

## GRASS - GIS Modules & Variables

November 19, 2014

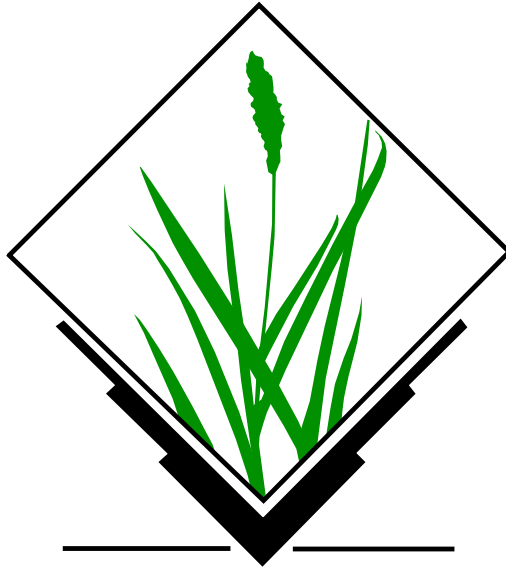


Figure 1: GRASS GIS Logo

Geographic Resources Analysis Support System, commonly referred to as GRASS, is an open source (GNU GPLed), image processing and Geographic Information System (GIS) used for

- geospatial data management and analysis
- image processing
- graphics/maps production
- spatial modeling
- visualization

GRASS is used in academic and commercial settings around the world, as well as by many governmental agencies and environmental consulting companies.

This reference list describes the modules distributed with GRASS. As well, it experiments with  $\LaTeX$ ' **listings** package in order to provide for syntax highlighting support for GRASS - GIS code.

GRASS GIS The world's leading Free GIS software

and temporal

List of modules retrieved from © 2003-2014  
GRASS Development Team, GRASS GIS  
7.0.0svn Reference Manual

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### *To do*

- add code examples in **Examples**, such as a Python script
- more...

## *Display commands (d.\*)*

*d.barscale* Displays a barscale on the graphics monitor.

*d.colorlist* Output a list of all available display colors with a configurable separator (default is comma).

*d.colortable* Displays the color table associated with a raster map layer.

*d.correlate* Prints a graph of the correlation between raster maps (in pairs).

*d.erase* Erases the contents of the active graphics display frame with user defined color.

*d.font* Selects the font in which text will be displayed on the user's graphics monitor.

*d.fontlist* Lists the available fonts.

*d.geodesic* Displays a geodesic line, tracing the shortest distance between two geographic points along a great circle, in a longitude/latitude data set.

*d.graph* Program for generating and displaying simple graphics on the display monitor.

*d.grid* Overlays a user-specified grid in the active display frame on the graphics monitor.

*d.his* Displays the result obtained by combining hue, intensity, and saturation (his) values from user-specified input raster map layers.

*d.histogram* Displays a histogram in the form of a pie or bar chart for a user-specified raster map.

*d.info* Displays information about the active display monitor.

*d.labels* Displays text labels (created with v.label) to the active frame on the graphics monitor.

*d.legend* Displays a legend for a 2D or 3D raster map in the active frame of the graphics monitor.

*d.linegraph* Generates and displays simple line graphs in the active graphics monitor display frame.

*d.mon* Controls graphics display monitors from the command line.

*d.northarrow* Displays a north arrow on the graphics monitor.

*d.out.file* Saves the contents of the active display monitor to a graphics file.

*d.path* Finds shortest path for selected starting and ending node.

*d.polar* Draws polar diagram of angle map such as aspect or flow directions

*d.profile* Plots profile of a transect.

*d.rast.arrow* Draws arrows representing cell aspect direction for a raster map containing aspect data.

*d.rast.edit* Edits cell values in a raster map.

*d.rast* Displays user-specified raster map in the active graphics frame.

*d.rast.leg* Displays a raster map and its legend on a graphics window

*d.rast.num* Overlays cell category values on a raster map displayed in the active graphics frame.

*d.redraw* Redraws the content of currently selected monitor.

*d.rgb* Displays three user-specified raster maps as red, green, and blue overlays in the active graphics frame.

*d.rhumbline* Displays the rhumbline joining two longitude/latitude coordinates.

*d.shadedmap* Drapes a color raster over a shaded relief map.

*d.text* Draws text in the active display frame on the graphics monitor using the current font.

*d.thematic.area* Displays a thematic vector area map in the active frame on the graphics monitor.

*d.title* Create a TITLE for a raster map in a form suitable for display with *d.text*.

*d.to.rast* Saves the contents of the active display monitor to a raster map.

*d.vect.chart* Displays charts of vector data in the active frame on the graphics monitor.

*d.vect* Displays user-specified vector map in the active graphics frame.

*d.vect.thematic* Displays thematic vector map

*d.what.rast* Allows the user to interactively query raster map layers at user-selected locations.

*d.what.vect* Allows the user to interactively query vector map layers at user-selected locations.

*d.where* Identifies the geographic coordinates associated with point locations given in display coordinates.

### *Database commands (db.\*)*

*db.columns* List all columns for a given table.

*db.connect* Prints/sets general DB connection for current mapset.

*db.copy* Copy a table.

*db.createdb* Creates an empty database.

*db.databases* Lists all databases for a given driver and location.

*db.describe* Describes a table in detail.

*db.drivers* Lists all database drivers.

*db.dropcolumn* Drops a column from selected attribute table.

*db.dropdb* Removes an existing database.

*db.droptable* Drops an attribute table.

*db.execute* Executes any SQL statement.

*db.in.ogr* Imports attribute tables in various formats.

*db.login* Sets user/password for DB driver/database.

*db.out.ogr* Exports attribute tables into various formats.

*db.select* Selects data from attribute table.

*db.tables* Lists all tables for a given database.

*db.test* Test database driver, database must exist and set by db.connect.

*db.univar* Calculates univariate statistics on selected table column.

### *General commands (g.\*)*

*g.access* Controls access to the current mapset for other users on the system.

*g.cairocomp* Overlays multiple X Pixmaps.

*g.copy* Copies available data files in the current mapset search path to the user's current mapset.

*g.dirseps* Internal GRASS utility for converting directory separator characters.

*g.extension.all* Rebuilds or removes all locally installed GRASS Addons extensions.

*g.extension* Maintains GRASS Addons extensions in local GRASS installation.

*g.filename* Prints GRASS data base file names.

*g.findetc* Searches for GRASS support files.

*g.findfile* Searches for GRASS data base files and sets variables for the shell.

*g.gisenv* Outputs and modifies the user's current GRASS variable settings.

*g.gui.animation* Tool for animating a series of raster and vector maps or a space time raster or vector dataset.

*g.gui.dbmgr* Launches graphical attribute table manager.

*g.gui.gcp* Georectifies a map and allows to manage Ground Control Points.

*g.gui.gmodeler* Graphical Modeler.

*g.gui* Launches a GRASS graphical user interface (GUI) session.

*g.gui.iclass* Tool for supervised classification of imagery data.

*g.gui.mapswipe* Interactively compares two maps by swiping a visibility bar.

*g.gui.psmmap* Tool for creating hardcopy map outputs.

*g.gui.rlisetup* Configuration tool for r.li modules.

*g.gui.timeline* Allows to compare temporal datasets by displaying their temporal extents in a plot.

*g.gui.vdigit* Interactive editing and digitization of vector maps.

*g.list* Lists available GRASS data base files of the user-specified data type optionally using the search pattern.

*g.manual* Displays the manual pages of GRASS modules.

*g.mapset* Changes/reports current mapset.

*g.mapsets* Modifies/prints the user's current mapset search path.

*g.message* Prints a message, warning, progress info, or fatal error in the GRASS way.

*g.mkfontcap* Generates the font configuration file by scanning various directories for fonts.

*g.parser* Provides automated parser, GUI, and help support for GRASS scripts.

*g.pnmcomp* Overlays multiple PPM image files.

*g.ppmtopng* Converts between PPM/PGM and PNG image formats.

*g.proj* Prints or modifies GRASS projection information files (in various coordinate system descriptions).

*g.region* Manages the boundary definitions for the geographic region.

*g.remove* Removes data base element files from the user's current mapset using the search pattern.

*g.rename* Renames data base element files in the user's current mapset.

*g.tempfile* Creates a temporary file and prints its file name.

*g.version* Displays GRASS version info.



## Imagery commands (i.\*)

- i.albedo* Computes broad band albedo from surface reflectance.
- i.aster.toar* Calculates Top of Atmosphere Radiance/Reflectance/Brightness Temperature from ASTER DN.
- i.atcorr* Performs atmospheric correction using the 6S algorithm.
- i.biomass* Computes biomass growth, precursor of crop yield calculation.
- i.cca* Canonical components analysis (CCA) program for image processing.
- i.cluster* Generates spectral signatures for land cover types in an image using a clustering algorithm.
- i.colors.enhance* Performs auto-balancing of colors for RGB images.
- i.eb.eta* Actual evapotranspiration for diurnal period (Bastiaanssen, 1995).
- i.eb.evapfr* Computes evaporative fraction (Bastiaanssen, 1995) and root zone soil moisture (Makin, Molden and Bastiaanssen, 2001).
- i.eb.hsebal01* Computes sensible heat flux iteration SEBAL 01.
- i.eb.netrad* Net radiation approximation (Bastiaanssen, 1995).
- i.eb.soilheatflux* Soil heat flux approximation (Bastiaanssen, 1995).
- i.emissivity* Computes emissivity from NDVI, generic method for sparse land.
- i.evapo.mh* Computes evapotranspiration calculation modified or original Hargreaves formulation, 2001.
- i.evapo.pm* Computes potential evapotranspiration calculation with hourly Penman-Monteith.
- i.evapo.pt* Computes evapotranspiration calculation Priestley and Taylor formulation, 1972.
- i.evapo.time* Computes temporal integration of satellite ET actual (ETa) following the daily ET reference (ETo) from meteorological station(s).
- i.fft* Fast Fourier Transform (FFT) for image processing.
- i.gensig* Generates statistics for i.maxlik from raster map.
- i.gensigset* Generates statistics for i.smap from raster map.
- i.group* Creates, edits, and lists groups of imagery data.
- i.his.rgb* Transforms raster maps from HIS (Hue-Intensity-Saturation) color space to RGB (Red-Green-Blue) color space.

*i.iff* Inverse Fast Fourier Transform (IFFT) for image processing.

*i.image.mosaic* Mosaics several images and extends colormap.

*i.in.spotvgt* Imports SPOT VGT NDVI data into a raster map.

*i.landsat.acca* Performs Landsat TM/ETM+ Automatic Cloud Cover Assessment (ACCA).

*i.landsat.toar* Calculates top-of-atmosphere radiance or reflectance and temperature for Landsat MSS/TM/ETM+/OLI

*i.maxlik* Classifies the cell spectral reflectances in imagery data.

*i.modis.qc* Extracts quality control parameters from MODIS QC layers.

*i.oif* Calculates Optimum-Index-Factor table for spectral bands

*i.ortho.camera* Select and modify the imagery group camera reference file.

*i.ortho.elev* Select or modify the target elevation model.

*i.ortho.rectify* Orthorectifies an image by using the image to photo coordinate transformation matrix.

*i.pansharpen* Image fusion algorithms to sharpen multispectral with high-res panchromatic channels

*i.pca* Principal components analysis (PCA) for image processing.

*i.rectify* Rectifies an image by computing a coordinate transformation for each pixel in the image based on the control points.

*i.rgb.his* Transforms raster maps from RGB (Red-Green-Blue) color space to HIS (Hue-Intensity-Saturation) color space.

*i.segment* Identifies segments (objects) from imagery data.

*i.smap* Performs contextual image classification using sequential maximum a posteriori (SMAP) estimation.

*i.spectral* Displays spectral response at user specified locations in group or images.

*i.target* Targets an imagery group to a GRASS location and mapset.

*i.tasscap* Performs Tasseled Cap (Kauth Thomas) transformation.

*i.topo.corr* Computes topographic correction of reflectance.

*i.vi* Calculates different types of vegetation indices.

*i.zc* Zero-crossing "edge detection" raster function for image processing.

*Miscellaneous commands (m.\*)*

*m.cogo* A simple utility for converting bearing and distance measurements to coordinates and vice versa.

*m.measure* Measures the lengths and areas of features.

*m.nviz.image* Creates a 3D rendering of GIS data.

*m.nviz.script* Creates fly-through script to run in NVIZ.

*m.proj* Converts coordinates from one projection to another (cs2cs frontend).

*m.transform* Computes a coordinate transformation based on the control points.

*Postscript commands (ps.\*)*

*ps.map* Produces hardcopy PostScript map output.

## *Raster commands (r.\*)*

- r.basins.fill* Generates watershed subbasins raster map.
- r.blend* Blends color components of two raster maps by a given ratio.
- r.buffer* Creates a raster map showing buffer zones surrounding cells that contain non-NULL category values.
- r.buffer.lowmem* Creates a raster map showing buffer zones surrounding cells that contain non-NULL category values.
- r.carve* Generates stream channels.
- r.category* Manages category values and labels associated with user-specified raster map layers.
- r.circle* Creates a raster map containing concentric rings around a given point.
- r.clump* Recategorizes data in a raster map by grouping cells that form physically discrete areas into unique categories.
- r.coin* Tabulates the mutual occurrence (coincidence) of categories for two raster map layers.
- r.colors* Creates/modifies the color table associated with a raster map.
- r.colors.out* Exports the color table associated with a raster map.
- r.colors.stddev* Sets color rules based on stddev from a raster map's mean value.
- r.composite* Combines red, green and blue raster maps into a single composite raster map.
- r.compress* Compresses and decompresses raster maps.
- r.contour* Produces a vector map of specified contours from a raster map.
- r.cost* Creates a raster map showing the cumulative cost of moving between different geographic locations on an input raster map whose cell category values represent cost.
- r.covar* Outputs a covariance/correlation matrix for user-specified raster map layer(s).
- r.cross* Creates a cross product of the category values from multiple raster map layers.
- r.describe* Prints terse list of category values found in a raster map layer.
- r.distance* Locates the closest points between objects in two raster maps.

*r.drain* Traces a flow through an elevation model or cost surface on a raster map.

*r.external* Links GDAL supported raster data as a pseudo GRASS raster map.

*r.external.out* Defines raster output format utilizing GDAL library.

*r.fill.dir* Filters and generates a depressionless elevation map and a flow direction map from a given elevation raster map.

*r.fillnulls* Fills no-data areas in raster maps using spline interpolation.

*r.flow* Constructs flowlines.

*r.grow.distance* Generates a raster map containing distances to nearest raster features.

*r.grow* Generates a raster map layer with contiguous areas grown by one cell.

*r.gwflow* Numerical calculation program for transient, confined and unconfined groundwater flow in two dimensions.

*r.his* Generates red, green and blue raster map layers combining hue, intensity and saturation (HIS) values from user-specified input raster map layers.

*r.horizon* Computes horizon angle height from a digital elevation model.

*r.in.ascii* Converts a GRASS ASCII raster file to binary raster map.

*r.in.aster* Georeference, rectify, and import Terra-ASTER imagery and relative DEMs using gdalwarp.

*r.in.bin* Import a binary raster file into a GRASS raster map layer.

*r.in.gdal* Imports raster data into a GRASS raster map using GDAL library.

*r.in.gridatb* Imports GRIDATB.FOR map file (TOPMODEL) into a GRASS raster map.

*r.in.lidar* Creates a raster map from LAS LiDAR points using univariate statistics.

*r.in.mat* Imports a binary MAT-File(v4) to a GRASS raster.

*r.in.png* Imports non-georeferenced PNG format image.

*r.in.poly* Creates raster maps from ASCII polygon/line/point data files.

*r.in.srtm* Imports SRTM HGT files into raster map.

*r.in.wms* Downloads and imports data from WMS/WMTS/NASA OnEarth server.

*r.in.xyz* Creates a raster map from an assemblage of many coordinates using univariate statistics.

*r.info* Outputs basic information about a raster map.

*r.kappa* Calculates error matrix and kappa parameter for accuracy assessment of classification result.

*r.lake* Fills lake at given point to given level.

*r.latlong* Creates a latitude/longitude raster map.

*r.li.cwed* Calculates contrast weighted edge density index on a raster map

*r.li.daemon* Support module for r.li landscape index calculations.

*r.li.dominance* Calculates dominance's diversity index on a raster map

*r.li.edgedensity* Calculates edge density index on a raster map, using a 4 neighbour algorithm

*r.li*

*r.li.mpa* Calculates mean pixel attribute index on a raster map

*r.li.mps* Calculates mean patch size index on a raster map, using a 4 neighbour algorithm

*r.li.padc* Calculates coefficient of variation of patch area on a raster map

*r.li.padr* Calculates range of patch area size on a raster map

*r.li.padsd* Calculates standard deviation of patch area a raster map

*r.li.patchdensity* Calculates patch density index on a raster map, using a 4 neighbour algorithm

*r.li.patchnum* Calculates patch number index on a raster map, using a 4 neighbour algorithm.

*r.li.pielou* Calculates Pielou's diversity index on a raster map

*r.li.renyi* Calculates Renyi's diversity index on a raster map

*r.li.richness* Calculates richness index on a raster map

*r.li.shannon* Calculates Shannon's diversity index on a raster map

*r.li.shape* Calculates shape index on a raster map

*r.li.simpson* Calculates Simpson's diversity index on a raster map

*r.mapcalc* Raster map calculator.

*r.mask* Creates a MASK for limiting raster operation.

*r.mfilter* Performs raster map matrix filter.

*r.mode* Finds the mode of values in a cover map within areas assigned the same category value in a user-specified base map.

*r.neighbors* Makes each cell category value a function of the category values assigned to the cells around it, and stores new cell values in an output raster map layer.

*r.null* Manages NULL-values of given raster map.

*r.out.ascii* Converts a raster map layer into a GRASS ASCII text file.

*r.out.bin* Exports a GRASS raster to a binary array.

*r.out.gdal* Exports GRASS raster maps into GDAL supported formats.

*r.out.gridatb* Exports GRASS raster map to GRIDATB.FOR map file (TOP-MODEL).

*r.out.mat* Exports a GRASS raster to a binary MAT-File.

*r.out.mpeg* Converts raster map series to MPEG movie.

*r.out.png* Export a GRASS raster map as a non-georeferenced PNG image.

*r.out.pov* Converts a raster map layer into a height-field file for POV-Ray.

*r.out.ppm* Converts a GRASS raster map to a PPM image file.

*r.out.ppm3* Converts 3 GRASS raster layers (R,G,B) to a PPM image file.

*r.out.vrml* Exports a raster map to the Virtual Reality Modeling Language (VRML).

*r.out.vtk* Converts raster maps into the VTK-ASCII format.

*r.out.xyz* Exports a raster map to a text file as x,y,z values based on cell centers.

*r.pack* Packs up a raster map and support files for copying.

*r.param.scale* Extracts terrain parameters from a DEM.

*r.patch* Creates a composite raster map layer by using known category values from one (or more) map layer(s) to fill in areas of "no data" in another map layer.

*r.plane* Creates raster plane map given dip (inclination), aspect (azimuth) and one point.

*r.profile* Outputs the raster map layer values lying on user-defined line(s).

*r.proj* Re-projects a raster map from given location to the current location.

*r.quant* Produces the quantization file for a floating-point map.



*r.quantile* Compute quantiles using two passes.

*r.random.cells* Generates random cell values with spatial dependence.

*r.random* Creates a raster map layer and vector point map containing randomly located points.

*r.random.surface* Generates random surface(s) with spatial dependence.

*r.reclass.area* Reclasses a raster map greater or less than user specified area size (in hectares).

*r.reclass* Reclassify raster map based on category values.

*r.recode* Recodes categorical raster maps.

*r.region* Sets the boundary definitions for a raster map.

*r.regression.line* Calculates linear regression from two raster maps:  $y = a + b \cdot x$ .

*r.regression.multi* Calculates multiple linear regression from raster maps.

*r.report* Reports statistics for raster maps.

*r.resamp.bspline* Performs bilinear or bicubic spline interpolation with Tykhonov regularization.

*r.resamp.filter* Resamples raster map layers using an analytic kernel.

*r.resamp.interp* Resamples raster map to a finer grid using interpolation.

*r.resamp.rst* Reinterpolates and optionally computes topographic analysis from input raster map to a new raster map (possibly with different resolution) using regularized spline with tension and smoothing.

*r.resamp.stats* Resamples raster map layers to a coarser grid using aggregation.

*r.resample* GRASS raster map layer data resampling capability.

*r.rescale.eq* Rescales histogram equalized the range of category values in a raster map layer.

*r.rescale* Rescales the range of category values in a raster map layer.

*r.rgb* Splits a raster map into red, green and blue maps.

*r.ros* Generates rate of spread raster maps.

*r.series.accumulate* Makes each output cell value a accumulationfunction of the values assigned to the corresponding cells in the input raster map layers.

*r.series* Makes each output cell value a function of the values assigned to the corresponding cells in the input raster map layers.

*r.series.interp* Interpolate raster maps located (temporal or spatial) in between input raster maps at specific sampling positions.

*r.shaded.relief* Creates shaded relief map from an elevation map (DEM).

*r.sim.sediment* Sediment transport and erosion/deposition simulation using path sampling method (SIMWE).

*r.sim.water* Overland flow hydrologic simulation using path sampling method (SIMWE).

*r.slope.aspect* Generates raster maps of slope, aspect, curvatures and partial derivatives from an elevation raster map.

*r.solute.transport* Numerical calculation program for transient, confined and unconfined solute transport in two dimensions

*r.spread* Simulates elliptically anisotropic spread.

*r.spreadpath* Recursively traces the least cost path backwards to cells from which the cumulative cost was determined.

*r.statistics* Calculates category or object oriented statistics.

*r.stats* Generates area statistics for raster map.

*r.stats.quantile* Compute category quantiles using two passes.

*r.stats.zonal* Calculates category or object oriented statistics (accumulator-based statistics).

*r.stream.extract* Performs stream network extraction.

*r.sun* Solar irradiance and irradiation model.

*r.sunhours* Calculates solar elevation, solar azimuth, and sun hours.

*r.sunmask* Calculates cast shadow areas from sun position and elevation raster map.

*r.support* Allows creation and/or modification of raster map layer support files.

*r.support.stats* Update raster map statistics

*r.surf.area* Prints estimation of surface area for raster map.

*r.surf.contour* Generates surface raster map from rasterized contours.

*r.surf.fractal* Creates a fractal surface of a given fractal dimension.

*r.surf.gauss* Generates a raster map using gaussian random number generator.

*r.surf.idw* Surface interpolation utility for raster map.

*r.surf.idw2* Surface generation program.

*r.surf.random* Produces a raster surface map of uniform random deviates with defined range.

*r.terraflow* Flow computation for massive grids (float version).

*r.texture* Generate images with textural features from a raster map.

*r.thin* Thins non-zero cells that denote linear features in a raster map layer.

*r.tile* Splits a raster map into tiles.

*r.tileset* Produces tilings of the source projection for use in the destination region and projection.

*r.timestamp* Modifies a timestamp for a raster map.

*r.to.rast3* Converts 2D raster map slices to one 3D raster volume map.

*r.to.rast3elev* Creates a 3D volume map based on 2D elevation and value raster maps.

*r.to.vect* Converts a raster map into a vector map.

*r.topidx* Creates a topographic index raster map from an elevation raster map.

*r.topmodel* Simulates TOPMODEL which is a physically based hydrologic model.

*r.transect* Outputs raster map layer values lying along user defined transect line(s).

*r.univar* Calculates univariate statistics from the non-null cells of a raster map.

*r.unpack* Unpacks a raster map packed with *r.pack*.

*r.uslek* Computes USLE Soil Erodibility Factor (K).

*r.usler* Computes USLE R factor, Rainfall erosivity index.

*r.viewshed* Computes the viewshed of a point on an elevation raster map.

*r.volume* Calculates the volume of data "clumps".

*r.walk* Outputs a raster map showing the anisotropic cumulative cost.

*r.water.outlet* Creates watershed basins from a drainage direction map.

*r.watershed* Calculates hydrological parameters and RUSLE factors.

*r.what.color* Queries colors for a raster map layer.

*r.what* Queries raster maps on their category values and category labels.

### 3D Raster commands (*r3.\**)

- r3.colors* Creates/modifies the color table associated with a 3D raster map.
- r3.colors.out* Exports the color table associated with a 3D raster map.
- r3.cross.rast* Creates cross section 2D raster map from 3D raster map based on 2D elevation map
- r3.gwflow* Numerical calculation program for transient, confined groundwater flow in three dimensions.
- r3.in.ascii* Converts a 3D ASCII raster text file into a (binary) 3D raster map.
- r3.in.bin* Imports a binary raster file into a GRASS 3D raster map.
- r3.in.v5d* Import 3-dimensional Vis5D files.
- r3.in.xyz* Create a 3D raster map from an assemblage of many coordinates using univariate statistics
- r3.info* Outputs basic information about a user-specified 3D raster map layer.
- r3.mapcalc* Raster map calculator.
- r3.mask* Establishes the current working 3D raster mask.
- r3.mkdspf* Creates a display file from an existing 3D raster map according to specified threshold levels.
- r3.neighbors* Makes each voxel value a function of the values assigned to the voxels around it, and stores new voxel values in an output 3D raster map
- r3.null* Explicitly create the 3D NULL-value bitmap file.
- r3.out.ascii* Converts a 3D raster map layer into a ASCII text file.
- r3.out.bin* Exports a GRASS 3D raster map to a binary array.
- r3.out.netcdf* Export a 3D raster map as netCDF file.
- r3.out.v5d* Exports GRASS 3D raster map to 3-dimensional Vis5D file.
- r3.out.vtk* Converts 3D raster maps into the VTK-ASCII format.
- r3.retile* Retiles an existing 3D raster map with user defined x, y and z tile size.
- r3.stats* Generates volume statistics for 3D raster maps.
- r3.support* Allows creation and/or modification of raster3d map layer support files.
- r3.timestamp* Print/add/remove a timestamp for a 3D raster map

*r3.to.rast* Converts 3D raster maps to 2D raster maps

*r3.univar* Calculates univariate statistics from the non-null cells of a 3D raster map.

### *Temporal commands (t.\*)*

- t.connect* Prints/sets general temporal GIS database connection for current mapset.
- t.create* Creates a space time dataset.
- t.info* Lists information about space time datasets and maps.
- t.list* Lists space time datasets and maps registered in the temporal database.
- t.merge* Merges several space time datasets into a single space time dataset.
- t.rast.accdetect* Detects accumulation patterns in temporally accumulated space time raster datasets created by *t.rast.accumulate*.
- t.rast.accumulate* Computes cyclic accumulations of a space time raster dataset.
- t.rast.aggregate.ds* Aggregates data of an existing space time raster dataset using the time intervals of a second space time dataset.
- t.rast.aggregate* Aggregates temporally the maps of a space time raster dataset by a user defined granularity.
- t.rast.colors* Creates/modifies the color table associated with each raster map of the space time raster dataset.
- t.rast.export* Exports space time raster dataset.
- t.rast.extract* Extracts a subset of a space time raster datasets.
- t.rast.gapfill* Replaces gaps in a space time raster dataset with interpolated raster maps.
- t.rast.import* Imports space time raster dataset.
- t.rast.list* Lists registered maps of a space time raster dataset.
- t.rast.mapcalc* Performs spatio-temporal mapcalc expressions on temporally sampled maps of space time raster datasets.
- t.rast.neighbors* Performs a neighborhood analysis for each map in a space time raster dataset.
- t.rast.out.vtk* Exports space time raster dataset as VTK time series.
- t.rast.series* Performs different aggregation algorithms from *r.series* on all or a subset of raster maps in a space time raster dataset.
- t.rast.to.rast3* Converts a space time raster dataset into a raster3d map.
- t.rast.univar* Calculates univariate statistics from the non-null cells for each registered raster map of a space time raster dataset.

*t.rast3d.extract* Extracts a subset of a space time 3D raster dataset.

*t.rast3d.list* Lists registered maps of a space time raster3d dataset.

*t.rast3d.mapcalc* Performs r3.mapcalc expressions on maps of sampled space time 3D raster datasets.

*t.rast3d.univar* Calculates univariate statistics from the non-null cells for each registered raster3d map of a space time raster3d dataset.

*t.register* Registers raster, vector and raster3d maps in a space time datasets.

*t.remove* Removes space time datasets from temporal database.

*t.rename* Renames a space time dataset

*t.sample* Samples the input space time dataset(s) with a sample space time dataset and print the result to stdout.

*t.shift* Shifts temporally the maps of a space time dataset.

*t.snap* Snaps temporally the maps of a space time dataset.

*t.support* Modifies the metadata of a space time dataset.

*t.topology* Lists temporal topology of a space time dataset.

*t.unregister* Unregisters raster, vector and raster3d maps from the temporal database or a specific space time dataset.

*t.vect.db.select* Prints attributes of vector maps registered in a space time vector dataset.

*t.vect.export* Exports a space time vector dataset as GRASS GIS specific archive file.

*t.vect.extract* Extracts a subset of a space time vector dataset.

*t.vect.import* Imports a space time vector dataset from a GRASS GIS specific archive file.

*t.vect.list* Lists registered maps of a space time vector dataset.

*t.vect.observe.strds* Observes specific locations in a space time raster dataset over a period of time using vector points.

*t.vect.univar* Calculates univariate statistics of attributes for each registered vector map of a space time vector dataset

*t.vect.what.strds* Stores raster map values at spatial and temporal positions of vector points as vector attributes.

## Vector commands (v.\*)

- v.buffer* Creates a buffer around vector features of given type.
- v.build.all* Rebuilds topology on all vector maps in the current mapset.
- v.build* Creates topology for vector map.
- v.build.polylines* Builds polylines from lines or boundaries.
- v.category* Attaches, deletes or reports vector categories to map geometry.
- v.centroids* Adds missing centroids to closed boundaries.
- v.class* Classifies attribute data, e.g. for thematic mapping
- v.clean* Toolset for cleaning topology of vector map.
- v.colors* Creates/modifies the color table associated with a vector map.
- v.colors.out* Exports the color table associated with a vector map.
- v.convert.all* Converts all older versions of GRASS vector maps in current mapset to current format.
- v.convert* Imports older versions of GRASS vector maps.
- v.db.addcolumn* Adds one or more columns to the attribute table connected to a given vector map.
- v.db.addtable* Creates and connects a new attribute table to a given layer of an existing vector map.
- v.db.connect* Prints/sets DB connection for a vector map to attribute table.
- v.db.dropcolumn* Drops a column from the attribute table connected to a given vector map.
- v.db.droprow* Removes a vector feature from a vector map through attribute selection.
- v.db.droptable* Removes existing attribute table of a vector map.
- v.db.join* Joins a database table to a vector map table.
- v.db.reconnect.all* Reconnects attribute tables for all vector maps from the current mapset to a new database.
- v.db.renamecolumn* Renames a column in the attribute table connected to a given vector map.
- v.db.select* Prints vector map attributes.



- v.db.univar* Calculates univariate statistics on selected table column for a GRASS vector map.
- v.db.update* Updates a column in the attribute table connected to a vector map.
- v.delaunay* Creates a Delaunay triangulation from an input vector map containing points or centroids.
- v.dissolve* Dissolves boundaries between adjacent areas sharing a common category number or attribute.
- v.distance* Finds the nearest element in vector map 'to' for elements in vector map 'from'.
- v.drape* Converts 2D vector features to 3D by sampling of elevation raster map.
- v.edit* Edits a vector map, allows adding, deleting and modifying selected vector features.
- v.external* Creates a new pseudo-vector map as a link to an OGR-supported layer or a PostGIS feature table.
- v.external.out* Defines vector output format.
- v.extract* Selects vector features from an existing vector map and creates a new vector map containing only the selected features.
- v.extrude* Extrudes flat vector features to 3D vector features with defined height.
- v.generalize* Performs vector based generalization.
- v.hull* Produces a 2D/3D convex hull for a given vector map.
- v.in.ascii* Creates a vector map from an ASCII points file or ASCII vector file.
- v.in.db* Creates new vector (points) map from database table containing coordinates.
- v.in.dxf* Converts file in DXF format to GRASS vector map.
- v.in.e00* Imports E00 file into a vector map.
- v.in.geonames* Imports geonames.org country files into a vector points map.
- v.in.gns* Imports US-NGA GEOnet Names Server (GNS) country files into a GRASS vector points map.
- v.in.lidar* Converts LAS LiDAR point clouds to a GRASS vector map with libLAS.
- v.in.lines* Imports ASCII x,y[,z] coordinates as a series of lines.

*v.in.mapgen* Imports Mapgen or Matlab-ASCII vector maps into GRASS.

*v.in.ogr* Imports vector data into a GRASS vector map using OGR library.

*v.in.region* Creates a vector polygon from the current region extent.

*v.in.wfs* Imports GetFeature from a WFS server.

*v.info* Outputs basic information about a vector map.

*v.kcv* Randomly partition points into test/train sets.

*v.kernel* Generates a raster density map from vector points map.

*v.krige* Performs ordinary or block kriging for vector maps.

*v.label* Creates point labels for a vector map from attached attributes.

*v.lidar.correction* Correction of the *v.lidar.growing* output. It is the last of the three algorithms for LIDAR filtering.

*v.lidar.edgedetection* Detects the object's edges from a LIDAR data set.

*v.lidar.growing* Building contour determination and Region Growing algorithm for determining the building inside

*v.lrs.create* Creates a linear reference system.

*v.lrs.label* Creates stationing from input lines, and linear reference system.

*v.lrs.segment* Creates points/segments from input lines, linear reference system and positions read from stdin or a file.

*v.lrs.where* Finds line id and real km+offset for given points in vector map using linear reference system.

*v.mkgrid* Creates a vector map of a user-defined grid.

*v.neighbors* Neighborhood analysis tool for vector point maps.

*v.net.alloc* Allocates subnets for nearest centers (direction from center).

*v.net.allpairs* Computes the shortest path between all pairs of nodes in the network.

*v.net.bridge* Computes bridges and articulation points in the network.

*v.net centrality* Computes degree, centrality, betweenness, closeness and eigenvector centrality measures in the network.

*v.net.components* Computes strongly and weakly connected components in the network.

*v.net.connectivity* Computes vertex connectivity between two sets of nodes in the network.

*v.net.distance* Computes shortest distance via the network between the given sets of features.

*v.net.flow* Computes the maximum flow between two sets of nodes in the network.

*v.net* Performs network maintenance.

*v.net.iso* Splits net by cost isolines.

*v.net.path* Finds shortest path on vector network.

*v.net.salesman* Creates a cycle connecting given nodes (Traveling salesman problem).

*v.net.spanningtree* Computes minimum spanning tree for the network.

*v.net.steiner* Creates Steiner tree for the network and given terminals.

*v.net.timetable* Finds shortest path using timetables.

*v.net.visibility* Performs visibility graph construction.

*v.normal* Tests for normality for vector points.

*v.out.ascii* Exports a vector map to a GRASS ASCII vector representation.

*v.out.dxf* Exports vector map to DXF file format.

*v.out.gps* Exports a vector map to a GPS receiver or file format supported by GPSTabel.

*v.out.ogr* Exports a vector map layer to any of the supported OGR vector formats.

*v.out.postgis* Exports a vector map layer to PostGIS feature table.

*v.out.pov* Converts GRASS x,y,z points to POV-Ray x,z,y format.

*v.out.svg* Exports a vector map to SVG file.

*v.out.vtk* Converts a vector map to VTK ASCII output.

*v.outlier* Removes outliers from vector point data.

*v.overlay* Overlays two vector maps.

*v.pack* Packs up a vector map and support files for copying.

*v.parallel* Creates parallel line to input vector lines.

*v.patch* Creates a new vector map by combining other vector maps.

*v.perturb* Random location perturbations of vector points.

*v.proj* Re-projects a vector map from one location to the current location.

*v.qcount* Indices for quadrat counts of sites lists.

*v.random* Generates random 2D/3D vector points.

*v.rast.stats* Calculates univariate statistics from a raster map based on a vector map and uploads statistics to new attribute columns.

*v.reclass* Changes vector category values for an existing vector map according to results of SQL queries or a value in attribute table column.

*v.rectify* Rectifies a vector by computing a coordinate transformation for each object in the vector based on the control points.

*v.report* Reports geometry statistics for vector maps.

*v.sample* Samples a raster map at vector point locations.

*v.segment* Creates points/segments from input vector lines and positions.

*v.select* Selects features from vector map (A) by features from other vector map (B).

*v.split* Splits vector lines to shorter segments.

*v.support* Updates vector map metadata.

*v.surf.bspline* Performs bicubic or bilinear spline interpolation with Tykhonov regularization.

*v.surf.idw* Provides surface interpolation from vector point data by Inverse Distance Squared Weighting.

*v.surf.rst* Performs surface interpolation from vector points map by splines.

*v.timestamp* Modifies a timestamp for a vector map.

*v.to.3d* Performs transformation of 2D vector features to 3D.

*v.to.db* Populates attribute values from vector features.

*v.to.lines* Converts vector polygons or points to lines.

*v.to.points* Creates points along input lines in new vector map with 2 layers.

*v.to.rast* Converts (rasterize) a vector map into a raster map.

*v.to.rast3* Converts a vector map (only points) into a 3D raster map.

*v.transform* Performs an affine transformation (shift, scale and rotate) on vector map.

*v.type* Changes type of vector features.

*v.univar* Calculates univariate statistics for attribute.

*v.unpack* Unpacks a vector map packed with *v.pack*.

*v.vect.stats* Count points in areas, calculate statistics from point attributes.

*v.vol.rst* Interpolates point data to a 3D raster map using regularized spline with tension (RST) algorithm.

*v.voronoi* Creates a Voronoi diagram in current region from an input vector map containing points or centroids.

*v.what* Queries a vector map at given locations.

*v.what.rast* Uploads raster values at positions of vector points to the table.

*v.what.rast3* Uploads 3D raster values at positions of vector points to the table.

*v.what.vect* Uploads vector values at positions of vector points to the table.

*Add-Ons*

```
1 for D in *; do echo "${D}" |tr "\n" "|" && grep -A1 '#%\n
    module' ${D} |sed 's/%%module//g' |sed 's/%% \n
    description: //g'; don
```

d.correlate|

Prints a graph of the correlation between raster maps (in pairs).

d.out.file|

Saves the contents of the active display monitor to a graphics file.

d.polar|d.rast.edit|

Edits cell values in a raster map.

d.rast.leg|

Displays a raster map and its legend on a graphics window

d.redraw|

Redraws the content of currently selected monitor.

d.shadedmap|

Drapes a color raster over a shaded relief map.

d.to.rast|

Saves the contents of the active display monitor to a raster map.

d.vect.thematic|

Displays thematic vector map

d.what.rast|

Allows the user to interactively query raster map layers at user-selected locations.

d.what.vect|

Allows the user to interactively query vector map layers at user-selected locations.

db.dropcolumn|

Drops a column from selected attribute table.

db.droptable|

Drops an attribute table.

db.in.ogr|db.out.ogr|

Exports attribute tables into various formats.

db.test|

Test database driver, database must exist and set by db.connect.

db.univar|

Calculates univariate statistics on selected table column.

g.extension|

## label: Maintains GRASS Addons extensions in local GRASS installation.

g.extension.all|

## label: Rebuilds or removes all locally installed GRASS Addons extensions.

g.gui.animation|

Tool for animating a series of raster and vector maps or a space time raster or vector dataset.

g.gui.dbmgr|

Launches graphical attribute table manager.

g.gui.gcp|

Georectifies a map and allows to manage Ground Control Points.

g.gui.gmodeler|

## label: Graphical Modeler.

g.gui.iclass|

`#% label`: Tool for supervised classification of imagery data.

`g.gui.mapswipe|`

Interactively compares two maps by swiping a visibility bar.

`g.gui.psmmap|`

Tool for creating hardcopy map outputs.

`g.gui.rlisetup|`

Configuration tool for `r.li` modules.

`g.gui.timeline|`

Allows to compare temporal datasets by displaying their temporal extents in a plot.

`g.gui.vdigit|`

Interactive editing and digitization of vector maps.

`g.manual|`

Displays the manual pages of GRASS modules.

`i.colors.enhance|`

Performs auto-balancing of colors for RGB images.

`i.fusion.hpf|i.image.mosaic|`

Mosaics several images and extends colormap.

`i.in.spotvgt|`

Imports SPOT VGT NDVI data into a raster map.

`i.oif|i.pansharpen|i.spectral|i.tasscap|m.proj|`

Converts coordinates from one projection to another (`cs2cs` frontend).

`r.blend|`

Blends color components of two raster maps by a given ratio.

`r.buffer.lowmem|`



`#% label`: Creates a raster map showing buffer zones surrounding cells that contain non-NULL category values.

`r.colors.stddev`|

Sets color rules based on stddev from a raster map's mean value.

`r.fillnulls`|

Fills no-data areas in raster maps using spline interpolation.

`r.grow`|`r.in.aster`|`r.in.srtm`|`r.in.wms`|

Downloads and imports data from WMS/WMTS/NASA OnEarth server.

`r.mask`|

Creates a MASK for limiting raster operation.

`r.out.xyz`|

Exports a raster map to a text file as x,y,z values based on cell centers.

`r.pack`|

Packs up a raster map and support files for copying.

`r.plane`|

Creates raster plane map given dip (inclination), aspect (azimuth) and one point.

`r.reclass.area`|

Reclasses a raster map greater or less than user specified area size (in hectares).

`r.rgb`|

Splits a raster map into red, green and blue maps.

`r.tileset`|

Produces tilings of the source projection for use in the destination region and projection.

`r.unpack`|

Unpacks a raster map packed with `r.pack`.

`r3.in.xyz|t.create|`

Creates a space time dataset.

`t.info|`

Lists information about space time datasets and maps.

`t.list|`

Lists space time datasets and maps registered in the temporal database.

`t.merge|`

Merges several space time datasets into a single space time dataset.

`t.rast.accdetect|`

Detects accumulation patterns in temporally accumulated space time raster datasets created by `t.rast.accumulate`.

`t.rast.accumulate|`

Computes cyclic accumulations of a space time raster dataset.

`t.rast.aggregate|`

Aggregates temporally the maps of a space time raster dataset by a user defined granularity.

`t.rast.aggregate.ds|`

Aggregates data of an existing space time raster dataset using the time intervals of a second space time dataset.

`t.rast.colors|`

Creates/modifies the color table associated with each raster map of the space time raster dataset.

`t.rast.export|`

Exports space time raster dataset.

`t.rast.extract|`

Extracts a subset of a space time raster datasets.

`t.rast.gapfill|`

Replaces gaps in a space time raster dataset with interpolated raster maps.

`t.rast.import|`

Imports space time raster dataset.

`t.rast.list|`

Lists registered maps of a space time raster dataset.

`t.rast.mapcalc|`

Performs spatio-temporal mapcalc expressions on temporally sampled maps of space time raster datasets.

`t.rast.neighbors|`

Performs a neighborhood analysis for each map in a space time raster dataset.

`t.rast.out.vtk|`

Exports space time raster dataset as VTK time series.

`t.rast.series|`

Performs different aggregation algorithms from `r.series` on all or a subset of raster maps in a space time raster dataset.

`t.rast.to.rast3|`

Converts a space time raster dataset into a raster3d map.

`t.rast.univar|`

Calculates univariate statistics from the non-null cells for each registered raster map of a space time raster dataset.

`t.rast3d.extract|`

Extracts a subset of a space time 3D raster dataset.

`t.rast3d.list|`

Lists registered maps of a space time raster3d dataset.

`t.rast3d.mapcalc|`

Performs `r3.mapcalc` expressions on maps of sampled space time 3D raster datasets.

`t.rast3d.univar|`

Calculates univariate statistics from the non-null cells for each registered raster3d map of a space time raster3d dataset.

`t.register|`

Registers raster, vector and raster3d maps in a space time datasets.

`t.remove|`

Removes space time datasets from temporal database.

`t.rename|`

Renames a space time dataset

`t.sample|`

Samples the input space time dataset(s) with a sample space time dataset and print the result to stdout.

`t.shift|`

Shifts temporally the maps of a space time dataset.

`t.snap|`

Snaps temporally the maps of a space time dataset.

`t.support|`

Modifies the metadata of a space time dataset.

`t.topology|`

Lists temporal topology of a space time dataset.

`t.unregister|`

Unregisters raster, vector and raster3d maps from the temporal database or a specific space time dataset.

`t.vect.db.select|`

Prints attributes of vector maps registered in a space time vector dataset.

`t.vect.export|`

Exports a space time vector dataset as GRASS GIS specific archive file.

`t.vect.extract|`

Extracts a subset of a space time vector dataset.

`t.vect.import|`

Imports a space time vector dataset from a GRASS GIS specific archive file.

`t.vect.list|`

Lists registered maps of a space time vector dataset.

`t.vect.observe.strds|`

Observes specific locations in a space time raster dataset over a period of time using vector points.

`t.vect.univar|`

Calculates univariate statistics of attributes for each registered vector map of a space time vector dataset

`t.vect.what.strds|`

Stores raster map values at spatial and temporal positions of vector points as vector attributes.

`v.build.all|`

Rebuilds topology on all vector maps in the current mapset.

`v.centroids|v.class.ml|v.convert.all|`

Converts all older versions of GRASS vector maps in current mapset to current format.

`v.db.addcolumn|`

Adds one or more columns to the attribute table connected to a given vector map.

`v.db.addtable|`

Creates and connects a new attribute table to a given layer of an existing vector map.

`v.db.dropcolumn|`

Drops a column from the attribute table connected to a given vector map.

`v.db.dropprow|`

Removes a vector feature from a vector map through attribute selection.

`v.db.droptable|v.db.join|`

Joins a database table to a vector map table.

`v.db.reconnect.all|`

Reconnects attribute tables for all vector maps from the current mapset to a new database.

`v.db.renamecolumn|`

Renames a column in the attribute table connected to a given vector map.

`v.db.univar|`

Calculates univariate statistics on selected table column for a GRASS vector map.

`v.db.update|`

Updates a column in the attribute table connected to a vector map.

`v.dissolve|`

Dissolves boundaries between adjacent areas sharing a common category number or attribute.

`v.in.e00|`

Imports E00 file into a vector map.

`v.in.geonames|`

Imports geonames.org country files into a vector points map.

`v.in.gns|`

Imports US-NGA GEOnet Names Server (GNS) country files into a GRASS vector points map.

`v.in.lines|`

Imports ASCII  $x,y[,z]$  coordinates as a series of lines.

`v.in.mapgen|`

Imports Mapgen or Matlab-ASCII vector maps into GRASS.

`v.in.wfs|v.krige|`

Performs ordinary or block kriging for vector maps.

`v.out.gps|v.pack|`

Packs up a vector map and support files for copying.

`v.rast.stats|`

Calculates univariate statistics from a raster map based on a vector map and uploads statistics to new attribute columns.

`v.report|`

Reports geometry statistics for vector maps.

`v.to.lines|`

Converts vector polygons or points to lines.

`v.unpack|`

Unpacks a vector map packed with `v.pack`.

`v.what.vect|`

Uploads vector values at positions of vector points to the table.

`wxpyimgview|`

Views BMP images from the PNG driver.

*Environment Variables*

```
1 APPDATA
2 ASCII
3 CELL
4 DCELL
5 DEBUG
6 FCELL
7 GISBASE
8 GISDBASE
9 GISRC
10 GIS_ERROR_LOG
11 GIS_LOCK
12 GRASS_ADDON_BASE
13 GRASS_ADDON_ETC
14 GRASS_ADDON_PATH
15 GRASS_BATCH_JOB
16 GRASS_DB_ENCODING
17 GRASS_ENCODING
18 GRASS_ERROR_MAIL
19 GRASS_FONT
20 GRASS_FONT_CAP
21 GRASS_GNUPLOT
22 GRASS_GUI
23 GRASS_HTML_BROWSER
24 GRASS_INT_ZLIB
25 GRASS_MESSAGE_FORMAT
26 GRASS_MOUSE_BUTTON
27 GRASS_NO_GLX_PBUFFERS
28 GRASS_NO_GLX_PIXMAPS
29 GRASS_OVERWRITE
30 GRASS_PAGER
31 GRASS_PERL
32 GRASS_PYTHON
33 GRASS_REGION
34 GRASS_RENDER_FRAME
35 GRASS_RENDER_HEIGHT
36 GRASS_RENDER_IMMEDIATE
37 GRASS_RENDER_LINE_WIDTH
38 GRASS_RENDER_TEXT_SIZE
39 GRASS_RENDER_WIDTH
40 GRASS_SH
41 GRASS_SIGSEGV_ON_ERROR
42 GRASS_SKIP_MAPSET_OWNER_CHECK
43 GRASS_UI_TERM
44 GRASS_VECTOR_EXTERNAL_IGNORE
45 GRASS_VECTOR_EXTERNAL_IMMEDIATE
46 GRASS_VECTOR_LOWMEM
47 GRASS_VECTOR_OGR
48 GRASS_VECTOR_TEMPORARY
```



```
49 GRASS_VERBOSE
50 GRASS_VERSION
51 GRASS_WXBUNDLED
52 GRASS_XTERM
53 GRASS_ZLIB_LEVEL
54 GUI
55 LOCATION
56 LOCATION_NAME
57 MAPSET
58 OMP_NUM_THREADS
59 OVERWRITE
60 SIGSEGV
61 TEMP
62 TMP
63 TMPDIR
64 WIND_OVERRIDE
65 WX_DEBUG
66 wxGUI
```

## Code Listings

Example of a custom defined language for the listings  $\LaTeX$  package, used in this document, demonstrated partially below ( on page 45).

### A grassgis language definition for the listings packages

```

1 % Listings
2 \usepackage{listings}
3 \renewcommand{\lstlistlistingname}{List of Listings} % Fix the List of \
4 % Listings title
5
6 \AtBeginDocument{% Beginning of AtBegin --->
7
8 % "define" grassgis
9 \lstdefinlanguage{grassgis}{
10   alsoletter=-.,
11   alsoother={\{=\}},
12   morekeywords=[1]{d.barscale, d.colorlist, d.colortable, d.correlate, d.\
13     erase, d.font, d.fontlist, d.geodesic, d.graph, d.grid, d.his, d.\
14     histogram, d.info, d.labels, d.legend, d.linegraph, d.mon, d.\
15     northarrow, d.out.file, d.path, d.polar, d.profile, d.rast, d.rast.\
16     arrow, d.rast.edit, d.rast.leg, d.rast.num, d.redraw, d.rgb, d.\
17     rhumbline, d.shadedmap, d.text, d.thematic.area, d.title, d.to.rast,\
18     d.vect, d.vect.chart, d.vect.thematic, d.what.rast, d.what.vect, d.\
19     where},
20
21 % db
22 morekeywords=[2]{db.columns, db.connect, db.copy, db.createdb, db.\
23   databases, db.describe, db.drivers, db.dropcolumn, db.dropdb, db.\
24   droptable, db.execute, db.in.ogr, db.login, db.out.ogr, db.select, \
25   db.tables, db.test, db.univar},
26
27 % g
28 morekeywords=[3]{g.access, g.cairocomp, g.copy, g.dirseps, g.extension, g\
29   .extension.all, g.filename, g.findetc, g.findfile, g.gisenv, g.gui, \
30   g.gui.animation, g.gui.dbmgr, g.gui.gcp, g.gui.gmodeler, g.gui.\
31   iclass, g.gui.mapswipe, g.gui.psmmap, g.gui.rlisetup, g.gui.timeline,\
32   g.gui.vdigit, g.list, g.manual, g.mapset, g.mapsets, g.message, g.\
33   mkfontcap, g.parser, g.pnmcomp, g.ppmtojpg, g.proj, g.region, g.\
34   remove, g.rename, g.tempfile, g.version},
35
36 % i
37 morekeywords=[4]{i.albedo, i.aster.toar, i.atcorr, i.biomass, i.cca, i.\
38   cluster, i.colors.enhance, i.eb.eta, i.eb.evapfr, i.eb.hsebal01, i.\
39   eb.netrad, i.eb.soilheatflux, i.emissivity, i.evapo.mh, i.evapo.pm, \
40   i.evapo.pt, i.evapo.time, i.fft, i.gensig, i.gensigset, i.group, i.\
41   his.rgb, i.iff, i.image.mosaic, i.in.spotvgt, i.landsat.acca, i.\
42   landsat.toar, i.maxlik, i.modis.qc, i.oif, i.ortho.camera, i.ortho.\
43   elev, i.ortho.rectify, i.pansharpen, i.pca, i.rectify, i.rgb.his, i.\
44   segment, i.smap, i.spectral, i.target, i.tasscap, i.topo.corr, i.vi,\
45   i.zc},
46
47 % m
48 morekeywords=[5]{m.cogo, m.measure, m.nviz.image, m.nviz.script, m.proj, \
49   m.transform},
50
51 % ps
52 morekeywords=[6]{ps.map},
53
54 % r
55 morekeywords=[7]{r.basins.fill, r.blend, r.buffer, r.buffer.lowmem, r.\
56   carve, r.category, r.circle, r.clump, r.coin, r.colors, r.colors.out\
57   , r.colors.stddev, r.composite, r.compress, r.contour, r.cost, r.\
58   covar, r.cross, r.describe, r.distance, r.drain, r.external, r.\
59   external.out, r.fill.dir, r.fillnulls, r.flow, r.grow, r.grow.\
60   distance, r.gwflow, r.his, r.horizon, r.in.ascii, r.in.aster, r.in.\
61   bin, r.in.gdal, r.in.gridatb, r.in.lidar, r.in.mat, r.in.png, r.in.\

```

```

poly, r.in.srtm, r.in.wms, r.in.xyz, r.info, r.kappa, r.lake, r.\
latlong, r.li, r.li.cwcd, r.li.daemon, r.li.dominance, r.li.\
edgedensity, r.li.mpa, r.li.mps, r.li.pdcv, r.li.pdrange, r.li.\
padsd, r.li.patchdensity, r.li.patchnum, r.li.pielou, r.li.renyi, r.\
li.richness, r.li.shannon, r.li.shape, r.li.simpson, r.mapcalc, r.\
mask, r.mfilter, r.mode, r.neighbors, r.null, r.out.ascii, r.out.bin\
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reclass.area, r.recode, r.region, r.regression.line, r.regression.\
multi, r.report, r.resamp.bspline, r.resamp.filter, r.resamp.interp,\
r.resamp.rst, r.resamp.stats, r.resample, r.rescale, r.rescale.eq,\
r.rgb, r.ros, r.series, r.series.accumulate, r.series.interp, r.\
shaded.relief, r.sim.sediment, r.sim.water, r.slope.aspect, r.solute\
.transport, r.spread, r.spreadpath, r.statistics, r.stats, r.stats.\
quantile, r.stats.zonal, r.stream.extract, r.sun, r.sunhours, r.\
sunmask, r.support, r.support.stats, r.surf.area, r.surf.contour, r.\
surf.fractal, r.surf.gauss, r.surf.idw, r.surf.idw2, r.surf.random, \
r.terraflow, r.texture, r.thin, r.tile, r.tileset, r.timestamp, r.to\
.rast3, r.to.rast3elev, r.to.vect, r.topidx, r.topmodel, r.transect,\
r.univar, r.unpack, r.uslek, r.usler, r.viewshed, r.volume, r.walk,\
r.water.outlet, r.watershed, r.what, r.what.color},
25 % r3
26 morekeywords=[8]{r3.colors, r3.colors.out, r3.cross.rast, r3.gwflow, r3.\
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mask, r3.mkdspf, r3.neighbors, r3.null, r3.out.ascii, r3.out.bin, r\
3.out.netcdf, r3.out.v5d, r3.out.vtk, r3.retile, r3.stats, r3.\
support, r3.timestamp, r3.to.rast, r3.univar},
27 % t
28 morekeywords=[9]{t.connect, t.create, t.info, t.list, t.merge, t.rast.\
accdetect, t.rast.accumulate, t.rast.aggregate, t.rast.aggregate.ds,\
t.rast.colors, t.rast.export, t.rast.extract, t.rast.gapfill, t.\
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out.vtk, t.rast.series, t.rast.to.rast3, t.rast.univar, t.rast3d.\
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univar, t.vect.what.strds},
29 % v
30 morekeywords=[10]{v.buffer, v.build, v.build.all, v.build.polylines, v.\
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v.db.dropcolumn, v.db.droptable, v.db.join, v.db.\
reconnect.all, v.db.renamecolumn, v.db.select, v.db.univar, v.db.\
update, v.delaunay, v.dissolve, v.distance, v.drape, v.edit, v.\
external, v.external.out, v.extract, v.extrude, v.generalize, v.hull\
, v.in.ascii, v.in.db, v.in.dxf, v.in.e00, v.in.geonames, v.in.gns, \
v.in.lidar, v.in.lines, v.in.mapgen, v.in.ogr, v.in.region, v.in.wfs\
, v.info, v.kcv, v.kernel, v.krige, v.label, v.lidar.correction, v.\
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lrs.segment, v.lrs.where, v.mkgrid, v.neighbors, v.net, v.net.alloc,\
v.net.allpairs, v.net.bridge, v.net.centrality, v.net.components, v\
.net.connectivity, v.net.distance, v.net.flow, v.net.iso, v.net.path\
, v.net.salesman, v.net.spanningtree, v.net.steiner, v.net.timetable\
, v.net.visibility, v.normal, v.out.ascii, v.out.dxf, v.out.gps, v.\
out.ogr, v.out.postgis, v.out.pov, v.out.svg, v.out.vtk, v.outlier, \
v.overlay, v.pack, v.parallel, v.patch, v.perturb, v.proj, v.qcount,\
v.random, v.rast.stats, v.reclass, v.rectify, v.report, v.sample, v\
.segment, v.select, v.split, v.support, v.surf.bspline, v.surf.idw, \
v.surf.rst, v.timestamp, v.to.3d, v.to.db, v.to.lines, v.to.points, \
v.to.rast, v.to.rast3, v.transform, v.type, v.univar, v.unpack, v.\
vect.stats, v.vol.rst, v.voronoi, v.what, v.what.rast, v.what.rast3,\
v.what.vect},
31 % parameters
32 morekeywords=[11]{region=, zoom=, nsres=, ewres=, MASK=, input=, in=, dsn\
=, rast=, map=, output=, out=, type=, use=, attrcolumn=, rgbcolumn=,\
labelcolumn=, method=, size=, title=, color=, null()=, S=, N=, W=, \

```

```

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33 % variables
34 morekeywords=[12]{APPDATA, ASCII, CELL, DCELL, DEBUG, FCELL, GISBASE, \
    GISDBASE, GISRC, GIS_ERROR_LOG, GIS_LOCK, GRASS_ADDON_BASE, GRASS_\
    ADDON_ETC, GRASS_ADDON_PATH, GRASS_BATCH_JOB, GRASS_DB_ENCODING, \
    GRASS_ENCODING, GRASS_ERROR_MAIL, GRASS_FONT, GRASS_FONT_CAP, GRASS_\
    GNUPLOT, GRASS_GUI, GRASS_HTML_BROWSER, GRASS_INT_ZLIB, GRASS_\
    MESSAGE_FORMAT, GRASS_MOUSE_BUTTON, GRASS_NO_GX_PBUFFERS, GRASS_NO_\
    GLX_PIXMAPS, GRASS_OVERWRITE, GRASS_PAGER, GRASS_PERL, GRASS_PYTHON, \
    GRASS_REGION, GRASS_RENDER_FRAME, GRASS_RENDER_HEIGHT, GRASS_RENDER_\
    IMMEDIATE, GRASS_RENDER_LINE_WIDTH, GRASS_RENDER_TEXT_SIZE, GRASS_\
    RENDER_WIDTH, GRASS_SH, GRASS_SIGSEGV_ON_ERROR, GRASS_SKIP_MAPSET_\
    OWNER_CHECK, GRASS_UI_TERM, GRASS_VECTOR_EXTERNAL_IGNORE, GRASS_\
    VECTOR_EXTERNAL_IMMEDIATE, GRASS_VECTOR_LOWMEM, GRASS_VECTOR_OGR, \
    GRASS_VECTOR_TEMPORARY, GRASS_VERBOSE, GRASS_VERSION, GRASS_\
    WXBUNDLED, GRASS_XTERM, GRASS_ZLIB_LEVEL, GUI, LOCATION, LOCATION_\
    NAME, MAPSET, OMP_NUM_THREADS, OVERWRITE, SIGSEGV, TEMP, TMP, TMPDIR\
    , WIND_OVERRIDE, WX_DEBUG, wxGUI},
35 %
36 sensitive=true,
37 morestring=[b]"
38
39 % Default settings for code listings
40 % morecomment = [n][\keywordstyle]{}{}},
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42   language=Python
43 }
44 \lstset{
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74   keywordstyle=[12]\color{magenta},
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77   numbersep=3em,
78   keepspaces=true,
79   showstringspaces=false,
80   tab=BADTAB,
81   showtabs=true,
82   upquote=true
83 }
84 % see: <http://tex.stackexchange.com/a/145868/8272>

```

*Examples*

```

1  d.barscale Displays a barscale on the graphics monitor.
2
3  d.colorlist Output a list of all available display \
   colors with a configurable separator (default is \
   comma).
4
5  d.colortable Displays the color table associated with a \
   raster map layer.
6
7  d.correlate Prints a graph of the correlation between \
   raster maps (in pairs).
8
9  d.erase Erases the contents of the active graphics \
   display frame with user defined color.
10
11 d.font Selects the font in which text will be displayed \
   on the user's graphics monitor.
12
13 d.fontlist Lists the available fonts.
14
15 d.geodesic Displays a geodesic line, tracing the \
   shortest distance between two geographic points along\
   a great circle, in a longitude/latitude data set.
16
17 d.graph Program for generating and displaying simple \
   graphics on the display monitor.
18
19 d.grid Overlays a user-specified grid in the active \
   display frame on the graphics monitor.
20
21 d.his Displays the result obtained by combining hue, \
   intensity, and saturation (his) values from \
   user-specified input raster map layers.
22
23 d.histogram Displays a histogram in the form of a pie or\
   bar chart for a user-specified raster map.
24
25 d.info Displays information about the active display \
   monitor.
26
27 d.labels Displays text labels (created with v.label) to \
   the active frame on the graphics monitor.
28
29 d.legend Displays a legend for a 2D or 3D raster map in \
   the active frame of the graphics monitor.
30
31 d.linegraph Generates and displays simple line graphs in\
   the active graphics monitor display frame.
32

```

33 **d.mon** Controls graphics display monitors from the \  
command line.

34

35 **d.northarrow** Displays a north arrow on the graphics \  
monitor.

36

37 **d.out.file** Saves the contents of the active display \  
monitor to a graphics file.

38

39 **d.path** Finds shortest path for selected starting and \  
ending node.

40

41 **d.polar** Draws polar diagram of angle map such as aspect \  
or flow directions

42

43 **d.profile** Plots profile of a transect.

44

45 **d.rast.arrow** Draws arrows representing cell aspect \  
direction for a raster map containing aspect data.

46

47 **d.rast.edit** Edits cell values in a raster map.

48

49 **d.rast** Displays user-specified raster map in the active \  
graphics frame.

50

51 **d.rast.leg** Displays a raster map and its legend on a \  
graphics window

52

53 **d.rast.num** Overlays cell category values on a raster map \  
displayed in the active graphics frame.

54

55 **d.redraw** Redraws the content of currently selected \  
monitor.

56

57 **d.rgb** Displays three user-specified raster maps as red, \  
green, and blue overlays in the active graphics \  
frame.

58

59 **d.rhumbline** Displays the rhumbline joining two longitude \  
/latitude coordinates.

60

61 **d.shadedmap** Drapes a color raster over a shaded relief \  
map.

62

63 **d.text** Draws text in the active display frame on the \  
graphics monitor using the current font.

64

65 **d.thematic.area** Displays a thematic vector area map in \  
the active frame on the graphics monitor.

66

```
67 d.title Create a TITLE for a raster map in a form \
    suitable for display with d.text.
68
69 d.to.rast Saves the contents of the active display \
    monitor to a raster map.
70
71 d.vect.chart Displays charts of vector data in the \
    active frame on the graphics monitor.
72
73 d.vect Displays user-specified vector map in the active \
    graphics frame.
74
75 d.vect.thematic Displays thematic vector map
76
77 d.what.rast Allows the user to interactively query \
    raster map layers at user-selected locations.
78
79 d.what.vect Allows the user to interactively query \
    vector map layers at user-selected locations.
80
81 d.where Identifies the geographic coordinates associated\
    with point locations given in display coordinates.
82
83 db.columns List all columns for a given table.
84
85 db.connect Prints/sets general DB connection for current\
    mapset.
86
87 db.copy Copy a table.
88
89 db.createdb Creates an empty database.
90
91 db.databases Lists all databases for a given driver and \
    location.
92
93 db.describe Describes a table in detail.
94
95 db.drivers Lists all database drivers.
96
97 db.dropcolumn Drops a column from selected attribute \
    table.
98
99 db.dropdb Removes an existing database.
100
101 db.droptable Drops an attribute table.
102
103 db.execute Executes any SQL statement.
104
105 db.in.ogr Imports attribute tables in various formats.
106
107 db.login Sets user/password for DB driver/database.
```

```

108
109 db.out.ogr Exports attribute tables into various formats.
110
111 db.select Selects data from attribute table.
112
113 db.tables Lists all tables for a given database.
114
115 db.test Test database driver, database must exist and \
    set by db.connect.
116
117 db.univar Calculates univariate statistics on selected \
    table column.
118
119 g.access Controls access to the current mapset for other\
    users on the system.
120
121 g.cairocomp Overlays multiple X Pixmaps.
122
123 g.copy Copies available data files in the current mapset\
    search path to the user's current mapset.
124
125 g.dirseps Internal GRASS utility for converting \
    directory separator characters.
126
127 g.extension.all Rebuilds or removes all locally \
    installed GRASS Addons extensions.
128
129 g.extension Maintains GRASS Addons extensions in local \
    GRASS installation.
130
131 g.filename Prints GRASS data base file names.
132
133 g.findetc Searches for GRASS support files.
134
135 g.findfile Searches for GRASS data base files and sets \
    variables for the shell.
136
137 g.gisenv Outputs and modifies the user's current GRASS \
    variable settings.
138
139 g.gui.animation Tool for animating a series of raster \
    and vector maps or a space time raster or vector \
    dataset.
140
141 g.gui.dbmgr Launches graphical attribute table manager.
142
143 g.gui.gcp Georectifies a map and allows to manage Ground\
    Control Points.
144
145 g.gui.gmodeler Graphical Modeler.
146

```



```

147 g.gui Launches a GRASS graphical user interface (GUI) \
    session.
148
149 g.gui.iclass Tool for supervised classification of \
    imagery data.
150
151 g.gui.mapswipe Interactively compares two maps by \
    swiping a visibility bar.
152
153 g.gui.psmmap Tool for creating hardcopy map outputs.
154
155 g.gui.rlisetup Configuration tool for r.li modules.
156
157 g.gui.timeline Allows to compare temporal datasets by \
    displaying their temporal extents in a plot.
158
159 g.gui.vdigit Interactive editing and digitization of \
    vector maps.
160
161 g.list Lists available GRASS data base files of the \
    user-specified data type optionally using the search \
    pattern.
162
163 g.manual Displays the manual pages of GRASS modules.
164
165 g.mapset Changes/reports current mapset.
166
167 g.mapsets Modifies/prints the user's current mapset \
    search path.
168
169 g.message Prints a message, warning, progress info, or \
    fatal error in the GRASS way.
170
171 g.mkfontcap Generates the font configuration file by \
    scanning various directories for fonts.
172
173 g.parser Provides automated parser, GUI, and help \
    support for GRASS scripts.
174
175 g.pnmcomp Overlays multiple PPM image files.
176
177 g.ppmtopng Converts between PPM/PGM and PNG image \
    formats.
178
179 g.proj Prints or modifies GRASS projection information \
    files (in various co-ordinate system descriptions).
180
181 g.region Manages the boundary definitions for the \
    geographic region.
182

```

183 **g.remove** Removes data base element files from the user's\  
current mapset using the search pattern.

184

185 **g.rename** Renames data base element files in the user's \  
current mapset.

186

187 **g.tempfile** Creates a temporary file and prints it's file\  
name.

188

189 **g.version** Displays **GRASS** version info.

190

191 **i.albedo** Computes broad band albedo from surface \  
reflectance.

192

193 **i.aster.toar** Calculates Top of Atmosphere Radiance/\  
Reflectance/Brightness Temperature from ASTER DN.

194

195 **i.atcorr** Performs atmospheric correction using the 6S \  
algorithm.

196

197 **i.biomass** Computes biomass growth, precursor of crop \  
yield calculation.

198

199 **i.cca** Canonical components analysis (CCA) program for \  
image processing.

200

201 **i.cluster** Generates spectral signatures for land cover \  
types in an image using a clustering algorithm.

202

203 **i.colors.enhance** Performs auto-balancing of colors for \  
RGB images.

204

205 **i.eb.eta** Actual evapotranspiration for diurnal period (\  
Bastiaanssen, 1995).

206

207 **i.eb.evapfr** Computes evaporative fraction (Bastiaanssen,\  
1995) and root zone soil moisture (Makin, Molden and\  
Bastiaanssen, 2001).

208

209 **i.eb.hsebal01** Computes sensible heat flux iteration \  
SEBAL 01.

210

211 **i.eb.netrad** Net radiation approximation (Bastiaanssen, \  
1995).

212

213 **i.eb.soilheatflux** Soil heat flux approximation (\  
Bastiaanssen, 1995).

214

215 **i.emissivity** Computes emissivity from NDVI, generic \  
method for sparse land.

216

```

217 i.evapo.mh Computes evapotranspiration calculation \
      modified or original Hargreaves formulation, 2001.
218
219 i.evapo.pm Computes potential evapotranspiration \
      calculation with hourly Penman-Monteith.
220
221 i.evapo.pt Computes evapotranspiration calculation \
      Priestley and Taylor formulation, 1972.
222
223 i.evapo.time Computes temporal integration of satellite \
      ET actual (ETa) following the daily ET reference (ETo\
      ) from meteorological station(s).
224
225 i.fft Fast Fourier Transform (FFT) for image processing.
226
227 i.gensig Generates statistics for i.maxlik from raster \
      map.
228
229 i.gensigset Generates statistics for i.smap from raster \
      map.
230
231 i.group Creates, edits, and lists groups of imagery data.
232
233 i.his.rgb Transforms raster maps from HIS (\
      Hue-Intensity-Saturation) color space to RGB (\
      Red-Green-Blue) color space.
234
235 i.ifft Inverse Fast Fourier Transform (IFFT) for image \
      processing.
236
237 i.image.mosaic Mosaics several images and extends \
      colormap.
238
239 i.in.spotvgt Imports SPOT VGT NDVI data into a raster \
      map.
240
241 i.landsat.acca Performs Landsat TM/ETM+ Automatic Cloud \
      Cover Assessment (ACCA).
242
243 i.landsat.toar Calculates top-of-atmosphere radiance or \
      reflectance and temperature for Landsat MSS/TM/ETM+/\
      OLI
244
245 i.maxlik Classifies the cell spectral reflectances in \
      imagery data.
246
247 i.modis.qc Extracts quality control parameters from \
      MODIS QC layers.
248
249 i.oif Calculates Optimum-Index-Factor table for spectral\
      bands

```

```

250
251 i.ortho.camera Select and modify the imagery group \
      camera reference file.
252
253 i.ortho.elev Select or modify the target elevation model.
254
255 i.ortho.rectify Orthorectifies an image by using the \
      image to photo coordinate transformation matrix.
256
257 i.pansharpen Image fusion algorithms to sharpen \
      multispectral with high-res panchromatic channels
258
259 i.pca Principal components analysis (PCA) for image \
      processing.
260
261 i.rectify Rectifies an image by computing a coordinate \
      transformation for each pixel in the image based on \
      the control points.
262
263 i.rgb.his Transforms raster maps from RGB (\
      Red-Green-Blue) color space to HIS (\
      Hue-Intensity-Saturation) color space.
264
265 i.segment Identifies segments (objects) from imagery \
      data.
266
267 i.smap Performs contextual image classification using \
      sequential maximum a posteriori (SMAP) estimation.
268
269 i.spectral Displays spectral response at user specified \
      locations in group or images.
270
271 i.target Targets an imagery group to a GRASS location \
      and mapset.
272
273 i.tasscap Performs Tasseled Cap (Kauth Thomas) \
      transformation.
274
275 i.topo.corr Computes topographic correction of \
      reflectance.
276
277 i.vi Calculates different types of vegetation indices.
278
279 i.zc Zero-crossing "edge detection" raster function for \
      image processing.
280
281 m.cogo A simple utility for converting bearing and \
      distance measurements to coordinates and vice versa.
282
283 m.measure Measures the lengths and areas of features.
284

```

```

285 m.nviz.image Creates a 3D rendering of GIS data.
286
287 m.nviz.script Creates fly-through script to run in NVIZ.
288
289 m.proj Converts coordinates from one projection to \
    another (cs2cs frontend).
290
291 m.transform Computes a coordinate transformation based \
    on the control points.
292
293 Postscript commands (ps.*)
294
295 ps.map Produces hardcopy PostScript map output.
296
297 r.basins.fill Generates watershed subbasins raster map.
298
299 r.blend Blends color components of two raster maps by a \
    given ratio.
300
301 r.buffer Creates a raster map showing buffer zones \
    surrounding cells that contain non-NULL category \
    values.
302
303 r.buffer.lowmem Creates a raster map showing buffer \
    zones surrounding cells that contain non-NULL \
    category values.
304
305 r.carve Generates stream channels.
306
307 r.category Manages category values and labels associated\
    with user-specified raster map layers.
308
309 r.circle Creates a raster map containing concentric \
    rings around a given point.
310
311 r.clump Recategorizes data in a raster map by grouping \
    cells that form physically discrete areas into unique\
    categories.
312
313 r.coin Tabulates the mutual occurrence (coincidence) of \
    categories for two raster map layers.
314
315 r.colors Creates/modifies the color table associated \
    with a raster map.
316
317 r.colors.out Exports the color table associated with a \
    raster map.
318
319 r.colors.stddev Sets color rules based on stddev from a \
    raster map's mean value.
320

```

```

321 r.composite Combines red, green and blue raster maps \
    into a single composite raster map.
322
323 r.compress Compresses and decompresses raster maps.
324
325 r.contour Produces a vector map of specified contours \
    from a raster map.
326
327 r.cost Creates a raster map showing the cumulative cost \
    of moving between different geographic locations on \
    an input raster map whose cell category values \
    represent cost.
328
329 r.covar Outputs a covariance/correlation matrix for \
    user-specified raster map layer(s).
330
331 r.cross Creates a cross product of the category values \
    from multiple raster map layers.
332
333 r.describe Prints terse list of category values found in\
    a raster map layer.
334
335 r.distance Locates the closest points between objects in\
    two raster maps.
336
337 r.drain Traces a flow through an elevation model or cost\
    surface on a raster map.
338
339 r.external Links GDAL supported raster data as a pseudo \
    GRASS raster map.
340
341 r.external.out Defines raster output format utilizing \
    GDAL library.
342
343 r.fill.dir Filters and generates a depressionless \
    elevation map and a flow direction map from a given \
    elevation raster map.
344
345 r.fillnulls Fills no-data areas in raster maps using \
    spline interpolation.
346
347 r.flow Constructs flowlines.
348
349 r.grow.distance Generates a raster map containing \
    distances to nearest raster features.
350
351 r.grow Generates a raster map layer with contiguous \
    areas grown by one cell.
352
353 r.gwflow Numerical calculation program for transient, \
    confined and unconfined groundwater flow in two \

```

dimensions.

**r.his** Generates red, green and blue raster map layers \ combining hue, intensity and saturation (HIS) values \ from user-specified input raster map layers.

**r.horizon** Computes horizon angle height from a digital \ elevation model.

**r.in.ascii** Converts a **GRASS ASCII** raster file to binary \ raster map.

**r.in.aster** Georeference, rectify, and import Terra-ASTER \ imagery and relative DEMs using gdalwarp.

**r.in.bin** Import a binary raster file into a **GRASS** raster \ map layer.

**r.in.gdal** Imports raster data into a **GRASS** raster map \ using GDAL library.

**r.in.gridatb** Imports GRIDATB.FOR map file (TOPMODEL) \ into a **GRASS** raster map.

**r.in.lidar** Creates a raster map from LAS LiDAR points \ using univariate statistics.

**r.in.mat** Imports a binary MAT-File(v4) to a **GRASS** raster.

**r.in.png** Imports non-georeferenced PNG format image.

**r.in.poly** Creates raster maps from **ASCII** polygon/line \ point data files.

**r.in.srtm** Imports SRTM HGT files into raster map.

**r.in.wms** Downloads and imports data from WMS/WMTS/NASA \ OnEarth server.

**r.in.xyz** Creates a raster map from an assemblage of many \ coordinates using univariate statistics.

**r.info** Outputs basic information about a raster map.

**r.kappa** Calculates error matrix and kappa parameter for \ accuracy assessment of classification result.

**r.lake** Fills lake at given point to given level.

**r.latlong** Creates a latitude/longitude raster map.

```
391 r.li.cwed Calculates contrast weighted edge density \
    index on a raster map
392
393 r.li.daemon Support module for r.li landscape index \
    calculations.
394
395 r.li.dominance Calculates dominance's diversity index on\
    a raster map
396
397 r.li.edgedensity Calculates edge density index on a \
    raster map, using a 4 neighbour algorithm
398
399 r.li
400
401 r.li.mpa Calculates mean pixel attribute index on a \
    raster map
402
403 r.li.mps Calculates mean patch size index on a raster \
    map, using a 4 neighbour algorithm
404
405 r.li.padv Calculated coefficient of variation of patch \
    area on a raster map
406
407 r.li.padrage Calculates range of patch area size on a \
    raster map
408
409 r.li.padsd Calculates standard deviation of patch area a\
    raster map
410
411 r.li.patchdensity Calculates patch density index on a \
    raster map, using a 4 neighbour algorithm
412
413 r.li.patchnum Calculates patch number index on a raster \
    map, using a 4 neighbour algorithm.
414
415 r.li.pielou Calculates Pielou's diversity index on a \
    raster map
416
417 r.li.renyi Calculates Renyi's diversity index on a \
    raster map
418
419 r.li.richness Calculates richness index on a raster map
420
421 r.li.shannon Calculates Shannon's diversity index on a \
    raster map
422
423 r.li.shape Calculates shape index on a raster map
424
425 r.li.simpson Calculates Simpson's diversity index on a \
    raster map
426
```



```

427 r.mapcalc Raster map calculator.
428
429 r.mask Creates a MASK for limiting raster operation.
430
431 r.mfilter Performs raster map matrix filter.
432
433 r.mode Finds the mode of values in a cover map within \
    areas assigned the same category value in a \
    user-specified base map.
434
435 r.neighbors Makes each cell category value a function of\
    the category values assigned to the cells around it,\
    and stores new cell values in an output raster map \
    layer.
436
437 r.null Manages NULL-values of given raster map.
438
439 r.out.ascii Converts a raster map layer into a GRASS \
    ASCII text file.
440
441 r.out.bin Exports a GRASS raster to a binary array.
442
443 r.out.gdal Exports GRASS raster maps into GDAL supported\
    formats.
444
445 r.out.gridatb Exports GRASS raster map to GRIDATB.FOR \
    map file (TOPMODEL).
446
447 r.out.mat Exports a GRASS raster to a binary MAT-File.
448
449 r.out.mpeg Converts raster map series to MPEG movie.
450
451 r.out.png Export a GRASS raster map as a \
    non-georeferenced PNG image.
452
453 r.out.pov Converts a raster map layer into a \
    height-field file for POV-Ray.
454
455 r.out.ppm Converts a GRASS raster map to a PPM image \
    file.
456
457 r.out.ppm3 Converts 3 GRASS raster layers (R,G,B) to a \
    PPM image file.
458
459 r.out.vrml Exports a raster map to the Virtual Reality \
    Modeling Language (VRML).
460
461 r.out.vtk Converts raster maps into the VTK-ASCII format.
462
463 r.out.xyz Exports a raster map to a text file as x,y,z \
    values based on cell centers.

```

464  
465 **r.pack** Packs up a raster map and support files for \  
copying.

466  
467 **r.param.scale** Extracts terrain parameters from a DEM.

468  
469 **r.patch** Creates a composite raster map layer by using \  
known category values from one (or more) map layer(s)\  
to fill in areas of "no data" in another map layer.

470  
471 **r.plane** Creates raster plane map given dip (inclination)\  
, aspect (azimuth) and one point.

472  
473 **r.profile** Outputs the raster map layer values lying on \  
user-defined line(s).

474  
475 **r.proj** Re-projects a raster map from given location to \  
the current location.

476  
477 **r.quant** Produces the quantization file for a \  
floating-point map.

478  
479 **r.quantile** Compute quantiles using two passes.

480  
481 **r.random.cells** Generates random cell values with spatial\  
dependence.

482  
483 **r.random** Creates a raster map layer and vector point map\  
containing randomly located points.

484  
485 **r.random.surface** Generates random surface(s) with \  
spatial dependence.

486  
487 **r.reclass.area** Reclasses a raster map greater or less \  
than user specified area size (in hectares).

488  
489 **r.reclass** Reclassify raster map based on category values.

490  
491 **r.recode** Recodes categorical raster maps.

492  
493 **r.region** Sets the boundary definitions for a raster map.

494  
495 **r.regression.line** Calculates linear regression from two \  
raster maps:  $y = a + b \cdot x$ .

496  
497 **r.regression.multi** Calculates multiple linear regression\  
from raster maps.

498  
499 **r.report** Reports statistics for raster maps.

500

```

501 r.resamp.bspline Performs bilinear or bicubic spline \
    interpolation with Tykhonov regularization.
502
503 r.resamp.filter Resamples raster map layers using an \
    analytic kernel.
504
505 r.resamp.interp Resamples raster map to a finer grid \
    using interpolation.
506
507 r.resamp.rst Reinterpolates and optionally computes \
    topographic analysis from input raster map to a new \
    raster map (possibly with different resolution) using \
    regularized spline with tension and smoothing.
508
509 r.resamp.stats Resamples raster map layers to a coarser \
    grid using aggregation.
510
511 r.resample GRASS raster map layer data resampling \
    capability.
512
513 r.rescale.eq Rescales histogram equalized the range of \
    category values in a raster map layer.
514
515 r.rescale Rescales the range of category values in a \
    raster map layer.
516
517 r.rgb Splits a raster map into red, green and blue maps.
518
519 r.ros Generates rate of spread raster maps.
520
521 r.series.accumulate Makes each output cell value a \
    accumulationfunction of the values assigned to the \
    corresponding cells in the input raster map layers.
522
523 r.series Makes each output cell value a function of the \
    values assigned to the corresponding cells in the \
    input raster map layers.
524
525 r.series.interp Interpolate raster maps located (\
    temporal or spatial) in between input raster maps at \
    specific sampling positions.
526
527 r.shaded.relief Creates shaded relief map from an \
    elevation map (DEM).
528
529 r.sim.sediment Sediment transport and erosion/deposition\
    simulation using path sampling method (SIMWE).
530
531 r.sim.water Overland flow hydrologic simulation using \
    path sampling method (SIMWE).
532

```

```

533 r.slope.aspect Generates raster maps of slope, aspect, \
    curvatures and partial derivatives from an elevation \
    raster map.
534
535 r.solute.transport Numerical calculation program for \
    transient, confined and unconfined solute transport \
    in two dimensions
536
537 r.spread Simulates elliptically anisotropic spread.
538
539 r.spreadpath Recursively traces the least cost path \
    backwards to cells from which the cumulative cost was\
    determined.
540
541 r.statistics Calculates category or object oriented \
    statistics.
542
543 r.stats Generates area statistics for raster map.
544
545 r.stats.quantile Compute category quantiles using two \
    passes.
546
547 r.stats.zonal Calculates category or object oriented \
    statistics (accumulator-based statistics).
548
549 r.stream.extract Performs stream network extraction.
550
551 r.sun Solar irradiance and irradiation model.
552
553 r.sunhours Calculates solar elevation, solar azimuth, \
    and sun hours.
554
555 r.sunmask Calculates cast shadow areas from sun position\
    and elevation raster map.
556
557 r.support Allows creation and/or modification of raster \
    map layer support files.
558
559 r.support.stats Update raster map statistics
560
561 r.surf.area Prints estimation of surface area for raster\
    map.
562
563 r.surf.contour Generates surface raster map from \
    rasterized contours.
564
565 r.surf.fractal Creates a fractal surface of a given \
    fractal dimension.
566
567 r.surf.gauss Generates a raster map using gaussian \
    random number generator.

```

```

568 r.surf.idw Surface interpolation utility for raster map.
569
570 r.surf.idw2 Surface generation program.
571
572 r.surf.random Produces a raster surface map of uniform \
573 random deviates with defined range.
574
575 r.terraflow Flow computation for massive grids (float \
576 version).
577
578 r.texture Generate images with textural features from a \
579 raster map.
580
581 r.thin Thins non-zero cells that denote linear features \
582 in a raster map layer.
583
584 r.tile Splits a raster map into tiles.
585
586 r.tileset Produces tilings of the source projection for \
587 use in the destination region and projection.
588
589 r.timestamp Modifies a timestamp for a raster map.
590
591 r.to.rast3 Converts 2D raster map slices to one 3D \
592 raster volume map.
593
594 r.to.rast3elev Creates a 3D volume map based on 2D \
595 elevation and value raster maps.
596
597 r.to.vect Converts a raster map into a vector map.
598
599 r.topidx Creates a topographic index raster map from an \
600 elevation raster map.
601
602 r.topmodel Simulates TOPMODEL which is a physically \
603 based hydrologic model.
604
605 r.transect Outputs raster map layer values lying along \
606 user defined transect line(s).

```

```

607 r.viewshed Computes the viewshed of a point on an \
    elevation raster map.
608
609 r.volume Calculates the volume of data "clumps".
610
611 r.walk Outputs a raster map showing the anisotropic \
    cumulative cost.
612
613 r.water.outlet Creates watershed basins from a drainage \
    direction map.
614
615 r.watershed Calculates hydrological parameters and RUSLE \
    factors.
616
617 r.what.color Queries colors for a raster map layer.
618
619 r.what Queries raster maps on their category values and \
    category labels.
620
621 r3.colors Creates/modifies the color table associated \
    with a 3D raster map.
622
623 r3.colors.out Exports the color table associated with a \
    3D raster map.
624
625 r3.cross.rast Creates cross section 2D raster map from 3 \
    D raster map based on 2D elevation map
626
627 r3.gwflow Numerical calculation program for transient, \
    confined groundwater flow in three dimensions.
628
629 r3.in.ascii Converts a 3D ASCII raster text file into a \
    (binary) 3D raster map.
630
631 r3.in.bin Imports a binary raster file into a GRASS 3D \
    raster map.
632
633 r3.in.v5d Import 3-dimensional Vis5D files.
634
635 r3.in.xyz Create a 3D raster map from an assemblage of \
    many coordinates using univariate statistics
636
637 r3.info Outputs basic information about a user-specified \
    3D raster map layer.
638
639 r3.mapcalc Raster map calculator.
640
641 r3.mask Establishes the current working 3D raster mask.
642
643 r3.mkdspf Creates a display file from an existing 3D \
    raster map according to specified threshold levels.

```

```

644
645 r3.neighbors Makes each voxel value a function of the \
        values assigned to the voxels around it, and stores \
        new voxel values in an output 3D raster map
646
647 r3.null Explicitly create the 3D NULL-value bitmap file.
648
649 r3.out.ascii Converts a 3D raster map layer into a ASCII\
        text file.
650
651 r3.out.bin Exports a GRASS 3D raster map to a binary \
        array.
652
653 r3.out.netcdf Export a 3D raster map as netCDF file.
654
655 r3.out.v5d Exports GRASS 3D raster map to 3-dimensional \
        Vis5D file.
656
657 r3.out.vtk Converts 3D raster maps into the VTK-ASCII \
        format.
658
659 r3.retile Retiles an existing 3D raster map with user \
        defined x, y and z tile size.
660
661 r3.stats Generates volume statistics for 3D raster maps.
662
663 r3.support Allows creation and/or modification of \
        raster3d map layer support files.
664
665 r3.timestamp Print/add/remove a timestamp for a 3D \
        raster map
666
667 r3.to.rast Converts 3D raster maps to 2D raster maps
668
669 r3.univar Calculates univariate statistics from the \
        non-null cells of a 3D raster map.
670
671 t.connect Prints/sets general temporal GIS database \
        connection for current mapset.
672
673 t.create Creates a space time dataset.
674
675 t.info Lists information about space time datasets and \
        maps.
676
677 t.list Lists space time datasets and maps registered in \
        the temporal database.
678
679 t.merge Merges several space time datasets into a single\
        space time dataset.
680

```

```

681 t.rast.accdetect Detects accumulation patterns in \
    temporally accumulated space time raster datasets \
    created by t.rast.accumulate.
682
683 t.rast.accumulate Computes cyclic accumulations of a \
    space time raster dataset.
684
685 t.rast.aggregate.ds Aggregates data of an existing space\
    time raster dataset using the time intervals of a \
    second space time dataset.
686
687 t.rast.aggregate Aggregates temporally the maps of a \
    space time raster dataset by a user defined \
    granularity.
688
689 t.rast.colors Creates/modifies the color table \
    associated with each raster map of the space time \
    raster dataset.
690
691 t.rast.export Exports space time raster dataset.
692
693 t.rast.extract Extracts a subset of a space time raster \
    datasets.
694
695 t.rast.gapfill Replaces gaps in a space time raster \
    dataset with interpolated raster maps.
696
697 t.rast.import Imports space time raster dataset.
698
699 t.rast.list Lists registered maps of a space time raster\
    dataset.
700
701 t.rast.mapcalc Performs spatio-temporal mapcalc \
    expressions on temporally sampled maps of space time \
    raster datasets.
702
703 t.rast.neighbors Performs a neighborhood analysis for \
    each map in a space time raster dataset.
704
705 t.rast.out.vtk Exports space time raster dataset as VTK \
    time series.
706
707 t.rast.series Performs different aggregation algorithms \
    from r.series on all or a subset of raster maps in a \
    space time raster dataset.
708
709 t.rast.to.rast3 Converts a space time raster dataset \
    into a raster3d map.
710
711 t.rast.univar Calculates univariate statistics from the \
    non-null cells for each registered raster map of a \

```



space time raster dataset.

**t.rast3d.extract** Extracts a subset of a space time 3D \ raster dataset.

**t.rast3d.list** Lists registered maps of a space time \ raster3d dataset.

**t.rast3d.mapcalc** Performs **r3.mapcalc** expressions on maps\ of sampled space time 3D raster datasets.

**t.rast3d.univar** Calculates univariate statistics from \ the non-null cells for each registered raster3d map \ of a space time raster3d dataset.

**t.register** Registers raster, vector and raster3d maps in\ a space time datasets.

**t.remove** Removes space time datasets from temporal \ database.

**t.rename** Renames a space time dataset

**t.sample** Samples the input space time dataset(s) with a \ sample space time dataset and print the result to \ stdout.

**t.shift** Shifts temporally the maps of a space time \ dataset.

**t.snap** Snaps temporally the maps of a space time dataset.

**t.support** Modifies the metadata of a space time dataset.

**t.topology** Lists temporal topology of a space time \ dataset.

**t.unregister** Unregisters raster, vector and raster3d \ maps from the temporal database or a specific space \ time dataset.

**t.vect.db.select** Prints attributes of vector maps \ registered in a space time vector dataset.

**t.vect.export** Exports a space time vector dataset as \ **GRASS** GIS specific archive file.

**t.vect.extract** Extracts a subset of a space time vector \ dataset.

```

745 t.vect.import Imports a space time vector dataset from a \
      GRASS GIS specific archive file.
746
747 t.vect.list Lists registered maps of a space time vector \
      dataset.
748
749 t.vect.observe.strds Observes specific locations in a \
      space time raster dataset over a period of time using \
      vector points.
750
751 t.vect.univar Calculates univariate statistics of \
      attributes for each registered vector map of a space \
      time vector dataset
752
753 t.vect.what.strds Stores raster map values at spatial \
      and temporal positions of vector points as vector \
      attributes.
754
755 v.buffer Creates a buffer around vector features of \
      given type.
756
757 v.build.all Rebuilds topology on all vector maps in the \
      current mapset.
758
759 v.build Creates topology for vector map.
760
761 v.build.polylines Builds polylines from lines or \
      boundaries.
762
763 v.category Attaches, deletes or reports vector \
      categories to map geometry.
764
765 v.centroids Adds missing centroids to closed boundaries.
766
767 v.class Classifies attribute data, e.g. for thematic \
      mapping
768
769 v.clean Toolset for cleaning topology of vector map.
770
771 v.colors Creates/modifies the color table associated \
      with a vector map.
772
773 v.colors.out Exports the color table associated with a \
      vector map.
774
775 v.convert.all Converts all older versions of GRASS \
      vector maps in current mapset to current format.
776
777 v.convert Imports older versions of GRASS vector maps.
778

```

```
779 v.db.addcolumn Adds one or more columns to the attribute \
    table connected to a given vector map.
780
781 v.db.addtable Creates and connects a new attribute table \
    to a given layer of an existing vector map.
782
783 v.db.connect Prints/sets DB connection for a vector map \
    to attribute table.
784
785 v.db.dropcolumn Drops a column from the attribute table \
    connected to a given vector map.
786
787 v.db.dropprow Removes a vector feature from a vector map \
    through attribute selection.
788
789 v.db.droptable Removes existing attribute table of a \
    vector map.
790
791 v.db.join Joins a database table to a vector map table.
792
793 v.db.reconnect.all Reconnects attribute tables for all \
    vector maps from the current mapset to a new \
    database.
794
795 v.db.renamecolumn Renames a column in the attribute \
    table connected to a given vector map.
796
797 v.db.select Prints vector map attributes.
798
799 v.db.univar Calculates univariate statistics on selected \
    table column for a GRASS vector map.
800
801 v.db.update Updates a column in the attribute table \
    connected to a vector map.
802
803 v.delaunay Creates a Delaunay triangulation from an \
    input vector map containing points or centroids.
804
805 v.dissolve Dissolves boundaries between adjacent areas \
    sharing a common category number or attribute.
806
807 v.distance Finds the nearest element in vector map 'to' \
    for elements in vector map 'from'.
808
809 v.drape Converts 2D vector features to 3D by sampling of \
    elevation raster map.
810
811 v.edit Edits a vector map, allows adding, deleting and \
    modifying selected vector features.
812
```

```

813 v.external Creates a new pseudo-vector map as a link to \
      an OGR-supported layer or a PostGIS feature table.
814
815 v.external.out Defines vector output format.
816
817 v.extract Selects vector features from an existing \
      vector map and creates a new vector map containing \
      only the selected features.
818
819 v.extrude Extrudes flat vector features to 3D vector \
      features with defined height.
820
821 v.generalize Performs vector based generalization.
822
823 v.hull Produces a 2D/3D convex hull for a given vector \
      map.
824
825 v.in.ascii Creates a vector map from an ASCII points \
      file or ASCII vector file.
826
827 v.in.db Creates new vector (points) map from database \
      table containing coordinates.
828
829 v.in.dxf Converts file in DXF format to GRASS vector map.
830
831 v.in.e00 Imports E00 file into a vector map.
832
833 v.in.geonames Imports geonames.org country files into a \
      vector points map.
834
835 v.in.gns Imports US-NGA GEOnet Names Server (GNS) \
      country files into a GRASS vector points map.
836
837 v.in.lidar Converts LAS LiDAR point clouds to a GRASS \
      vector map with libLAS.
838
839 v.in.lines Imports ASCII x,y[,z] coordinates as a series\
      of lines.
840
841 v.in.mapgen Imports Mapgen or Matlab-ASCII vector maps \
      into GRASS.
842
843 v.in.ogr Imports vector data into a GRASS vector map \
      using OGR library.
844
845 v.in.region Creates a vector polygon from the current \
      region extent.
846
847 v.in.wfs Imports GetFeature from a WFS server.
848
849 v.info Outputs basic information about a vector map.

```

```

850
851 v.kcv Randomly partition points into test/train sets.
852
853 v.kernel Generates a raster density map from vector \
      points map.
854
855 v.krige Performs ordinary or block kriging for vector \
      maps.
856
857 v.label Creates point labels for a vector map from \
      attached attributes.
858
859 v.lidar.correction Correction of the v.lidar.growing \
      output. It is the last of the three algorithms for \
      LIDAR filtering.
860
861 v.lidar.edgedetection Detects the object's edges from a \
      LIDAR data set.
862
863 v.lidar.growing Building contour determination and \
      Region Growing algorithm for determining the building\
      inside
864
865 v.lrs.create Creates a linear reference system.
866
867 v.lrs.label Creates stationing from input lines, and \
      linear reference system.
868
869 v.lrs.segment Creates points/segments from input lines, \
      linear reference system and positions read from stdin\
      or a file.
870
871 v.lrs.where Finds line id and real km+offset for given \
      points in vector map using linear reference system.
872
873 v.mkgrid Creates a vector map of a user-defined grid.
874
875 v.neighbors Neighborhood analysis tool for vector point \
      maps.
876
877 v.net.alloc Allocates subnets for nearest centers (\
      direction from center).
878
879 v.net.allpairs Computes the shortest path between all \
      pairs of nodes in the network.
880
881 v.net.bridge Computes bridges and articulation points in\
      the network.
882
883 v.net.centralities Computes degree, centrality, betweenness\
      , closeness and eigenvector centrality measures in \

```

the network.

**v.net.components** Computes strongly and weakly connected \ components in the network.

**v.net.connectivity** Computes vertex connectivity between \ two sets of nodes in the network.

**v.net.distance** Computes shortest distance via the \ network between the given sets of features.

**v.net.flow** Computes the maximum flow between two sets of \ nodes in the network.

**v.net** Performs network maintenance.

**v.net.iso** Splits net by cost isolines.

**v.net.path** Finds shortest path on vector network.

**v.net.salesman** Creates a cycle connecting given nodes (\ Traveling salesman problem).

**v.net.spanningtree** Computes minimum spanning tree for \ the network.

**v.net.steiner** Creates Steiner tree for the network and \ given terminals.

**v.net.timetable** Finds shortest path using timetables.

**v.net.visibility** Performs visibility graph construction.

**v.normal** Tests for normality for vector points.

**v.out.ascii** Exports a vector map to a **GRASS ASCII** vector \ representation.

**v.out.dxf** Exports vector map to DXF file format.

**v.out.gps** Exports a vector map to a GPS receiver or file \ format supported by GPSTabel.

**v.out.ogr** Exports a vector map layer to any of the \ supported OGR vector formats.

**v.out.postgis** Exports a vector map layer to PostGIS \ feature table.

**v.out.pov** Converts **GRASS** x,y,z points to POV-Ray x,z,y \ format.

```
922
923 v.out.svg Exports a vector map to SVG file.
924
925 v.out.vtk Converts a vector map to VTK ASCII output.
926
927 v.outlier Removes outliers from vector point data.
928
929 v.overlay Overlays two vector maps.
930
931 v.pack Packs up a vector map and support files for \
    copying.
932
933 v.parallel Creates parallel line to input vector lines.
934
935 v.patch Creates a new vector map by combining other \
    vector maps.
936
937 v.perturb Random location perturbations of vector points.
938
939 v.proj Re-projects a vector map from one location to the\
    current location.
940
941 v.qcount Indices for quadrat counts of sites lists.
942
943 v.random Generates random 2D/3D vector points.
944
945 v.rast.stats Calculates univariate statistics from a \
    raster map based on a vector map and uploads \
    statistics to new attribute columns.
946
947 v.reclass Changes vector category values for an existing\
    vector map according to results of SQL queries or a \
    value in attribute table column.
948
949 v.rectify Rectifies a vector by computing a coordinate \
    transformation for each object in the vector based on\
    the control points.
950
951 v.report Reports geometry statistics for vector maps.
952
953 v.sample Samples a raster map at vector point locations.
954
955 v.segment Creates points/segments from input vector \
    lines and positions.
956
957 v.select Selects features from vector map (A) by \
    features from other vector map (B).
958
959 v.split Splits vector lines to shorter segments.
960
961 v.support Updates vector map metadata.
```

```
962
963 v.surf.bspline Performs bicubic or bilinear spline \
    interpolation with Tykhonov regularization.
964
965 v.surf.idw Provides surface interpolation from vector \
    point data by Inverse Distance Squared Weighting.
966
967 v.surf.rst Performs surface interpolation from vector \
    points map by splines.
968
969 v.timestamp Modifies a timestamp for a vector map.
970
971 v.to.3d Performs transformation of 2D vector features to\
    3D.
972
973 v.to.db Populates attribute values from vector features.
974
975 v.to.lines Converts vector polygons or points to lines.
976
977 v.to.points Creates points along input lines in new \
    vector map with 2 layers.
978
979 v.to.rast Converts (rasterize) a vector map into a \
    raster map.
980
981 v.to.rast3 Converts a vector map (only points) into a 3D\
    raster map.
982
983 v.transform Performs an affine transformation (shift, \
    scale and rotate) on vector map.
984
985 v.type Changes type of vector features.
986
987 v.univar Calculates univariate statistics for attribute.
988
989 v.unpack Unpacks a vector map packed with v.pack.
990
991 v.vect.stats Count points in areas, calculate statistics\
    from point attributes.
992
993 v.vol.rst Interpolates point data to a 3D raster map \
    using regularized spline with tension (RST) \
    algorithm.
994
995 v.voronoi Creates a Voronoi diagram in current region \
    from an input vector map containing points or \
    centroids.
996
997 v.what Queries a vector map at given locations.
998
```



```
999 v.what.rast Uploads raster values at positions of vector\  
    points to the table.  
1000  
1001 v.what.rast3 Uploads 3D raster values at positions of \  
    vector points to the table.  
1002  
1003 v.what.vect Uploads vector values at positions of vector\  
    points to the table.
```

*How did I get this?*

```

1 11970 [ 12:59:19 11.Nov.14 ] cat grass-gis_variables | tr '\n' '|' | sed 's/|/', "/g'
2 12005 [ 16:01:14 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed -e /\n//
3 12006 [ 16:01:18 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed -e /\n//
4 12007 [ 16:01:21 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed e '\n//'
5 12008 [ 16:01:26 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed 's/\n//'
6
7 12012 [ 16:01:42 11.Nov.14 ] man sed
8 12014 [ 16:04:24 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d'
9 12015 [ 16:04:32 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Av.'
10 12016 [ 16:04:41 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Av.' > grassgis_modules_vector
11 12017 [ 16:04:48 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Ar.' > grassgis_modules_raster
12 12018 [ 16:04:57 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Ag.' > grassgis_modules_general
13 12019 [ 16:05:18 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Ai.' > grassgis_modules_imagery
14 12020 [ 16:05:26 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Adb.' > grassgis_modules_db
15 12021 [ 16:05:34 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'At.' > grassgis_modules_temporal
16 12022 [ 16:05:42 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Ad.' > grassgis_modules_display
17 12023 [ 16:05:55 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Am.' > grassgis_modules_miscellaneous
18 12024 [ 16:06:06 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Aps.' > grassgis_modules_postscript
19 12025 [ 16:06:22 11.Nov.14 ] cat grassgis_modules | cut -d " " -f1 | sed '/\s*$/d' | grep 'Ar3.' > grassgis_modules_raster3d
20
21 12256 [ 11:03:14 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
22 12257 [ 11:03:45 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
23 12258 [ 11:03:49 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
24 12259 [ 11:04:06 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
25 12260 [ 11:04:11 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
26 12261 [ 11:04:16 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
27 12262 [ 11:04:18 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
28 12263 [ 11:04:46 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
29 12264 [ 11:04:57 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
30 12265 [ 11:05:09 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
31 12266 [ 11:05:16 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
32 12267 [ 11:05:26 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
33 12268 [ 11:05:31 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
34 12269 [ 11:05:37 14.Nov.14 ] for D in *; do grep -A1 'module' ${D} | sed 's/module/\n/g'; done
35
36 12270 [ 11:06:13 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
37 12271 [ 11:06:39 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | tr "\n" " " | sed 's/module/\n/g'; done
38 12272 [ 11:06:49 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | tr "\n" "p" | sed 's/module/\n/g'; done
39 12273 [ 11:06:56 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | tr "\n" "\n" | sed 's/module/\n/g'; done
40 12274 [ 11:07:04 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | tr "\n" "." | sed 's/module/\n/g'; done
41 12275 [ 11:07:25 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
42 12276 [ 11:07:50 14.Nov.14 ] for D in *; do echo "${D}" | tr "\n" " " && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
43 12277 [ 11:08:17 14.Nov.14 ] for D in *; do echo "${D}" | tr "\n" "|" | tr "\n" " " && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
44
45 12278 [ 11:08:36 14.Nov.14 ] for D in *; do echo "${D}" | tr "\n" "|" | tr -d "\n" && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
46
47 12279 [ 11:09:01 14.Nov.14 ] for D in *; do echo "${D}" | tr -d "\n" && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
48 12280 [ 11:09:14 14.Nov.14 ] for D in *; do echo "${D}" | tr -d "\n" "|" && grep -A1 'module' ${D} | sed 's/module/\n/g'; done
49 12281 [ 11:09:17 14.Nov.14 ] for D in *; do echo "${D}" | tr "\n" "|" && grep -A1 'module' ${D} | sed 's/module/\n/g'; done

```