir sobre QGIS de código abierto en general, incluyendo QGIS. Puedes suscribirte a la lista de correos fossgis-talk-liste al visitar el siguiente enlace: https://lists.fossgis.de/mailman/listinfo/fossgis-talk-liste

21.1.3 desarrollador-qgis

SI eres un desarrollador con algunos problemas de naturaleza técnica, puede que quieras apuntarte a la lista de correos de desarrollador-qgis en el siguiente enlace: http://lists.osgeo.org/mailman/listinfo/qgis-developer

21.1.4 qgis-commit

Cada vez que algo se ejecuta en el repositorio de código del QGIS, se publica un email en esta lista. Si quieres estar al día de cada cambio en el código base actual, puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-commit

21.1.5 qgis-trac

Esta lista proporciona notificaciones por email relacionadas con gestión de proyectos, incluyendo informes de errores, tareas y solicitudes de funciones. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-trac

21.1.6 equipo-de-la-comunidad-qgis

Esta lista se ocupa de temas como la documentación, ayuda de contexto, guía para el usuario, páginas web. blog, listas de correos, foros y trabajos de traducción. Si además quisieras trabajar en la guía para el usuario, esta lista es un buen punto de partida para preguntar. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-community-team

21.1.7 equipo-de-publicación-qgis

Esta lista se ocupa de temas como el proceso de publicación, paquetes de datos binario para varios OSS y anuncios de nuevas publicaciones a nivel mundial. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-release-team

21.1.8 tr-qgis

Esta lista está relacionada con los trabajos de traducción. Si quieres trabajar en la traducción de los manuales o de la interfaz gráfica de usuario (GUI), esta lista es un buen punto de partida para responder a tus preguntas. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-tr

21.1.9 edu-qgis

Esta lista se encarga de los trabajos de educación de QGIS. Si quisieras trabajar en los materiales de educación QGIS, esta lista es un buen punto de partida para preguntar. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-edu

21.1.10 psc-qgis

Se utiliza esta lista para discutir los asuntos del Comité Directivo relacionados con la gestión y dirección general de QGIS. Puedes suscribirte a esta lista en: http://lists.osgeo.org/mailman/listinfo/qgis-psc

Te invitamos a suscribirte a cualquier lista. Por favor contribuye a la lista respondiendo a preguntas y compartiendo tus experiencias. Recuerda que las listas de qgis-commit y qgis-trac estñan diseñadas para dar notificaciones solamente y no para publicaciones de usuarios.

21.2 IRC

We also maintain a presence on IRC - visit us by joining the #qgis channel on irc.freenode.net. Please wait for a response to your question, as many folks on the channel are doing other things and it may take a while for them to notice your question. If you missed a discussion on IRC, not a problem! We log all discussion, so you can easily catch up. Just go to http://qgis.org/irclogs and read the IRC-logs.

Commercial support for QGIS is also available. Check the website http://qgis.org/en/commercial-support.html for more information.

21.3 Rastreador de Errores

While the qgis-users mailing list is useful for general 'How do I do XYZ in QGIS?'-type questions, you may wish to notify us about bugs in QGIS. You can submit bug reports using the QGIS bug tracker at http://hub.qgis.org/projects/quantum-gis/issues. When creating a new ticket for a bug, please provide an email address where we can contact you for additional information.

Please bear in mind that your bug may not always enjoy the priority you might hope for (depending on its severity). Some bugs may require significant developer effort to remedy, and the manpower is not always available for this.

Se pueden presentar las solicitudes de funciones utilizando el mismo sistema de ticket de errores. Asegúrate de seleccionar el tipo «Función».

If you have found a bug and fixed it yourself, you can submit this patch also. Again, the lovely redmine ticketsystem at http://hub.qgis.org/wiki/quantum-gis/issues has this type as well. Check the `Patch supplied` checkbox and attach your patch before submitting your bug. One of the developers will review it and apply it to QGIS. Please don't be alarmed if your patch is not applied straight away – developers may be tied up with other commitments.

21.4 Blog

The QGIS community also runs a weblog at http://planet.qgis.org/planet/, which has some interesting articles for users and developers as well provided by other blogs in the community. You are invited to contribute your own QGIS blog!

21.5 Plugins

The website http://plugins.qgis.org provides the official QGIS plugins web portal. Here, you find a list of all stable and experimental QGIS plugins available via the 'Official QGIS Plugin Repository'.

21.6 Wiki

Lastly, we maintain a WIKI web site at http://hub.qgis.org/projects/quantum-gis/wiki where you can find a variety of useful information relating to QGIS development, release plans, links to download sites, message-translation hints and more. Check it out, there are some goodies inside!

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CAPÍTULO 22

Apéndice

22.1 GNU General Public License

Versión 2, Junio de 1991

Preámbulo

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