

## On-line GIS Data Sources

RLIS & CCGIS (I:\Students\data\GIS)

[http://web.pdx.edu/~jduh/gis\\_datalinks.php](http://web.pdx.edu/~jduh/gis_datalinks.php)

## Basic GIS Concepts

GIS and GISci

- Geography
- Information systems/science

# Geography

Geography - the studies of:

- Components (heterogeneity)
- Relationships (structures / interaction / dependence / spatial autocorrelation)
- Process

Purposes of applying geographic knowledge

- Generating new knowledge
- Solving problems

GIS – A powerful tool for geographic applications

# GIS Applications

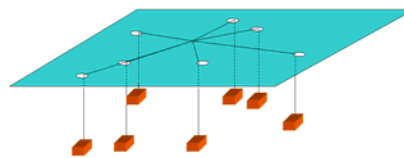
Use of analytical GIS tools to:

- Describe
- Explain
- Predict
- Support decision-making

## Descriptions

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

- Point of minimum aggregate travel (MAT)
- Varignon



1-median problem

## Explanation

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

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

AVERAGE	POP	FRRESIDENT
IQ	ELRECT	
113	John Kerry	
111	John Kerry	
111	John Kerry	
109	John Kerry	
107	John Kerry	
106	John Kerry	
105	John Kerry	
105	John Kerry	
104	John Kerry	
103	John Kerry	
102	John Kerry	
102	John Kerry	
102	John Kerry	
101	John Kerry	
101	John Kerry	
100	John Kerry	
100	George Bush	
100	John Kerry	
99	George Bush	
99	George Bush	
99	John Kerry	
99	George Bush	
99	George Bush	
99	George Bush	
99	John Kerry	
99	George Bush	
98	George Bush	
98	George Bush	
96	George Bush	
95	George Bush	
94	George Bush	
94	George Bush	
94	George Bush	
93	George Bush	
93	George Bush	
92	George Bush	
92	George Bush	
92	George Bush	
92	George Bush	
92	George Bush	
92	George Bush	
92	George Bush	
90	George Bush	
90	George Bush	
90	George Bush	
90	George Bush	
90	George Bush	
90	George Bush	
89	George Bush	
89	George Bush	
87	George Bush	
87	George Bush	
85	George Bush	

# Ecological Fallacy

- Inferring individual characteristics from aggregate population data.

GIS and GISci

- Geography
- **Information systems/science**

## Information Systems / Science

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

## Vector Data Model

- Point, polyline, polygon
- Topology
- Network
- TIN (Terrain)
- Object data model

## GIS Data Structure

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

## GIS Data Automation

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