M.Sc. Remote Sensing and GIS

RT-202

Geographic Information System

Unit-III

3.2 Vector Based Spatial Data Analysis

Part-III

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…Cont.

- Beside all these overlay methods can be more complex than that and therefore employ the basic Boolean operators: AND, OR, and XOR.
- Depending on which operator(s) are utilized, the overlay method employed will result in an intersection, union, symmetrical difference, or identity.

Union

- The union overlay method employs the OR operator. A union can be used only in the case of two polygon input layers. It preserves all features, attribute information, and spatial extents from both input layers.
- This overlay method is based on the polygon-in-polygon operation.

(a) Union

Intersection

- Alternatively, the intersection overlay method employs the AND operator. An intersection requires a polygon overlay, but can accept a point, line, or polygon input.
- The output layer covers the spatial extent of the overlay and contains features and attributes from both the input and overlay.

(b) Intersect

Symmetrical Difference

- The symmetrical difference overlay method employs the XOR operator, which results in the opposite output as an intersection. This method requires both input layers to be polygons.
- The output polygon layer produced by the symmetrical difference method represents those areas common to only one of the feature datasets.

(c) Symmetrical Difference

Identity

- In addition to these simple operations, the identity (also referred to as “minus”) overlay method creates an output layer with the spatial extent of the input layer but includes attribute information from the overlay (referred to as the “identity” layer, in this case).
- The input layer can be points, lines, or polygons. The identity layer must be a polygon dataset.

(d) Identity

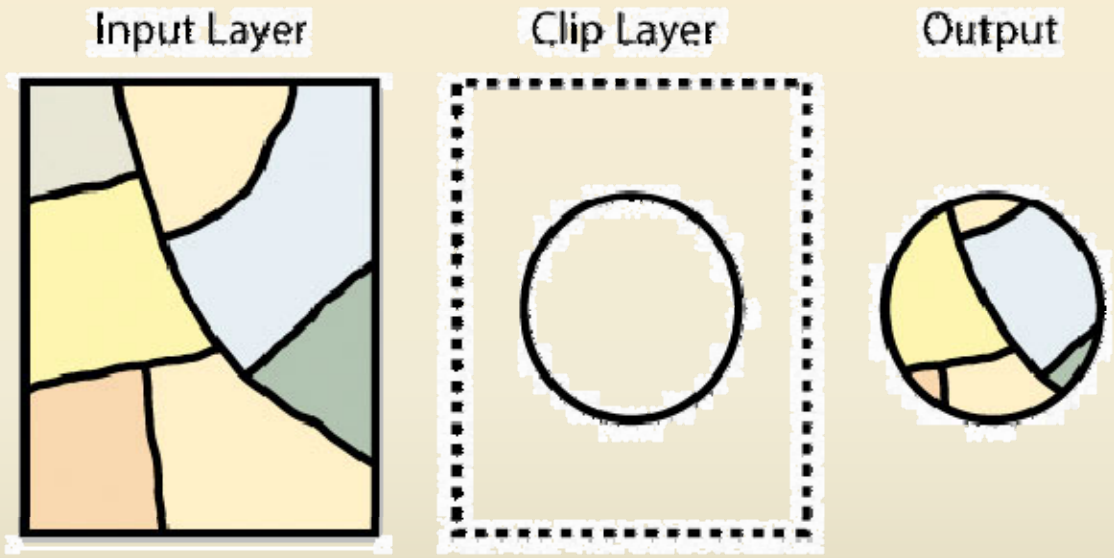
Other Multilayer Geoprocessing Options

- In addition to the aforementioned vector overlay methods, other common multiple layer geoprocessing options are available to the user. These included the
  - clip,
  - erase,
  - split tools.

Clip

- The clip geoprocessing operation is used to extract those features from an input point, line, or polygon layer that falls within the spatial extent of the clip layer.
- Following the clip, all attributes from the preserved portion of the input layer are included in the output. If any features are selected during this process, only those selected features within the clip boundary will be included in the output.
- For example, the clip tool could be used to clip the extent of a river floodplain by the extent of a county boundary. This would provide county managers with insight into which portions of the floodplain they are responsible to maintain.
- This is similar to the intersect overlay method; however, the attribute information associated with the clip layer is not carried into the output layer following the overlay.

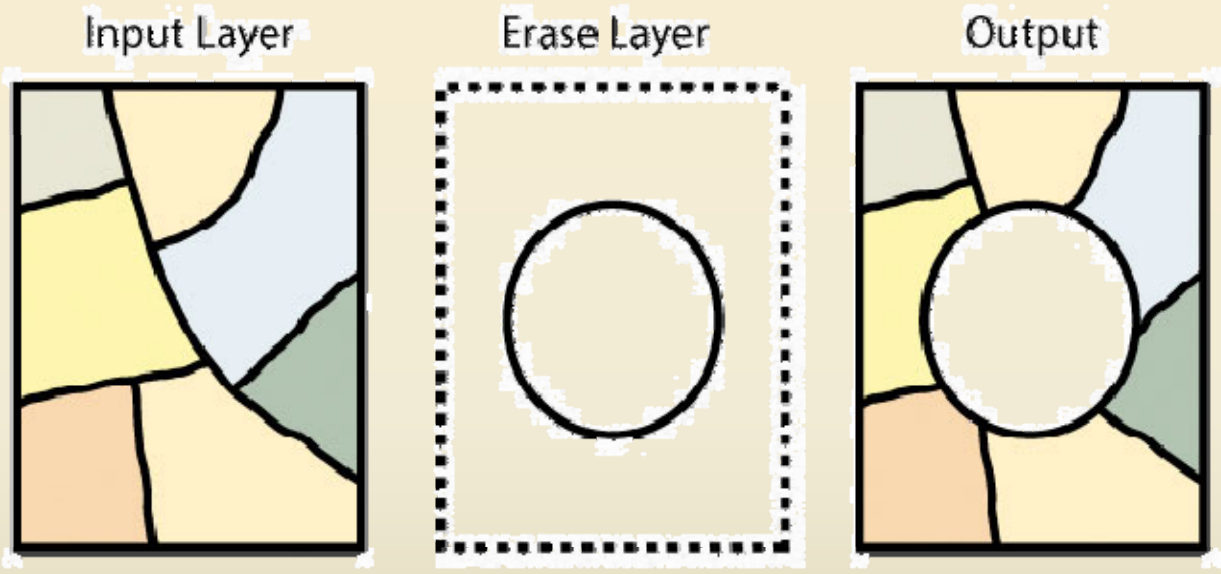
(e) Clip



Erase

- The erase geoprocessing operation is essentially the opposite of a clip. Whereas the clip tool preserves areas within an input layer, the erase tool preserves only those areas outside the extent of the analogous erase layer .
- While the input layer can be a point, line, or polygon dataset, the erase layer must be a polygon dataset. Continuing with our clip example, county managers could then use the erase tool to erase the areas of private ownership within the county floodplain area. Officials could then focus specifically on public reaches of the countywide floodplain for their upkeep and maintenance responsibilities.

(f) Erase



Split

- The split geoprocessing operation is used to divide an input layer into two or more layers based on a split layer.
- The split layer must be a polygon, while the input layers can be point, line, or polygon.
- For example, a homeowner's association may choose to split up a countywide soil series map by parcel boundaries so each homeowner has a specific soil map for their own parcel.

(g) Split