Introduction to buffering and overlay

Background

• Basic operations:
  – Buffer
  – Overlay
• Arguably the only functionality that is unique to GIS software
• Fundamental to GIS’s ability to integrate data
• Not really analysis – merely data manipulation
• Tests the quality of GIS data – error propagation

Buffering: The basics

• Input layer: can be point, line or polygon
• Output layer: Contains polygons that enclose all of the study region within a specified distance of the features on the input layer
• Examples:
  – Areas within 5 km of a hospital
  – Areas within 1 km of a river
  – Areas within 10 km of a lake
Examples of buffering

Overlay: The basics

- Two of more input layers
  - Can be any combination of point, line or polygon
- Spatial data and attribute data are both combined to create an output layer
  - Feature type of the output layer will depend on the combinations of the input layers

Spatial data in overlay
Spatial and attribute data

Overlay in ArcGIS

Clip:
A “cookie-cutter” form of overlay Input can be points, lines or polygons Clip coverage must be polygon Output coverage will be of the same feature type as the input Features from the input coverage that lie within the clip coverage are preserved Does not merge attributes

Overlay in ArcGIS

Intersect (points):
Input can be points, lines or polygons Intersect coverage must be polygon Only features from the input coverage that overlap with the intersect coverage are preserved The output coverage contains the merged attributes of both coverages
Overlay in ArcGIS

Intersect (polygons):

- Features from both coverages are preserved
- The output coverage contains the merged attributes of both coverages

Overlay in ArcGIS

Union:

- Input must be polygons
- Intersect coverage must be polygon
- Features from both coverages are preserved

Buffering and overlay combined

- How many farms lie within 2km of a major road
  - Input 1: Road layer (line) with type as attribute
  - Input 2: Farms (point)
Conclusions

• Overlay and buffering are powerful tools that allow us to manipulate spatial data
• They allow powerful spatial queries of multiple layers of data
• They are data manipulation tools that form an important components of the analytic toolbox
• Overlay always makes error worse – output layers must be used with care