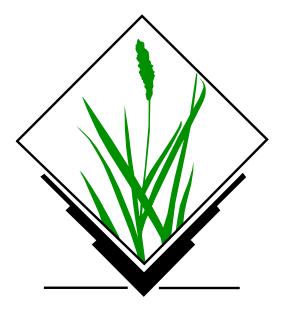# GRASS - GIS Modules & Variables

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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

GRASS GIS The world's leading Free GIS software

- geospatial data management and analysis

- image processing

- graphics/maps production

- spatial modeling

and temporal

- 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.

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

Contents

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.psmap 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 scipts.

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 co-ordinate 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 it's 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.ifft 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.padcv Calculates coefficient of variation of patch area on a raster map

r.li.padrange 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*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 paint 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, betweeness, closeness and eigenvec-
    tor 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 GPSBabel.

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

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

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.droprow|

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).

A grassgis *language definition for the* listings *packages*

```
1   % "define" grassgis
2   \lstdefinelanguage{grassgis}{
3   alsoletter=-.,
4   alsoother={\{\=\}},
5   % d
6   morekeywords=[1]{d.barscale,d.colorlist,d.colortable,\
        d.correlate,d.erase,d.font,d.fontlist,d.geodesic,\
        d.graph,d.grid,d.his,d.histogram,d.info,d.labels,\
        d.legend,d.linegraph,d.mon,d.northarrow,d.out.file,\
        d.path,d.polar,d.profile,d.rast.arrow,d.rast.edit,\
        d.rast,d.rast.leg,d.rast.num,d.redraw,d.rgb,\
        d.rhumbline,d.shadedmap,d.text,d.thematic.area,\
        d.title,d.to.rast,d.vect.chart,d.vect,d.vect.thematic\
        ,d.what.rast,d.what.vect,d.where},
7   % db
8   morekeywords=[2]{db.columns,db.connect,db.copy,\
        db.createdb,db.databases,db.describe,db.drivers,\
        db.dropcolumn,db.dropdb,db.droptable,db.execute,\
        db.in.ogr,db.login,db.out.ogr,db.select,db.tables,\
        db.test,db.univar},
9   % g
10  morekeywords=[3]{g.access,g.cairocomp,g.copy,g.dirseps,\
        g.extension.all,g.extension,g.filename,g.findetc,\
        g.findfile,g.gisenv,g.gui.animation,g.gui.dbmgr,\
        g.gui.gcp,g.gui.gmodeler,g.gui,g.gui.iclass,\
        g.gui.mapswipe,g.gui.psmap,g.gui.rlisetup,\
        g.gui.timeline,g.gui.vdigit,g.list,g.manual,g.mapset,\
        g.mapsets,g.message,g.mkfontcap,g.parser,g.pnmcomp,\
        g.ppmtopng,g.proj,g.region,g.remove,g.rename,\
        g.tempfile,g.version},
11  % i
12  morekeywords=[4]{i.albedo,i.aster.toar,i.atcorr,\
        i.biomass,i.cca,i.cluster,i.colors.enhance,i.eb.eta,\
        i.eb.evapfr,i.eb.hsebal01,i.eb.netrad,\
        i.eb.soilheatflux,i.emissivity,i.evapo.mh,i.evapo.pm,\
        i.evapo.pt,i.evapo.time,i.fft,i.gensig,i.gensigset,\
        i.group,i.his.rgb,i.ifft,i.image.mosaic,i.in.spotvgt,\
        i.landsat.acca,i.landsat.toar,i.maxlik,i.modis.qc,\
        i.oif,i.ortho.camera,i.ortho.elev,i.ortho.rectify,\
        i.pansharpen,i.pca,i.rectify,i.rgb.his,i.segment,\
        i.smap,i.spectral,i.target,i.tasscap,i.topo.corr,i.vi\
        ,i.zc},
```

```
13  % m
14  morekeywords=[5]{m.cogo,m.measure,m.nviz.image,\
        m.nviz.script,m.proj,m.transform},
15  % ps
16  morekeywords=[6]{ps.map},
17  % r
18  morekeywords=[7]{r.basins.fill,r.blend,r.buffer,\
        r.buffer.lowmem,r.carve,r.category,r.circle,r.clump,\
        r.coin,r.colors,r.colors.out,r.colors.stddev,\
        r.composite,r.compress,r.contour,r.cost,r.covar,\
        r.cross,r.describe,r.distance,r.drain,r.external,\
        r.external.out,r.fill.dir,r.fillnulls,r.flow,\
        r.grow.distance,r.grow,r.gwflow,r.his,r.horizon,\
        r.in.ascii,r.in.aster,r.in.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.cwed,r.li.daemon,r.li.dominance,r.li.edgedensity\
        ,r.li,r.li.mpa,r.li.mps,r.li.padcv,r.li.padrange,\
        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,\
        r.out.gdal,r.out.gridatb,r.out.mat,r.out.mpeg,\
        r.out.png,r.out.pov,r.out.ppm,r.out.ppm3,r.out.vrml,\
        r.out.vtk,r.out.xyz,r.pack,r.param.scale,r.patch,\
        r.plane,r.profile,r.proj,r.quant,r.quantile,\
        r.random.cells,r.random,r.random.surface,\
        r.reclass.area,r.reclass,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.eq,\
        r.rescale,r.rgb,r.ros,r.series.accumulate,r.series,\
        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.color,r.what},
19  % r3
20  morekeywords=[8]{r3.colors,r3.colors.out,r3.cross.rast,\
        r3.gwflow,r3.in.ascii,r3.in.bin,r3.in.v5d,r3.in.xyz,\
        r3.info,r3.mapcalc,r3.mask,r3.mkdspf,r3.neighbors,\
        r3.null,r3.out.ascii,r3.out.bin,r3.out.netcdf,\
        r3.out.v5d,r3.out.vtk,r3.retile,r3.stats,r3.support,\
        r3.timestamp,r3.to.rast,r3.univar,r3.colors,\
```

```
     r3.colors.out,r3.cross.rast,r3.gwflow,r3.in.ascii,\
     r3.in.bin,r3.in.v5d,r3.in.xyz,r3.info,r3.mapcalc,\
     r3.mask,r3.mkdspf,r3.neighbors,r3.null,r3.out.ascii,\
     r3.out.bin,r3.out.netcdf,r3.out.v5d,r3.out.vtk,\
     r3.retile,r3.stats,r3.support,r3.timestamp,r3.to.rast\
     ,r3.univar},
21   % t
22   morekeywords=[9]{t.connect,t.create,t.info,t.list,\
     t.merge,t.rast.accdetect,t.rast.accumulate,\
     t.rast.aggregate.ds,t.rast.aggregate,t.rast.colors,\
     t.rast.export,t.rast.extract,t.rast.gapfill,\
     t.rast.import,t.rast.list,t.rast.mapcalc,\
     t.rast.neighbors,t.rast.out.vtk,t.rast.series,\
     t.rast.to.rast3,t.rast.univar,t.rast3d.extract,\
     t.rast3d.list,t.rast3d.mapcalc,t.rast3d.univar,\
     t.register,t.remove,t.rename,t.sample,t.shift,t.snap,\
     t.support,t.topology,t.unregister,t.vect.db.select,\
     t.vect.export,t.vect.extract,t.vect.import,\
     t.vect.list,t.vect.observe.strds,t.vect.univar,\
     t.vect.what.strds},
23   % v
24   morekeywords=[10]{v.buffer,v.build.all,v.build,\
     v.build.polylines,v.category,v.centroids,v.class,\
     v.clean,v.colors,v.colors.out,v.convert.all,v.convert\
     ,v.db.addcolumn,v.db.addtable,v.db.connect,\
     v.db.dropcolumn,v.db.droprow,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.lidar.edgedetection,\
     v.lidar.growing,v.lrs.create,v.lrs.label,\
     v.lrs.segment,v.lrs.where,v.mkgrid,v.neighbors,\
     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,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},
```

```
25  % parameters
26  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=, E=, -f\
        , -g, n=,
27  s=, w=, e=, --o, -c, -e, -s, -ca,-h,--help},
28  % variables
29  morekeywords=[12]{APPDATA,ASCII,CELL,DCELL,DEBUG,FCELL,\
        GISBASE,GISDBASE,GISRC,GIS_ERROR_LOG,GIS_LOCK,GRASS,\
        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_GLX_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},
30  %
31  sensitive=true,
32  morestring=[b]"}
```

Experimenting with settings for the listings packages

```
1   % Default settings for code listings
2   %  morecomment={[n][\keywordstyle]{{}{}}},
3   \lstset{
4   language=Python
5   }
6   \lstset{
7   aboveskip=3mm,
8   belowskip=3mm,%
9   backgroundcolor={\color{lightgray5}},
10  basicstyle={\small\ttfamily},%
11  breaklines=true,
12  prebreak={\textbackslash},%
13  columns=fullflexible,%
14  fillcolor=\color{grassy},
15  frame=l,
```

```
16    framexleftmargin=1em,
17    framexrightmargin=0em,
18    framextopmargin=1em,
19    framexbottommargin=1em,
20    framerule=0em,%
21    language=grassgis,
22    literate={{=}{{{\bfseries\color{blue}=}}}1},
23    commentstyle={\itshape\color{lightgray}},
24    stringstyle=\color{orange},
25    keywordstyle=[1]\bfseries\color{grassy},
26    keywordstyle=[2]\bfseries\color{grassy},
27    keywordstyle=[3]\bfseries\color{grassy},
28    keywordstyle=[4]\bfseries\color{grassy},
29    keywordstyle=[5]\bfseries\color{grassy},
30    keywordstyle=[6]\bfseries\color{grassy},
31    keywordstyle=[7]\bfseries\color{grassy},
32    keywordstyle=[8]\bfseries\color{grassy},
33    keywordstyle=[9]\bfseries\color{grassy},
34    keywordstyle=[10]\bfseries\color{grassy},
35    keywordstyle=[11]\color{darkgreen},
36    keywordstyle=[12]\color{magenta},%
37    numbers=left,
38    numberstyle=\tiny\ttfamily,
39    numbersep=3em,%
40    keepspaces=true,
41    showstringspaces=false,%
42    tab=BADTAB,
43    showtabs=true,%
44    upquote=true
45    }
```

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.

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

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

87 db.copy Copy a table.

89 db.createdb Creates an empty database.

91 db.databases Lists all databases for a given driver and \
        location.

93 db.describe Describes a table in detail.

95 db.drivers Lists all database drivers.

97 db.dropcolumn Drops a column from selected attribute \
        table.

99 db.dropdb Removes an existing database.

101 db.droptable Drops an attribute table.

103 db.execute Executes any SQL statement.

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

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

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

111 db.select Selects data from attribute table.

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

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

117 db.univar Calculates univariate statistics on selected \
        table column.

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

121 g.cairocomp Overlays multiple X Pixmaps.

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.psmap 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 scipts.
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.

354

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

356

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

358

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

360

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

362

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

364

```
365  r.in.gdal Imports raster data into a GRASS raster map \
         using GDAL library.
366
367  r.in.gridatb Imports GRIDATB.FOR map file (TOPMODEL) \
         into a GRASS raster map.
368
369  r.in.lidar Creates a raster map from LAS LiDAR points \
         using univariate statistics.
370
371  r.in.mat Imports a binary MAT-File(v4) to a GRASS raster.
372
373  r.in.png Imports non-georeferenced PNG format image.
374
375  r.in.poly Creates raster maps from ASCII polygon/line/\
         point data files.
376
377  r.in.srtm Imports SRTM HGT files into raster map.
378
379  r.in.wms Downloads and imports data from WMS/WMTS/NASA \
         OnEarth server.
380
381  r.in.xyz Creates a raster map from an assemblage of many\
          coordinates using univariate statistics.
382
383  r.info Outputs basic information about a raster map.
384
385  r.kappa Calculates error matrix and kappa parameter for \
         accuracy assessment of classification result.
386
387  r.lake Fills lake at given point to given level.
388
389  r.latlong Creates a latitude/longitude raster map.
390
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.padcv Calculates coefficient of variation of patch \
          area on a raster map
406
407   r.li.padrange 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*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

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

570

571 r.surf.idw2 Surface generation program.

572

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

574

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

576

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

578

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

580

581 `r.tile` Splits a raster map into tiles.

583 `r.tileset` Produces tilings of the source projection for \
     use in the destination region and projection.

585 `r.timestamp` Modifies a timestamp for a raster map.

587 `r.to.rast3` Converts 2D raster map slices to one 3D \
     raster volume map.

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

591 `r.to.vect` Converts a raster map into a vector map.

593 `r.topidx` Creates a topographic index raster map from an \
     elevation raster map.

595 `r.topmodel` Simulates TOPMODEL which is a physically \
     based hydrologic model.

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

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

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

603 `r.uslek` Computes USLE Soil Erodibility Factor (K).

605 `r.usler` Computes USLE R factor, Rainfall erosivity index.

607 `r.viewshed` Computes the viewshed of a point on an \
     elevation raster map.

609 `r.volume` Calculates the volume of data `"clumps"`.

611 `r.walk` Outputs a raster map showing the anisotropic \
     cumulative cost.

613 `r.water.outlet` Creates watershed basins from a drainage \
     direction map.

615 `r.watershed` Calculates hydrological parameters and RUSLE\
     factors.

617 `r.what.color` Queries colors for a raster map layer.

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.
712
713    t.rast3d.extract Extracts a subset of a space time 3D \
           raster dataset.
714
715    t.rast3d.list Lists registered maps of a space time \
           raster3d dataset.
716
717    t.rast3d.mapcalc Performs r3.mapcalc expressions on maps\
            of sampled space time 3D raster datasets.
718
719    t.rast3d.univar Calculates univariate statistics from \
           the non-null cells for each registered raster3d map \
           of a space time raster3d dataset.
720
721    t.register Registers raster, vector and raster3d maps in\
            a space time datasets.
722
```

```
723   t.remove Removes space time datasets from temporal \
          database.

724

725   t.rename Renames a space time dataset

726

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

728

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

730

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

732

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

734

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

736

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

738

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

740

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

742

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

744

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.droprow 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 paint 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.centrality Computes degree, centrality, betweeness\
     , closeness and eigenvector centrality measures in \
     the network.

884

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

886

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

888

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

890

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

892

893 v.net Performs network maintenance.

894

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

896

897 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 GPSBabel.

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.

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 '^v.'
10   12016  [ 16:04:41 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^v.' > grassgis_modules_vector
11   12017  [ 16:04:48 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^r.' > grassgis_modules_raster
12   12018  [ 16:04:57 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^g.' > grassgis_modules_general
13   12019  [ 16:05:18 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^i.' > grassgis_modules_imagery
14   12020  [ 16:05:26 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^db.' > grassgis_modules_db
15   12021  [ 16:05:34 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^t.' > grassgis_modules_temporal
16   12022  [ 16:05:42 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^d.' > grassgis_modules_display
17   12023  [ 16:05:55 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^m.' > grassgis_modules_miscellaneous
18   12024  [ 16:06:06 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^ps.' > grassgis_modules_postscript
19   12025  [ 16:06:22 11.Nov.14 ] cat grassgis_modules |cut -d" " -f1 |sed '/^\s*$/d' |grep '^r3.' > 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//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 //g'; done
27   12262  [ 11:04:18 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g'; done
28   12263  [ 11:04:46 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description//g'; done
29   12264  [ 11:04:57 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: \n//g'; done
30   12265  [ 11:05:09 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //g' |cut -d "\n"; done
31   12266  [ 11:05:16 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //g' |tr -d "\n"; done
32   12267  [ 11:05:26 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //g' |tr "\n" ""; done
33   12268  [ 11:05:31 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //g' |tr "\n" " "; done
34   12269  [ 11:05:37 14.Nov.14 ] for D in *; do grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //g'; done
35
36   12270  [ 11:06:13 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 '#%module' ${D} | sed 's/#%module//g' |sed 's/#% description: //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//g' |sed 's/#% description: //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//g' |sed 's/#% description: //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//g' |sed 's/#% description: //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//g' |sed 's/#% description: //g'; done
41   12275  [ 11:07:25 14.Nov.14 ] for D in *; do echo ${D} && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g'; done
42   12276  [ 11:07:50 14.Nov.14 ] for D in *; do echo "${D}" |tr "\n" " " && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g'; done
43   12277  [ 11:08:17 14.Nov.14 ] for D in *; do echo "${D}" |tr "\n" "|" |tr "\n" " " && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //\
     g'; done
44   12278  [ 11:08:36 14.Nov.14 ] for D in *; do echo "${D}" |tr "\n" "|" |tr -d "\n" && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g\
     '; done
45   12279  [ 11:09:01 14.Nov.14 ] for D in *; do echo "${D}" |tr -d "\n" && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g'; done
46   12280  [ 11:09:14 14.Nov.14 ] for D in *; do echo "${D}" |tr -d "\n" "|" && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g'; done
47   12281  [ 11:09:17 14.Nov.14 ] for D in *; do echo "${D}" |tr "\n" "|" && grep -A1 '#%module' ${D} |sed 's/#%module//g' |sed 's/#% description: //g'; done
```