



SPATIAL ANALYSIS AND BUFFERING

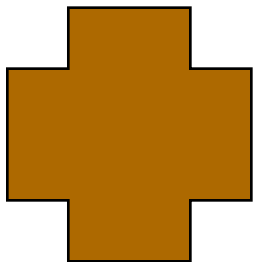
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Analysis

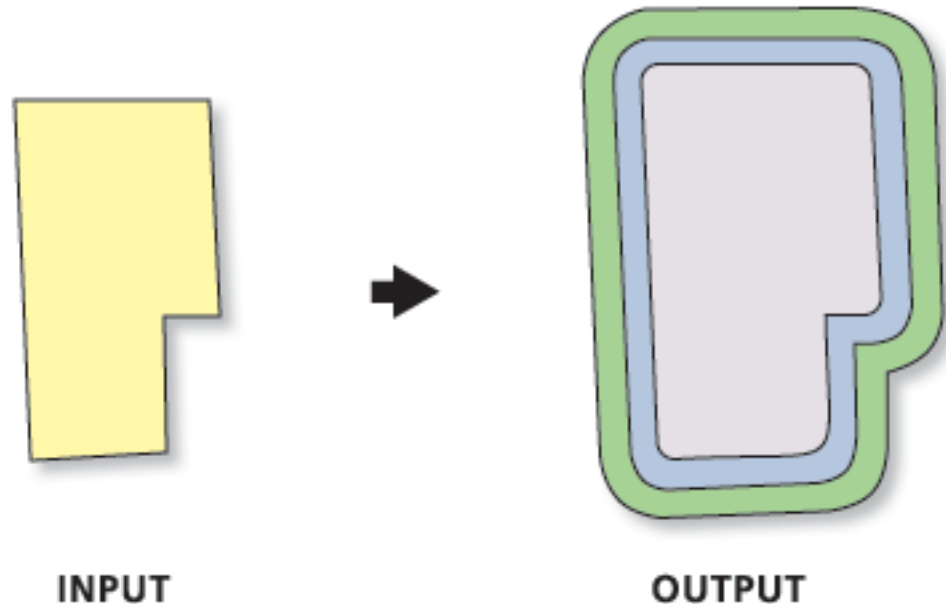


Decisions



Multiple Ring Buffer

- Creates a new feature class of buffer features using a set of buffer distances. The new features may be dissolved using the distance values or as a set of individual features. Available with any ArcGIS license.



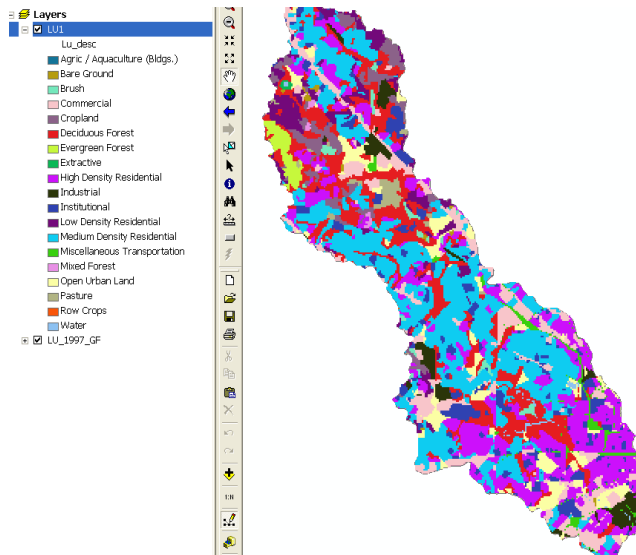
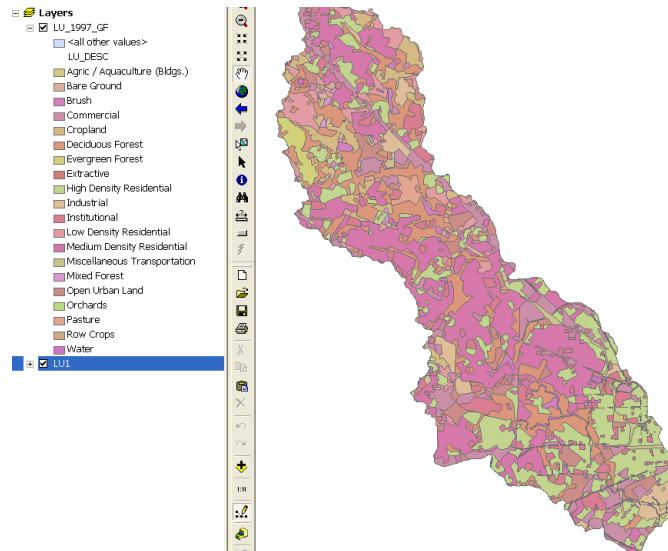
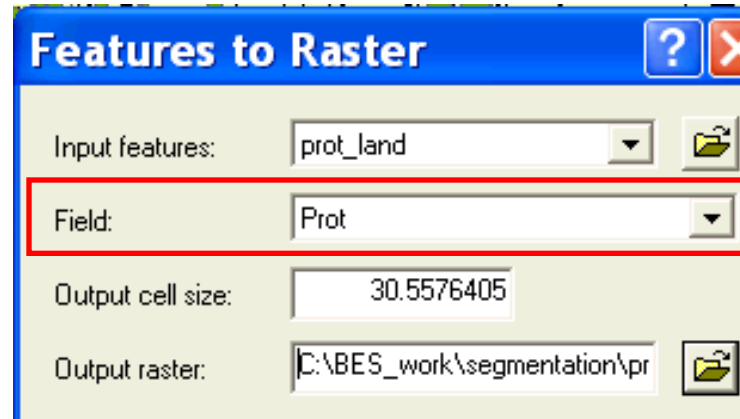
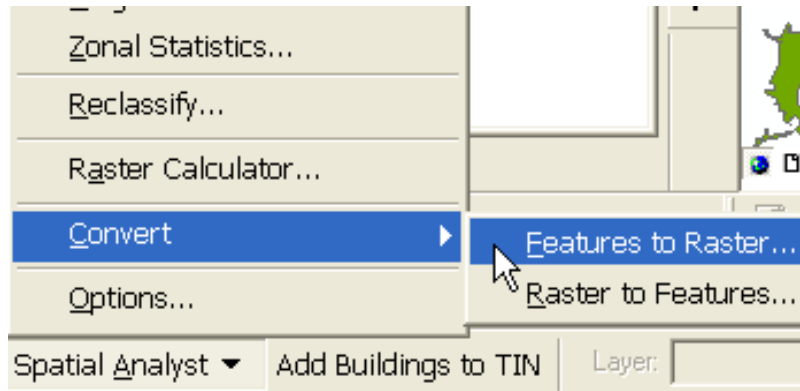
Topographic Functions

- Very important in remote sensing investigations
- Elevation, slope and aspect –often correlated with other spatial variables
- Map algebra function –most useful
 - Increment Gradient–compute slope
 - Increment Aspect–compares direction of the steepest descent at each location

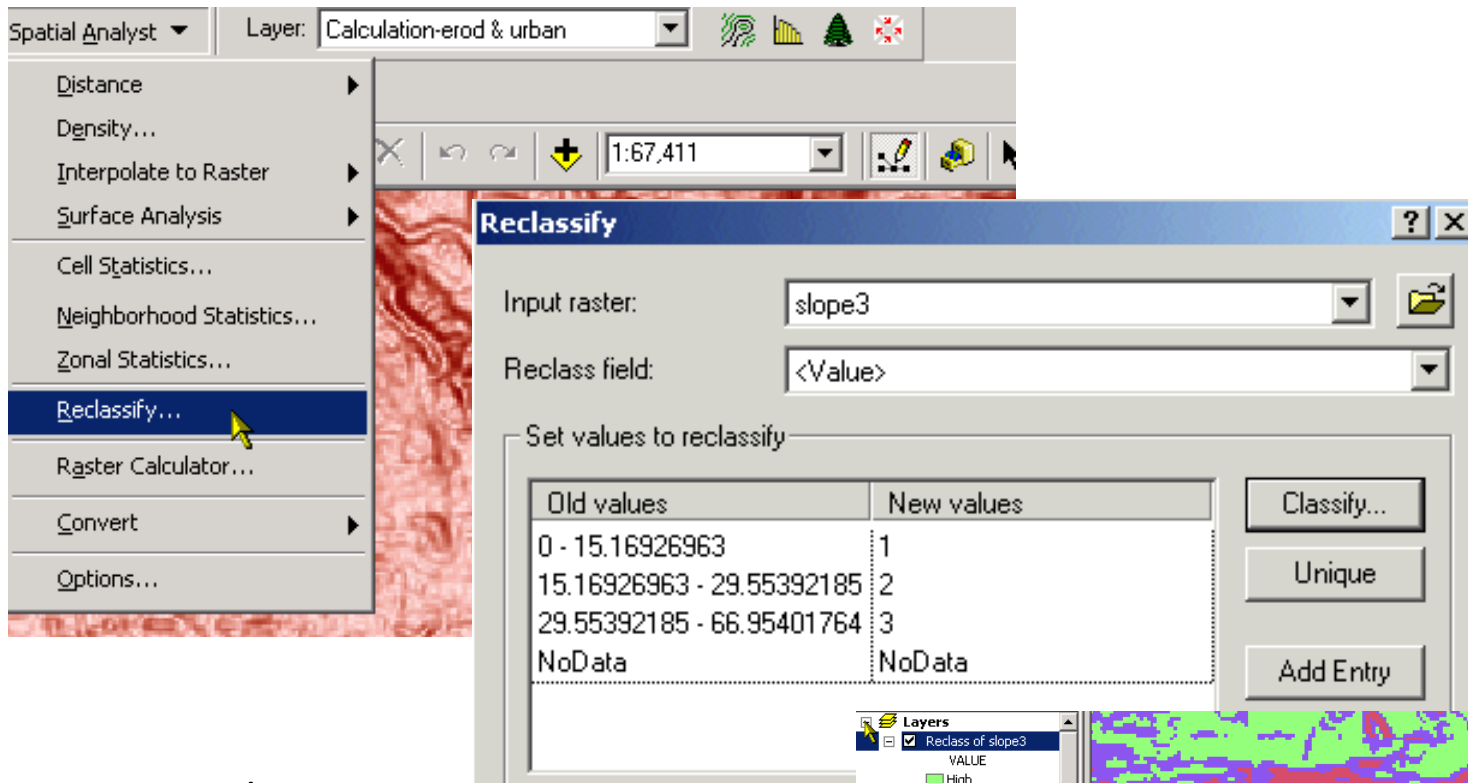
Network Analysis Operations: Common applications

- Finding the shortest distance from one feature to another to optimize vehicle routing
- Use of spread function to evaluate travel transportation time or cost over a complex surface
- Use of seek function to trace the path of water flow over a DEM
- Determining the interrelationship of various features in the landscape

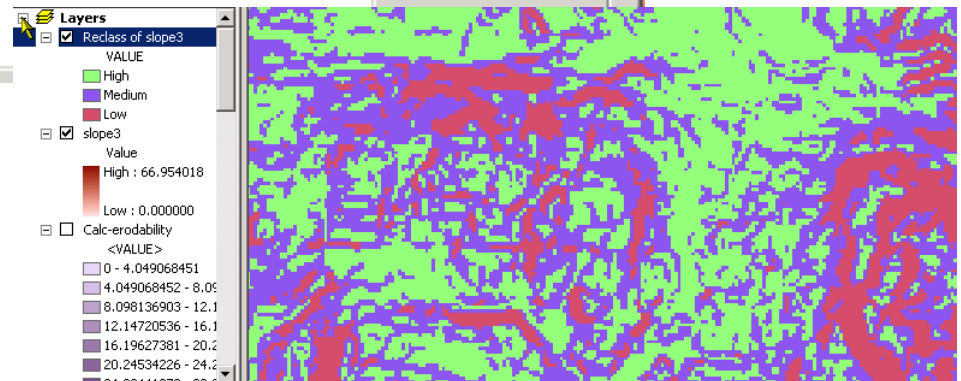
Converting vector to raster



Reclassification with Grids



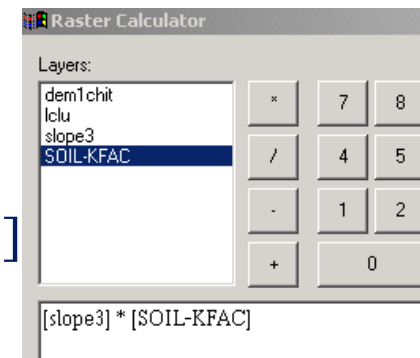
Here we reclass to 3 classes, based on natural breaks



Raster Analysis Overview

RASTER CALCULATOR

- Raster overlay queries
 - Example: [elevation > 2500] AND [slope > 20]
- Raster overlay calculations
 - Example: [soil_depth_1990] – [soil_depth_2000]
- Zonal Statistics

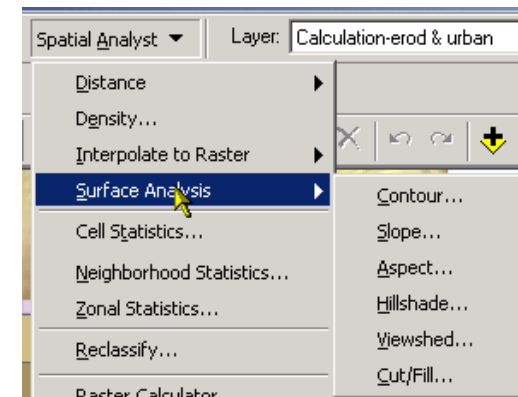
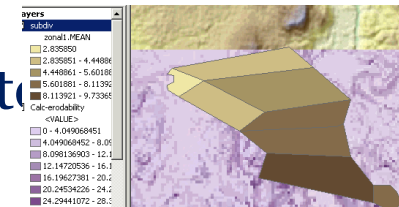


- Raster terrain functions (hillshade, slope, aspect, contour)

- Viewshed Analysis

Terrain + Points = Visibility raster

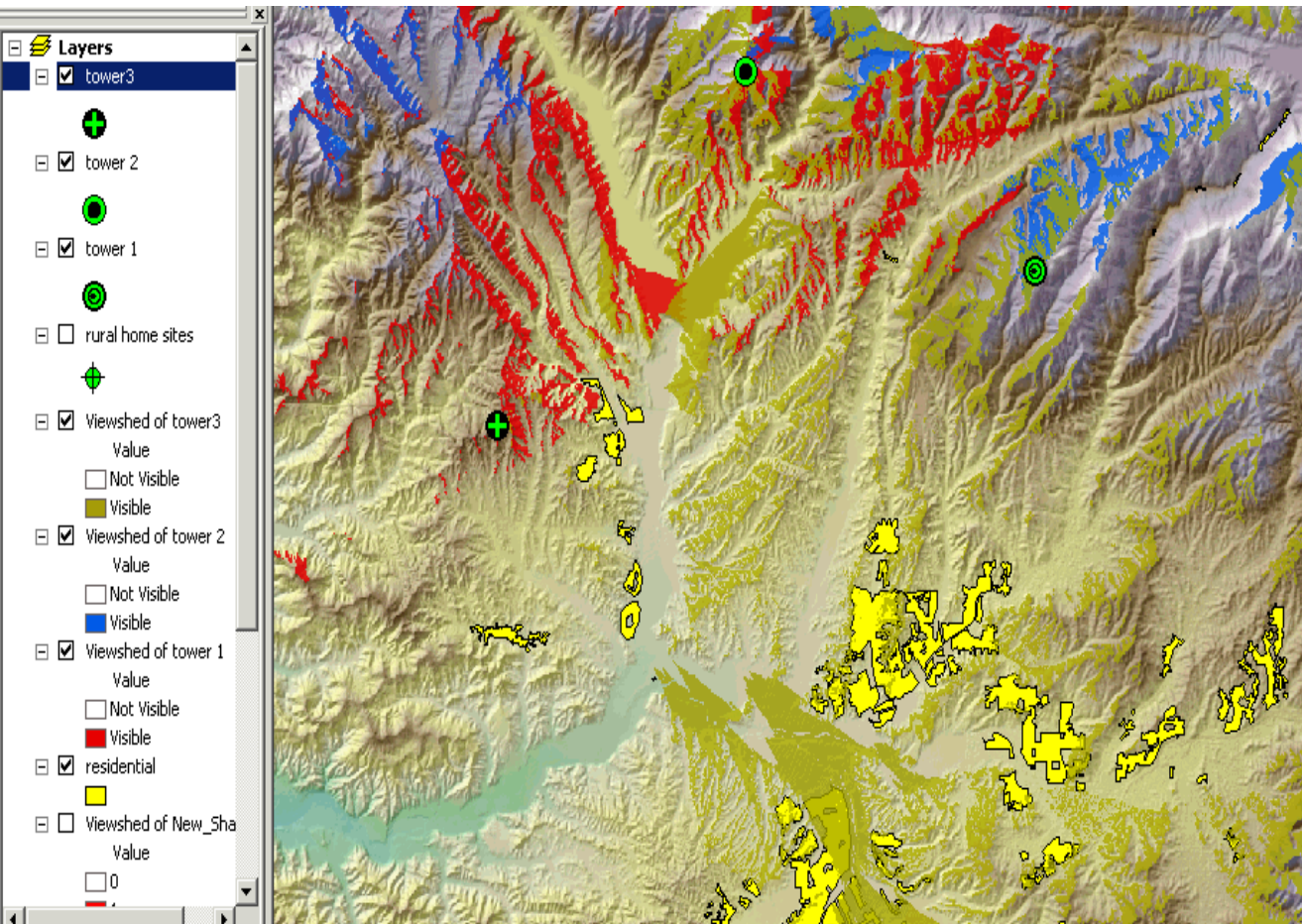
- Neighborhood Statistics & Filters
- Distance Functions & Density



Viewshed analysis

Inputs/outputs? Parameters?

In this case, red is for tower 1, blue for 2 and green for 3

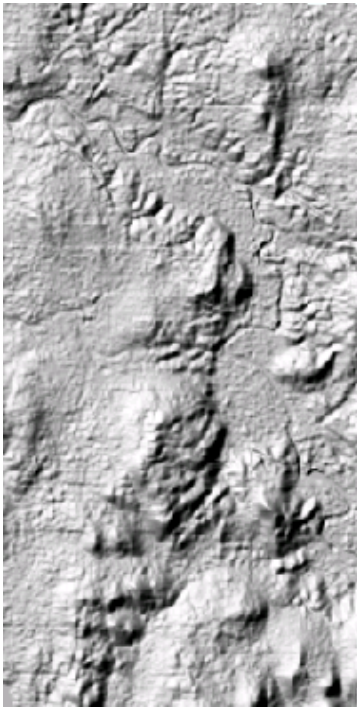


Viewshed identifies the cells in an input raster that can be seen from one or more observation points or lines.

It is useful for finding the visibility. For instance, finding a well-exposed places for communication towers

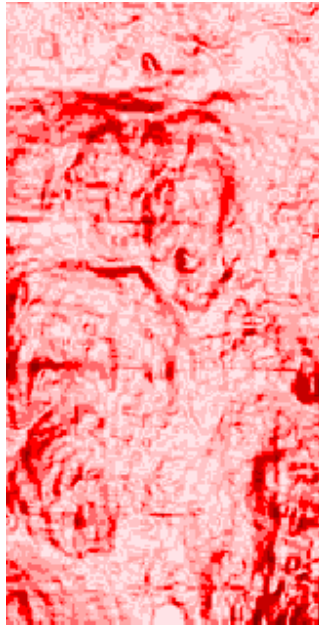
Raster terrain functions in ArcGIS

Hillshade:



Illumination /
brightness values

Slope:



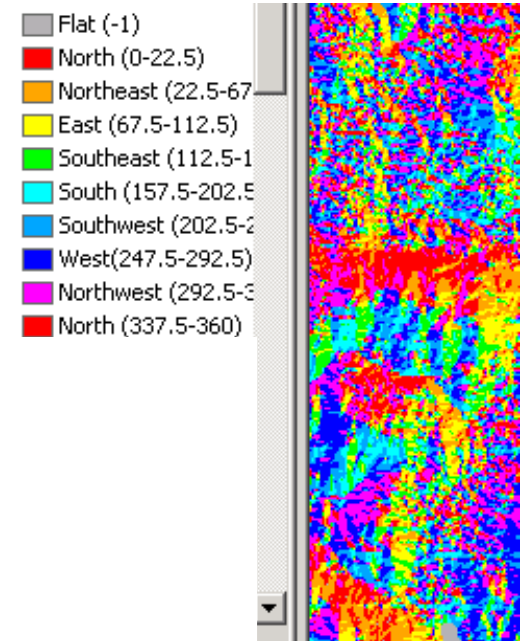
Rise / run
expressed as
percent slope OR
as angle
(degrees)

Contours:



User-defined
interval and
base contour

Aspect:



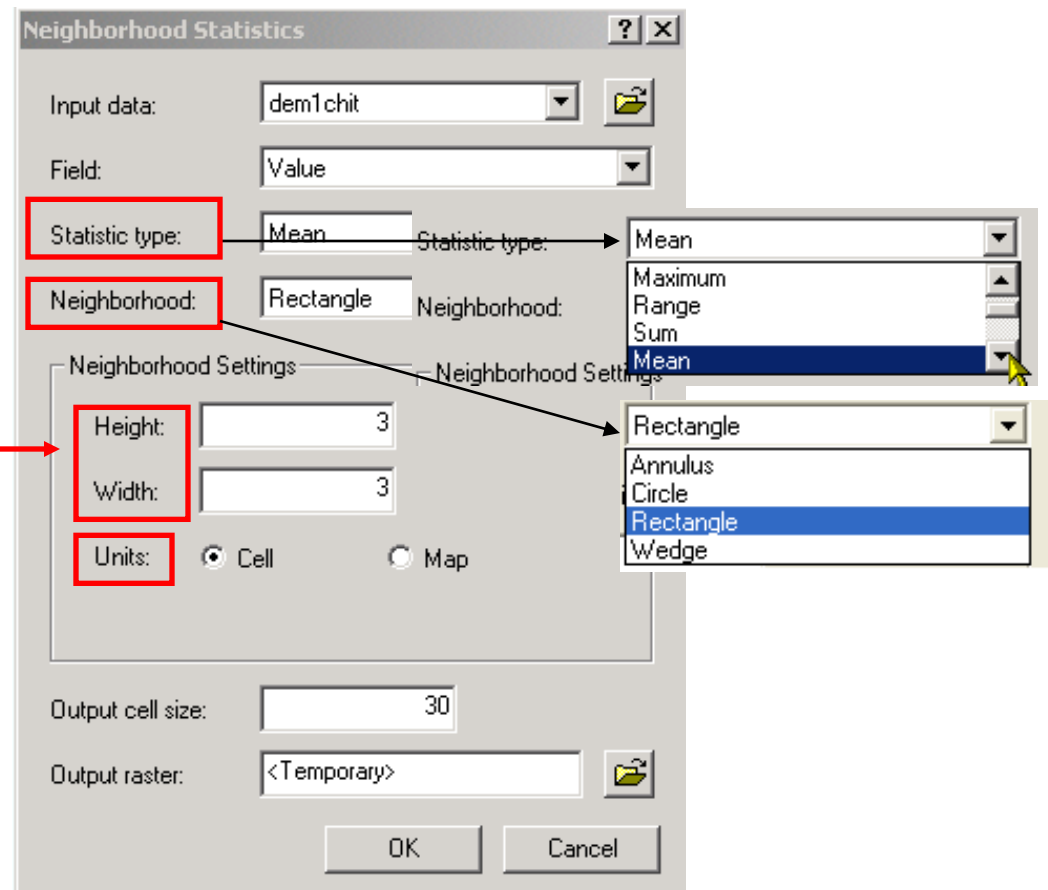
Azimuth angle of
steepest path
(orientation or
bearing of the
slope direction)



Neighborhood Statistics

- A “local” method of summarizing raster data within a neighborhood by a statistical measure, like mean, std dev.

- Statistic types
- Neighborhood shape
- Neighborhood settings
 - Window size
 - Units

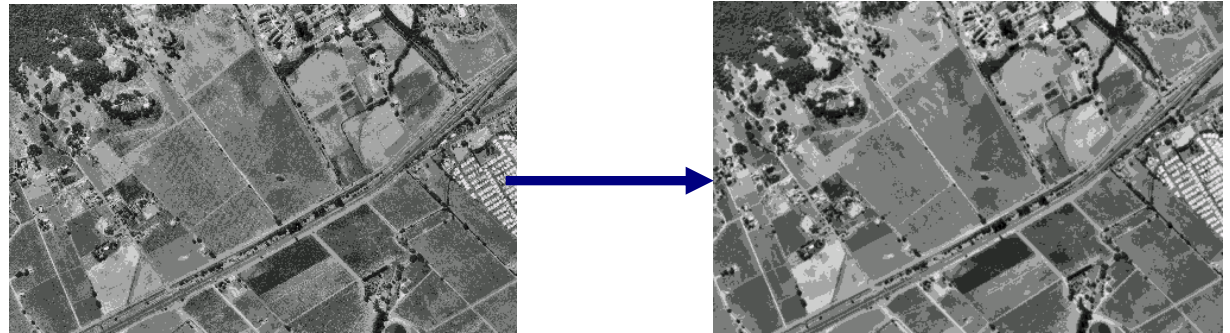




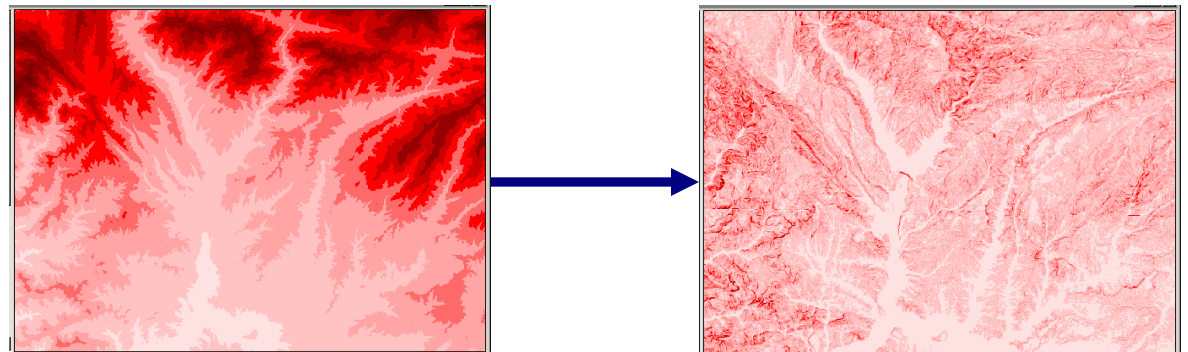
Neighborhood Filters

Filter types

- Low pass filters – remove noise (emphasize trends)



- High pass filters – edge enhancement (emphasize local detail)

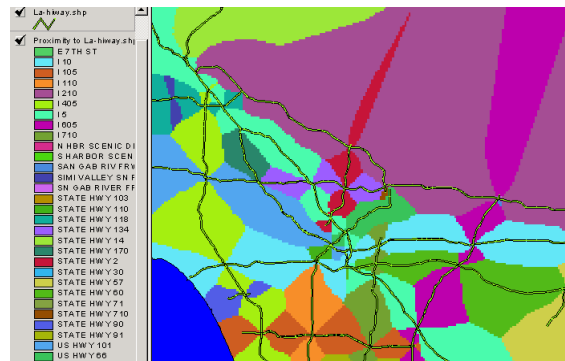




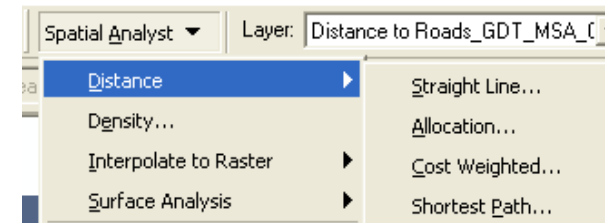
Distance Analysis

Used to answer questions related to distance

— Proximity

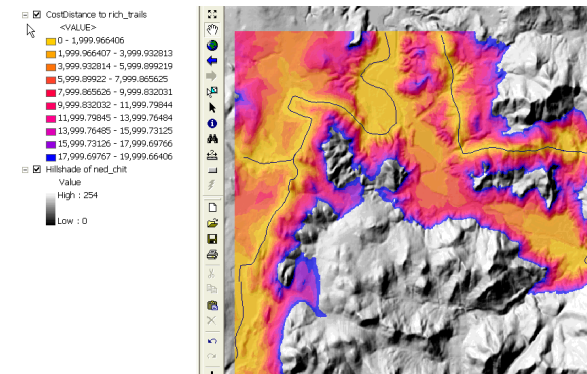


— Straight Line Distance Measurement



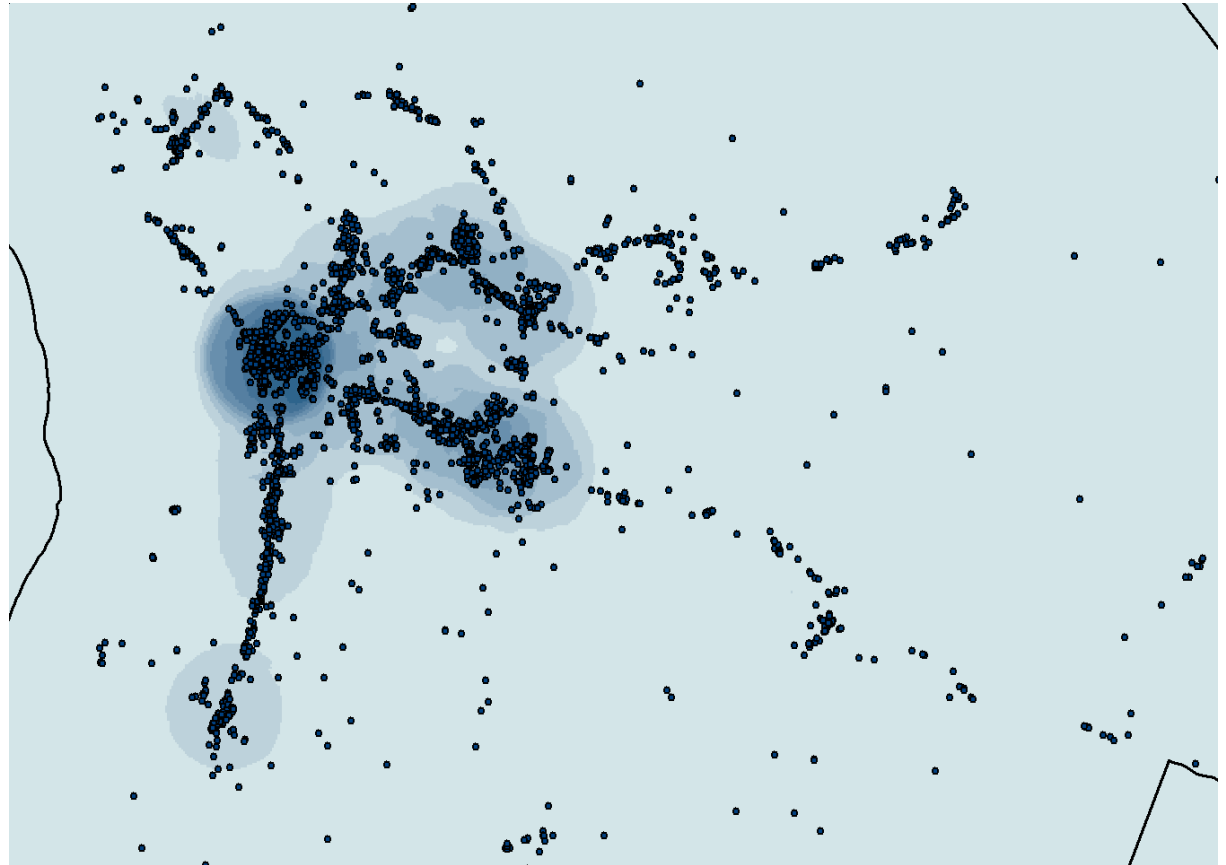
— Cost Weighted Distance Measurement

— Shortest Path



Density Functions

- Use sample points to create density surfaces
- Can use a z value, or it can simply be based on the abundance and distribution of points.
- Output: number of points per unit area of a designated neighborhood

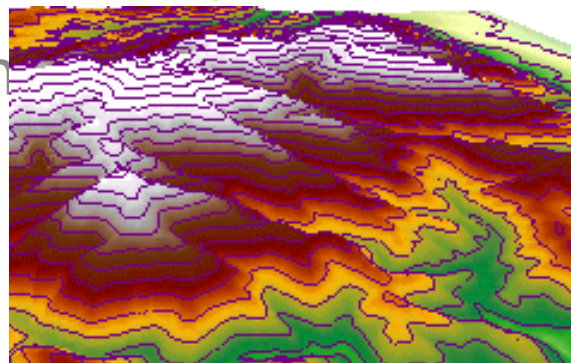




Slope, Aspect, Contours

- Raster slope is calculated by steepest path in neighborhood
- Aspect is direction of steepest path (azimuth in degrees)
- Critical for flow path analysis, watershed generation, drainage network and watershed analysis, etc.
- Contour generation

55	51	48
54	43	36
53	45	38



Contour

Input surface: ned_chit

Contour definition:

Input height range: Z min: 69 Z max: 4385

Contour interval: 100

Base contour: 0

Z factor: 1

Output information based on input contour definition:

Minimum contour: 100

Maximum contour: 4300

Total number of contour values: 43

Output features: C:\Temp\ctour2.shp



Three Dimensional data – TIN

- **Triangulated Irregular Network**
- **Irregular** distribution of elevation sample points
- Break lines
- Z-tolerance (~resolution)

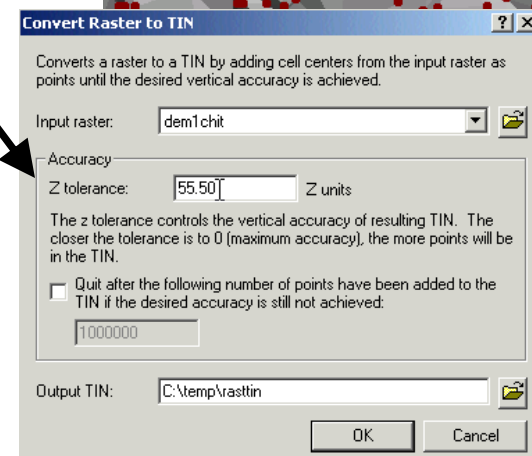
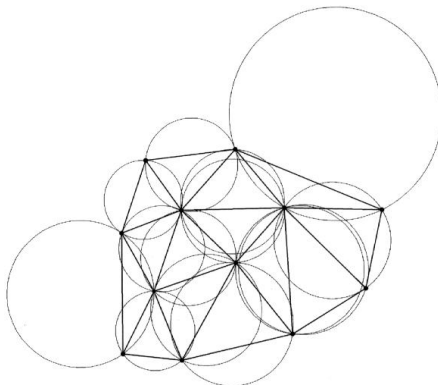
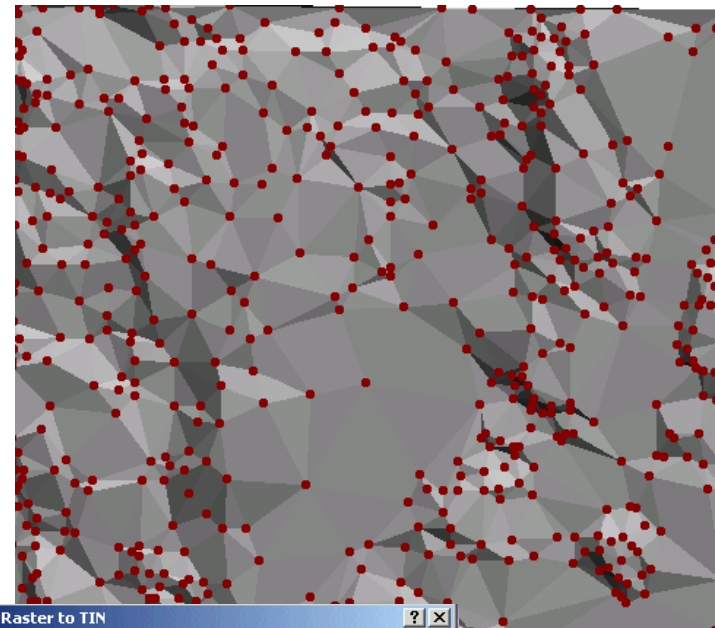
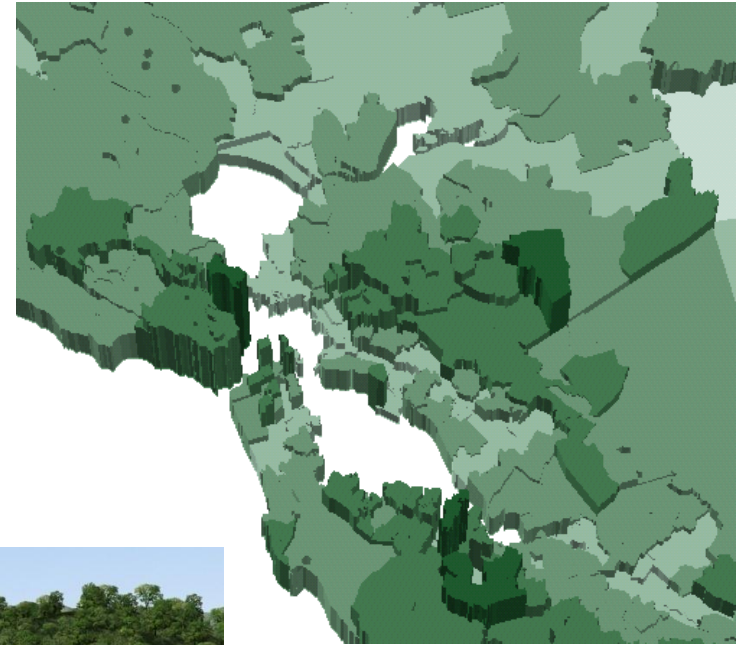


Figure 1 The circumcircle method for generating the DT



ArcScene

- 3D visualization
- Extrude a third dimension
- Drape thematic layers on elevation
- Create animations (fly-through)





3D Visualization

