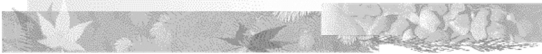


**Geography 38/42:376**  
**GIS II: Spatial Data Management & Analysis**

**Topic 3:**



**Exploratory Data Analysis**

Chang: Chapter 10  
(DeMers Chapters 7 & 8)

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**GIS Data Analysis**

- In many cases, GIS is simply used for geospatial data management
  - Essentially an automated mapping system
- Power of GIS is ability to perform spatial analysis
  - may be supplemented by 3<sup>rd</sup> party extensions/tools
- Advantages of using dynamically linked maps, tables, charts, and graphs

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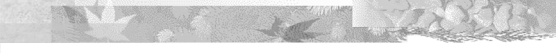
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**Start With Exploratory Data Analysis**

- Cartographic Visualization - What is where?
  - Patterns – spatial arrangement
  - Trends – variations over space
  - Associations - common occurrences
  - Spatial Relationships – causal effects
  - Geographic (Data) Visualization – linked maps, tables, charts, and graphs
- Why?
  - To formulate research questions/ hypotheses

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**Graphs and Charts**

- Pie Charts
- Bar Charts
- Scatter Plots
- Line Charts
- Histograms
- Variograms
- Cumulative Frequency Graphs
- ... in some cases dynamically linked to the map display (and/or in multiple linked views)

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**Descriptive Statistics**

- Attribute base operations:
  - Mean
  - Median
  - Mode
  - Range
  - Standard Deviation
- ... which can then be used to symbolize features

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**Query (by Attribute or Location)**

- Based on user-defined criteria
- Can be:
  - aspatial
  - spatial
  - compound
- Defines subset of features
  - can be mapped, graphed, reported, or saved

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## Query by Attribute

- Based on the aspatial characteristics
- Multiple selection tools
  - Utilize relational operators and boolean logic
- Used to answer “Show me where?” questions
  - Query the table, follow string to map (where?)

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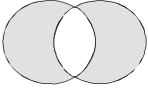
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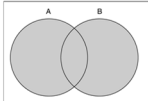
NOT



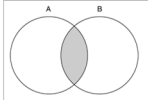
XOR



OR



AND



**Figure 11.12**  
The shaded portion represents the complement of data subset A (top), the union of data subsets A and B (middle), and the intersection of A and B (bottom).

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## Query by Location

- Based on geographic location and topological relationships
- Also multiple selection tools
- Used to answer “Show me what?” questions
  - Query map, follow string to table (what?)

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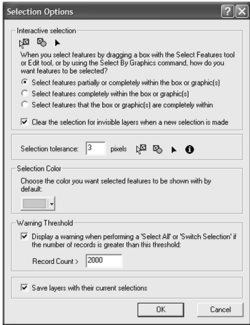
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## Query by Location

- Mouse



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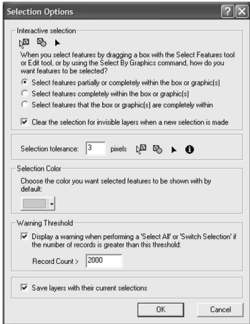
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## Query by Location

- Graphics



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## Query by Location

- Spatial (i.e. topological) relationships
  - Select features from one or more layers that
    - Intersect
    - Are within a distance of
    - Completely contain
    - Are completely within
    - Have their center in
    - Share a line segment with
    - Touch the boundary of
    - Are identical to
    - Are crossed by the outline of
    - Contain
    - Are contained by
  - ... the features of the same or other layers

- Containment
- Intersection
- Proximity/Adjacency

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## Raster Data Query

- Identifies pixels, not features or records
- Result is output boolean or binary raster
  - Cell value 1 = yes, criteria satisfied
  - Cell value 0 = no, criteria not satisfied

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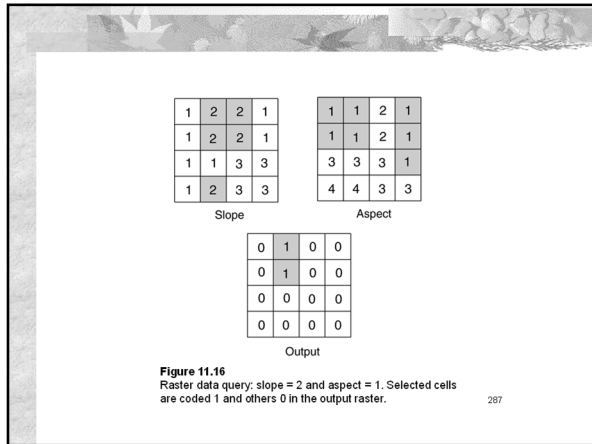
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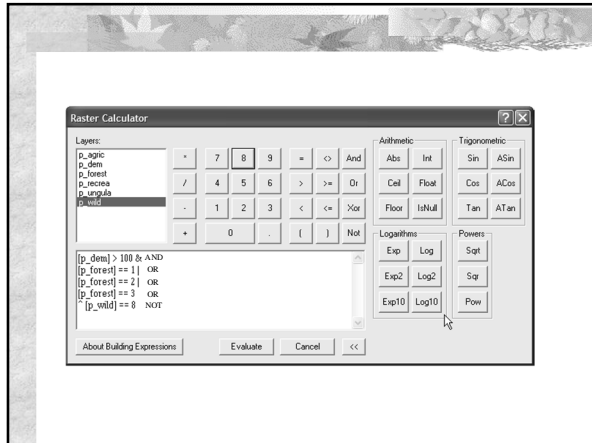
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