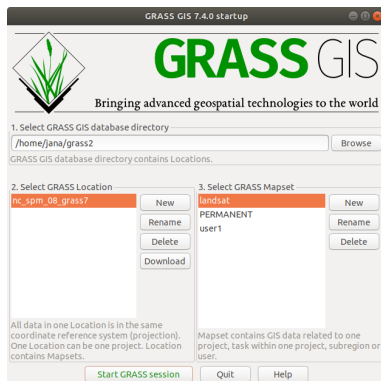


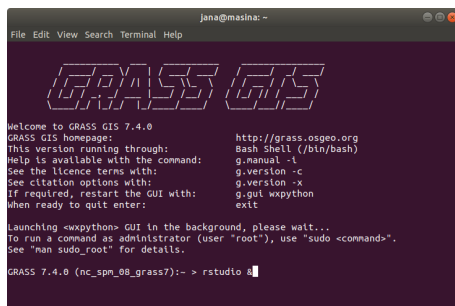
Predavanje 08 – GRASS GIS

GRASS GIS z RGrass7

Zaženemo GrassGis iz konzole:



V konzoli iz GrassGis-a zaženemo RStudio.



Potrebujemo dve R knjižnici, **rgrass7** in **rgdal**.

```
library(rgrass7)
```

```
## Loading required package: XML
```

```
## GRASS GIS interface loaded with GRASS version: GRASS 7.4.0 (2018)
## and location: nc_spm_08_grass7
```

```
library(rgdal)
```

```
## Loading required package: sp
```

```
## Please note that rgdal will be retired by the end of 2023,
## plan transition to sf/stars/terra functions using GDAL and PROJ
## at your earliest convenience.
```

```
##
## rgdal: version: 1.5-29, (SVN revision 1165M)
## Geospatial Data Abstraction Library extensions to R successfully loaded
## Loaded GDAL runtime: GDAL 2.2.3, released 2017/11/20
## Path to GDAL shared files: /usr/share/gdal/2.2
## GDAL binary built with GEOS: TRUE
## Loaded PROJ runtime: Rel. 4.9.3, 15 August 2016, [PJ_VERSION: 493]
## Path to PROJ shared files: (autodetected)
## Linking to sp version:1.4-6
```

Beremo vzorčni primer iz podatkov pridobljenih na <https://grassbook.org/datasets/datasets-3rd-edition/>.

Lahko si pogledamo metapodatke za svojo lokacijo z:

```
G <- gmeta()
str(G)
```

```
## List of 27
## $ LOCATION_NAME: chr "nc_spm_08_grass7"
## $ GISDBASE      : chr "/home/jana/grass2"
## $ MAPSET        : chr "landsat"
## $ GUI           : chr "wxpython"
## $ PID           : chr "19616"
## $ GUI_PID       : chr "19617"
## $ projection     : chr "99"
## $ zone          : chr "0"
## $ n             : num 228500
## $ s             : num 215000
## $ w             : num 630000
## $ e             : num 645000
## $ t             : num 1
## $ b             : num 0
## $ nsres         : num 10
## $ nsres3        : num 10
## $ ewres         : num 10
## $ ewres3        : num 10
## $ tbres         : num 1
## $ rows          : int 1350
## $ rows3         : int 1350
## $ cols          : int 1500
## $ cols3         : int 1500
## $ depths        : int 1
## $ cells         : chr "2025000"
## $ cells3        : chr "2025000"
## $ proj4         : chr "+proj=lcc +lat_1=36.16666666666666 +lat_2=34.33333333333334 +lat_0=33.75 +lon_0=100.0"
## - attr(*, "class")= chr "gmeta"
```

Prikaže vektorske zemljevide, ki so na voljo:

```
execGRASS("g.list", parameters = list(type = "vector"))
```

```
## P079214
## P079215
```

```

## P079218
## P079219
## boundary_county
## boundary_municp
## bridges
## busroute1
## busroute11
## busroute6
## busroute_a
## busroutesall
## busstopsall
## census_wake2000
## censusblk_swwake
## comm_colleges
## elev_lid792_bepts
## elev_lid792_cont1m
## elev_lid792_randpts
## elev_lidrural_mrpts
## elev_lidrural_mrptsft
## elev_ned10m_cont10m
## firestations
## geodetic_pts
## geodetic_swwake_pts
## geology
## geonames_NC
## geonames_wake
## hospitals
## lakes
## nc_state
## overpasses
## poi_names_wake
## precip_30ynormals
## precip_30ynormals_3d
## railroads
## roadsmajor
## schools_wake
## soils_general
## soils_wake
## streams
## streets_wake
## swwake_10m
## urbanarea
## usgsgages
## zipcodes_wake

```

Prikaži mrežne zemljevide

```
execGRASS("g.list", parameters = list(type = "raster"))
```

```

## aspect
## basin_50K
## boundary_county_500m
## cfactorbare_1m

```

```

## cfactorgrow_1m
## el_D782_6m
## el_D783_6m
## el_D792_6m
## el_D793_6m
## elev_lid792_1m
## elev_ned_30m
## elev_srtm_30m
## elev_state_500m
## elevation
## elevation_shade
## facility
## geology_30m
## lakes
## landclass96
## landcover_1m
## landuse96_28m
## lsat5_1987_10
## lsat5_1987_20
## lsat5_1987_30
## lsat5_1987_40
## lsat5_1987_50
## lsat5_1987_60
## lsat5_1987_70
## lsat7_2000_10
## lsat7_2000_20
## lsat7_2000_30
## lsat7_2000_40
## lsat7_2000_50
## lsat7_2000_61
## lsat7_2000_70
## lsat7_2000_80
## lsat7_2002_10
## lsat7_2002_20
## lsat7_2002_30
## lsat7_2002_40
## lsat7_2002_50
## lsat7_2002_61
## lsat7_2002_62
## lsat7_2002_70
## lsat7_2002_80
## ncmask_500m
## ortho_2001_t792_1m
## roadsmajor
## slope
## soilsID
## soils_Kfactor
## streams_derived
## towns
## urban
## zipcodes
## zipcodes_dbl

```

Preberemo dva GRASS mrežna zemljevidi ("geology_30m" in "elevation" iz vzorčne podatkovne zbirke

North Carolina) v R kot "ncdata".

Lahko pogledamo kaj smo prebrali.

```
str(ncdata)
```

```
## Formal class 'SpatialGridDataFrame' [package "sp"] with 4 slots
##   ..@ data      : 'data.frame':  2025000 obs. of  2 variables:
##   .. ..$ geology_30m: Factor w/ 13 levels "CZfg_217","CZlg_262",...: 5 5 5 4 4 4 4 4 4 4 ...
##   .. ..$ elevation  : num [1:2025000] 142 141 141 142 143 ...
##   ..@ grid       : Formal class 'GridTopology' [package "sp"] with 3 slots
##   .. .. ..@ cellcentre.offset: num [1:2] 630005 215005
##   .. .. ..@ cellsize         : num [1:2] 10 10
##   .. .. ..@ cells.dim        : int [1:2] 1500 1350
##   ..@ bbox       : num [1:2, 1:2] 630000 215000 645000 228500
##   .. ..- attr(*, "dimnames")=List of 2
##   .. .. ..$ : NULL
##   .. .. ..$ : chr [1:2] "min" "max"
##   ..@ proj4string: Formal class 'CRS' [package "sp"] with 1 slot
##   .. .. ..@ projargs: chr "+proj=lcc +lat_1=36.16666666666666 +lat_2=34.33333333333334 +lat_0=33.75
```

Pogledamo lahko strukturo podatkov:

```
str(ncdata@data)
```

```
## 'data.frame':  2025000 obs. of  2 variables:
## $ geology_30m: Factor w/ 13 levels "CZfg_217","CZlg_262",...: 5 5 5 4 4 4 4 4 4 4 ...
## $ elevation  : num  142 141 141 142 143 ...
```

```
summary(ncdata)
```

```
## Object of class SpatialGridDataFrame
## Coordinates:
##      min      max
## [1,] 630000 645000
## [2,] 215000 228500
## Is projected: TRUE
## proj4string :
## [+proj=lcc +lat_1=36.16666666666666 +lat_2=34.33333333333334
## +lat_0=33.75 +lon_0=-79 +x_0=609601.22 +y_0=0 +no_defs +a=6378137
## +rf=298.257222101 +towgs84=0.000,0.000,0.000 +to_meter=1]
## Grid attributes:
##   cellcentre.offset cellsize cells.dim
## 1              630005         10      1500
## 2              215005         10      1350
## Data attributes:
##   geology_30m      elevation
## CZfg_217:725562   Min.    : 55.58
## CZlg_262:198684   1st Qu.: 94.79
## CZbg_405:253710   Median :108.88
## CZlg_262:198684   Mean    :110.38
## CZam_862: 61722   3rd Qu.:126.79
## CZbg_910: 44964   Max.    :156.33
## (Other) : 50985
```



```
## | Digitization threshold: 0 |
## | Comment: |
## | |
## +-----+

```

```
vInfo("hospitals")
```

```
##      nodes      points      lines boundaries      centroids      areas      islands
##          0         160          0          0          0          0          0
## primitives      map3d
##          160          0

```

```
myschools <- readVECT("hospitals")
```

```
## Warning: Package rgrass7 transitioning to package rgrass for GRASS 8.
## 'readVECT' is deprecated. Use 'read_VECT' instead.

## Exporting 160 features...
## v.out.ogr complete. 160 features (Point type) written to <hospitals> (GPKG
## format).
## Reading layer 'hospitals' from data source
##   '/home/jana/grass2/nc_spm_08_grass7/landsat/.tmp/masina/640.0.gpkg'
##   using driver 'GPKG'
## Simple feature collection with 160 features and 16 fields
## Geometry type: POINT
## Dimension:      XY
## Bounding box:   xmin: 156998.2 ymin: 20235.56 xmax: 914347.9 ymax: 308097.9
## CRS:            3358

```

```
print(summary(myschools))
```

```
##      cat      OBJECTID      AREA      PERIMETER      HLS_
## Min.   : 1.00   Min.   : 1.00   Min.   :0   Min.   :0   Min.   : 1.00
## 1st Qu.: 40.75   1st Qu.: 40.75   1st Qu.:0   1st Qu.:0   1st Qu.: 40.75
## Median : 80.50   Median : 80.50   Median :0   Median :0   Median : 80.50
## Mean   : 80.50   Mean   : 80.50   Mean   :0   Mean   :0   Mean   : 80.50
## 3rd Qu.:120.25   3rd Qu.:120.25   3rd Qu.:0   3rd Qu.:0   3rd Qu.:120.25
## Max.   :160.00   Max.   :160.00   Max.   :0   Max.   :0   Max.   :160.00
##      HLS_ID      NAME      ADDRESS      CITY
## Min.   : 1.00   Length:160   Length:160   Length:160
## 1st Qu.: 40.75   Class :character   Class :character   Class :character
## Median : 80.50   Mode  :character   Mode  :character   Mode  :character
## Mean   : 80.50
## 3rd Qu.:120.25
## Max.   :160.00
##      ZIP      COUNTY      PHONE      CANCER
## Length:160   Length:160   Length:160   Length:160
## Class :character   Class :character   Class :character   Class :character
## Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##

```

```
##
## POLYGONID SCALE ANGLE geom
## Min. :0 Min. :1 Min. :0.0000 POINT :160
## 1st Qu.:0 1st Qu.:1 1st Qu.:1.0000 epsg:3358 : 0
## Median :0 Median :1 Median :1.0000 +proj=lcc ...: 0
## Mean :0 Mean :1 Mean :0.8313
## 3rd Qu.:0 3rd Qu.:1 3rd Qu.:1.0000
## Max. :0 Max. :1 Max. :1.0000
```

Povzemanje podatkov: Naredimo tabelo kolikokrat se posamezna vrednost pojavi.

```
table(ncdata$geology_30m)
```

```
## < table of extent 0 >
```

Primerjamo z GRASS izpisom:

```
execGRASS("r.stats", flags=c("c", "l"), parameters=list(input="geology_30m"), ignore.stderr=TRUE)
```

```
## 217 CZfg 725562
## 262 CZlg 198684
## 270 CZig 689373
## 405 CZbg 253710
## 583 CZve 21609
## 720 CZam 4824
## 766 CZg 7074
## 862 CZam 61722
## 910 CZbg 44964
## 921 Km 12528
## 945 CZbg 9
## 946 CZam 4068
## 948 CZam 873
```

Lahko narišemo “škatle z brki” različnih geoloških tipov po višinah

```
ncdata <- read_RAST(c("geology_30m", "elevation"), cat=c(TRUE, FALSE))
```

```
## Warning in .read_rast_non_plugin_ng(vname = vname, cat = cat, NODATA = NODATA, :
## non-unique category labels; category number appended
```

```
da <- data.frame(elevation = ncdata$elevation, geology_30m = ncdata$geology_30m)
library(ggplot2)
ggplot(da, aes(x = geology_30m, y = elevation)) + geom_boxplot()
```