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GEOGRAPHICAL INFORMATION SYSTEMS

Spatial Analysis (Part 2)

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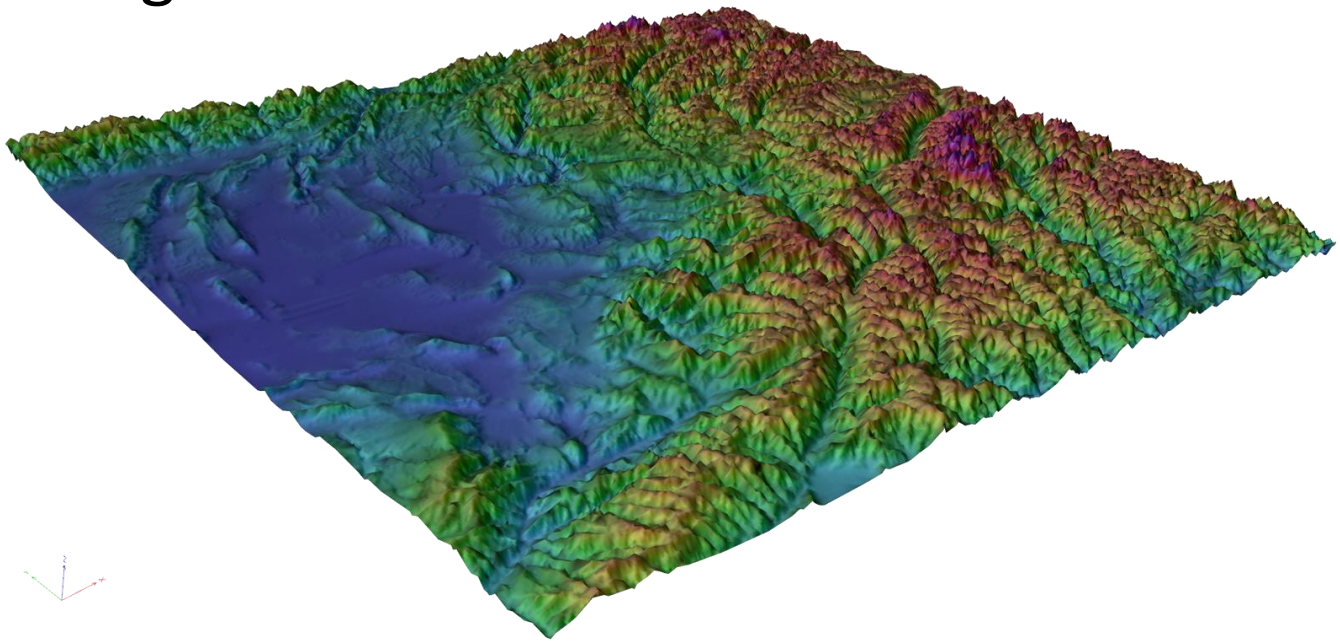
Raster Spatial Analysis

- Apart from the spatial analysis using vector data that is commonly performed, spatial analysis can also be done using raster data.



Source of picture: https://cdn.safe.com/wp-content/uploads/2016/06/20092632/Surface.png

Raster Data

- Cell-based datasets (usually represented in images or grids).
- Suitable for representing traditional geographic/natural phenomena that vary over space. For example: Elevation, Slope, Precipitation
- Also suitable for spatial modelling to represent flow and trends. For example: Hydrological modelling and demographic changes over time.

Raster Data

- Raster data can be created from:

  ✓ Any vector data sources in various format such as shapefiles, geodatabases, CAD files, or tabular data.

  ✓ Importing the standard format raster files such as TIFF, JPEG, DEM, DTM, BMP, ASCII and many others.

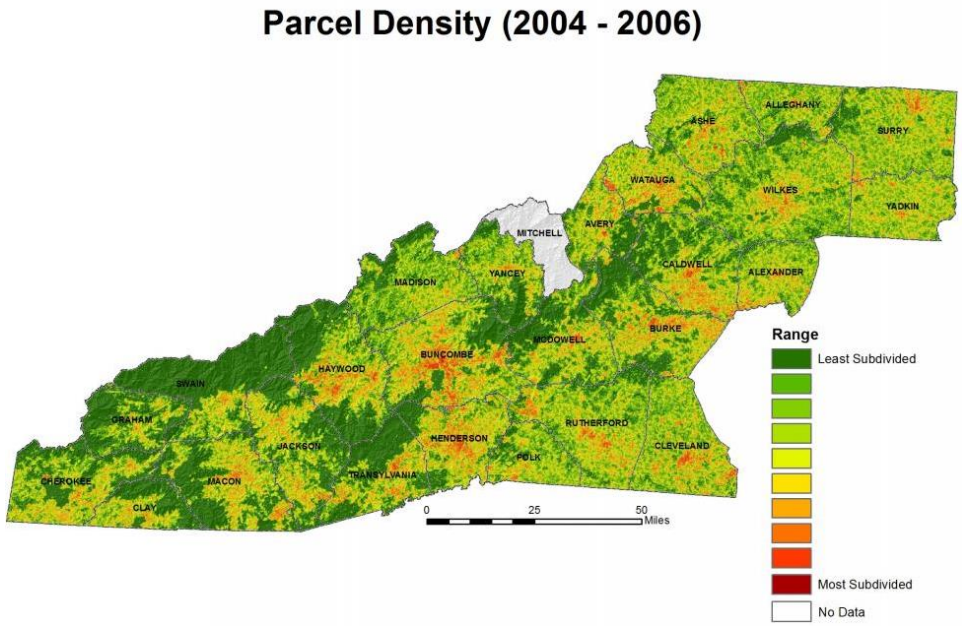
Types of Raster Spatial Analysis

- There are many types of analysis that can be done on raster data. In ArcGIS, some of the analyses are:

  - ✓ Density Analysis
  - ✓ Terrain Analysis
  - ✓ Statistical Analysis
  - ✓ Path Analysis

Density Analysis

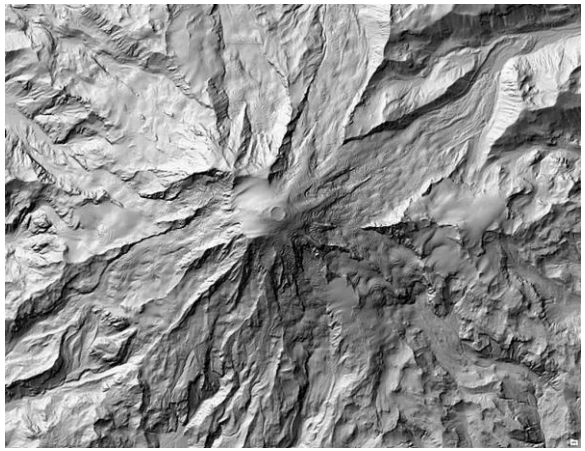
- Measures known quantities of some phenomenon (from an input feature) and spreads them across the landscape of the data.
- Good for showing the concentration of a feature relative to area.



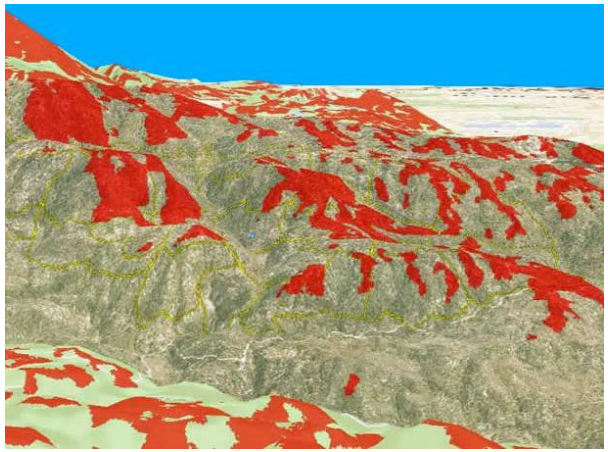
Source of picture: http://www.wncvitalityindex.org/land/parcel-density

Terrain Analysis

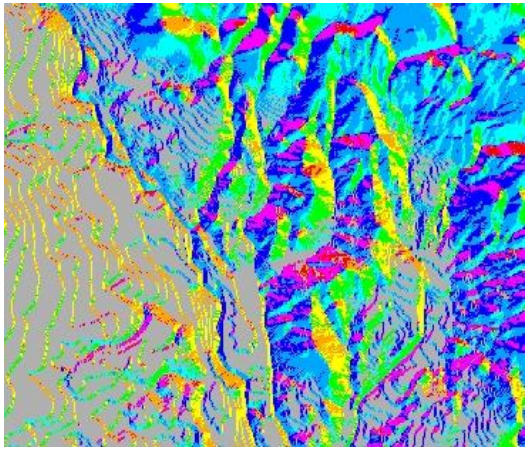
- In Terrain Analysis, useful information can be generated from: hillshade, contour slope, viewshed, or aspect map.



Hillshade –3D representation of a surface in grayscale



Viewshed – shows a visible area that can be viewed from a point of location



Aspect map – shows the direction and degree of slope for a continuous surface

Sources of pictures: www.esri.com and www.personal.psu.edu/users/k/m/kmc370/483proj7.html

Statistical Analysis

There are a number of statistical analysis available:

- ✓ Histograms
- ✓ Cell Statistics
- ✓ Neighbourhood Statistics
- ✓ Zonal Statistics
- ✓ Global Statistics

Source of picture: http://pixabay.com

Statistical Analysis

- Histograms

  ✓ Used to evaluate data and patterns

  ✓ In raster data, histogram is created using raster grids

Statistical Analysis

- Cell Statistics

  ✓ Used to visualize spatial changes over temporal

  ✓ Especially useful to view/understand what happens to an area in a specific time range.

Statistical Analysis

- Neighbourhood Statistics

  ✓ To obtain a value for each cell based on specified neighborhood.

  ✓ Will produce an output in a raster grid

Statistical Analysis

- Zonal Statistics

  ✓ Calculates/Summarizes the value of a dataset in a specific zone. The zone is specified based on another dataset.

  ✓ For example, a road (from a vector dataset) can be the zone for an accident dataset (from a raster dataset)

Statistical Analysis

- Global Statistics

  - ✓ Calculate and produce an output/raster dataset where each output is possibly a function of all cells from input raster
  - ✓ Two groups of global statistics are: Euclidean Distance and Weighted Distance

Think GIS way…

If you want to produce a map that shows specific zone based on the some characteristics of a vector data, what kind of raster spatial analysis should you apply?

Source of picture: pixabay.com