Geographic information systems

Working with raster layers – part II

(Lesson 8)

Ľuboš Balážovič, Hana Stanková © 2007-2017

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- interpolation methods
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Interpolation

- interpolation is a method of constructing new data points within the range of a discrete set of known data points
- in GIS, interpolation predicts values for cells in a raster from a limited number of sample data points



Source: ArcGIS Desktop Help

Interpolation methods

Inverse distance to a power

- estimates cell values by averaging the values of sample data points in the neighborhood of each processing cell
- the closer a point is to the center of the cell being estimated, the more influence, or weight, it has in the averaging process

Interpolation methods

Regularized spline with tension

- estimates values using a mathematical function that minimizes overall surface curvature, resulting in a smooth surface that passes exactly through the input points (suitable for relief modeling)
- v.surf.rst modul in GRASS software

GRASS



Geographic Resources Analysis Support System (GRASS)

- open source project (since 1982)
- more than 400 commands (tools)
- project website: https://grass.osgeo.org/
- avalaible as a GRASS plugin in QGIS
- GRASS tools located in Processing Toolbox

Interpolation tools

Raster → Analysis → Grid (Interpolation)

- interpolation method: Inverse distance to a power
 - Exercise:
- create a raster of minimal temperatures (field *int_*7) and raster of maximal temperatures (field *int_*8)
- input: vector point layer (teplota_kr.shp)

Interpolation tools



Processing Toolbox → Advanced interface

GRASS GISS 7 commands \rightarrow **Vector** \rightarrow **v.surf.rst**

- interpolation method Regularized Spline with Tension
 - Exercise:
- create a raster of temperatures (minimal or maximal) with resolution of 1 km
- input: vector point layer (teplota_kr.shp)

Contours

 vector isolines (contours) can be generated from any continual raster via:

Raster \rightarrow **Extraction** \rightarrow **Contour**

or

GRASS → **Raster** → **r.contour.step**

Exercise:

 create isolines of minimal temperature with 1°C step

Map algebra

- performing algebraic operations with the cells of one or more raster layers:
 - addition
 - subtraction
 - multiplication
 - division ... etc.

Raster → **Raster** calculator

or **GRASS** → **r.mapcalc**

Exercise:

compute a raster of average temperatures

- replacing the values in the input raster with new values according to certain rules
- there is no special tool for reclassification in QGIS
- however, we can use Raster calculator for simple reclassification (two categories)
- for advanced reclassification (more than two categories) we can use GRASS tool
 r.reclass

Exercise:

- reclassify a raster of minimal temperatures into binary raster according to following rules:
 - tmin values < 8 ... new value 1
 - tmin values >= 8 ... new value 0

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- reclassify a raster of minimal temperatures into binary raster according to following rules:
 - tmin values < 8 ... new value 1
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- solution via Raster calculator:

(tmin < 8) = 1 AND (tmin >= 8) = 0



Exercise:

- reclassify a raster of minimal temperatures into binary raster according to following rules:
 - tmin values < 8 ... new value 1
 - tmin values >= 8 ... new value 0
- solution via **r.reclass**: 0 thru 8 = 1
 - 8 thru 20 = 0

Raster/vector conversion

- conversion of vector to raster:
 - **Raster** → **Conversion** → **Rasterize**
 - **GRASS** → v.to.rast
- conversion of raster to vector:
 - **Raster** → **Conversion** → **Polygonize**
 - **GRASS** → **r.to.vect**

The End

Thank you for attention!