

Basic GIS Concepts

GIS and GISci

- Geography
- Information systems/science

Geography

Geography is related to the studies of:

- Spatial composition
- Spatial interaction
- Spatial process

Use of analytical tools to:

- Describe
- Explain
- Predict
- Support decision-making

Descriptions

- 1-Point: mean, scatterplots, histograms
- 2-Point: center, centroid, point of minimum aggregate travel (MAT), dispersion, Moran's I, semivariogram
- Multi-Point: shape, size, patch fragmentation

Explanation

- Queries and visualization
- Data transformation
 - Buffering
 - Point in polygon
 - Overlay
- Exploratory data mining
- Spatial inference

Prediction

- Spatial interpolation
 - Inverse distance weighting
 - Kriging
 - Density estimation
- Spatial modeling
 - Spatial regression models
 - Spatial process models
 - Agent-based models

Spatial Decision Support

- Map communication
- Spatial data integration
- Location-allocation
- Optimization
- Routing (shortest path, TSP)

Limitation/Consideration

- Spatial autocorrelation
- Spatial heterogeneity
- Ecological fallacy
- MAUP – Scale and zonal effects
- Uncertainty and error
 - Conception
 - Measurement and representation
 - Analysis

Information Systems / Science

- Hardware/Software
- Software
 - (G)UI, Tools, DBMS, Data
- GIS data models
 - CAD, graphical, image
 - Raster
 - Vector

Vector Data Model

- Point, polyline, polygon
- Topology
- Network
- TIN
- Object data model

GIS Data Structure

- Geometry & attributes
- ArcInfo: Coverages + Info tables
- ArcView: Shapefiles + dbf tables
- ArcGIS: Geodatabase
 - Feature dataset, feature class

GIS Data Automation

- Remote sensing / photogrammetry
- Survey / COGO
- GPS
- Scanner
- Manual digitizing