جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الانظمة الطبية الذكية

Lecture: (6)

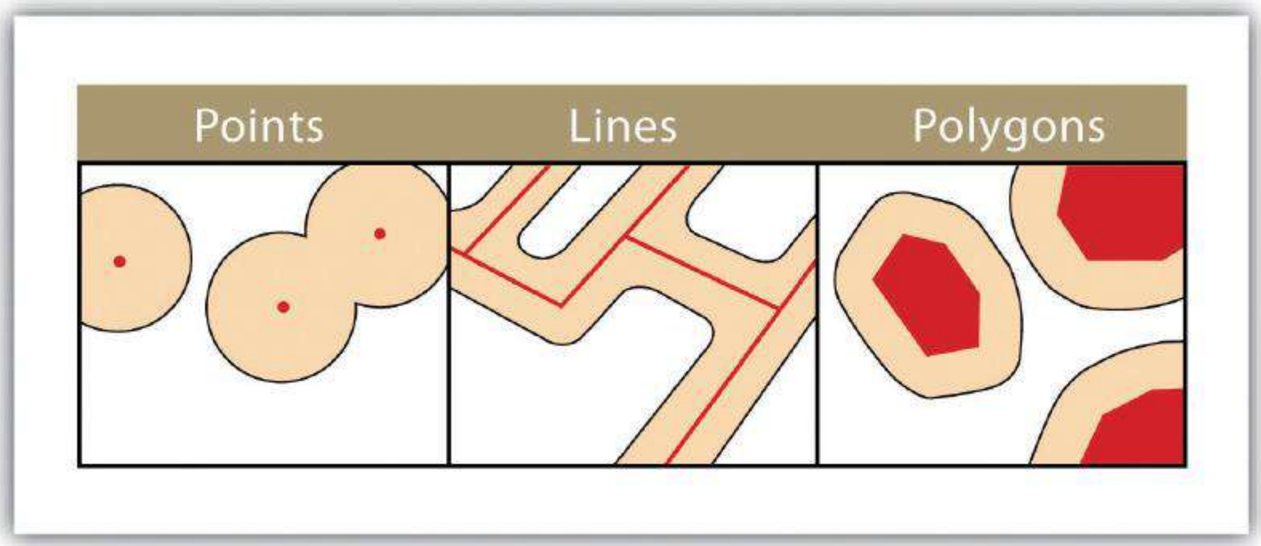
Subject: **Geospatial Analysis**
Level: Third

Lecturer: MSc. Mustafa Yousif

1- BUFFERING

It is a geo-processing technique

- Placing a region of specified width around a point, line, or polygon.

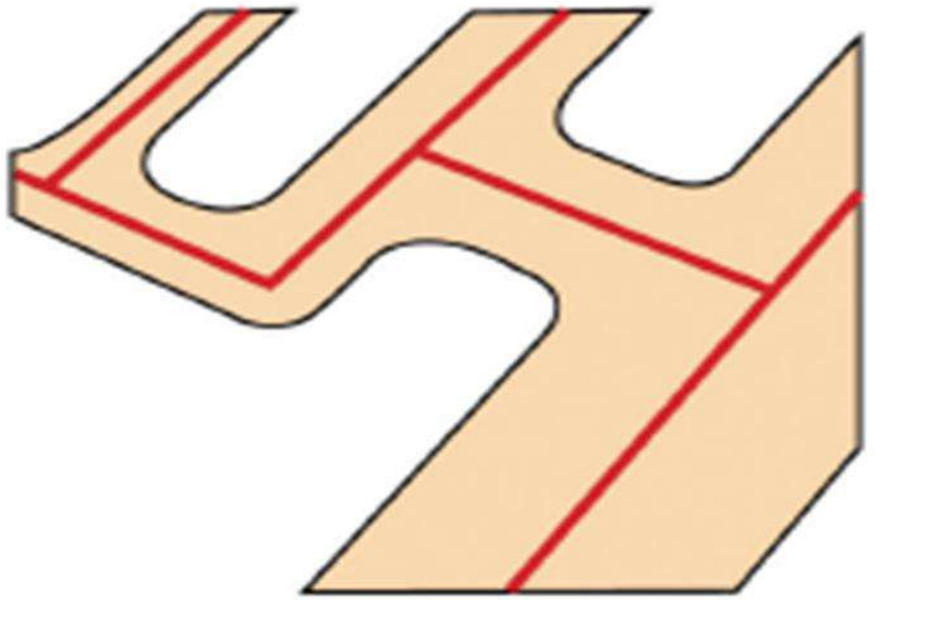


BUFFERING

- Two primary types of buffers are available to the GIS users:
- **constant width**: Regions of constant width around points, lines, or polygons.

- **variable width**: Regions of variable width around points, lines, or polygons.

variable width



BUFFERING Examples

- **BUFFERING Site selection**
  determine location of new well – make sure it does not fall within 10km of chemical factories.

- **BUFFERING Epidemiology**
  disease clusters around certain features (e.g. asthma surrounding incinerators)

2- Dissolve

It is a geo-processing technique that removes the boundary between adjacent polygons with identical values

Example

- the boundaries of seven different parcels of land, owned by four different families (labeled 1 through 4).
- The dissolve tool automatically combines all adjacent features with the **same attribute values.**
- The result is an output layer with the same extent as the original but without all of the unnecessary, intervening line segments.

3- Append

It is a geo-processing technique that combines adjacent polygon datasets into a single dataset.

- For use with point, line, and polygon datasets, the output layer will be the same feature type as the input layers (which must each be the same feature type as well).

Unlike the dissolve tool, append does not remove the boundary lines between appended layers .

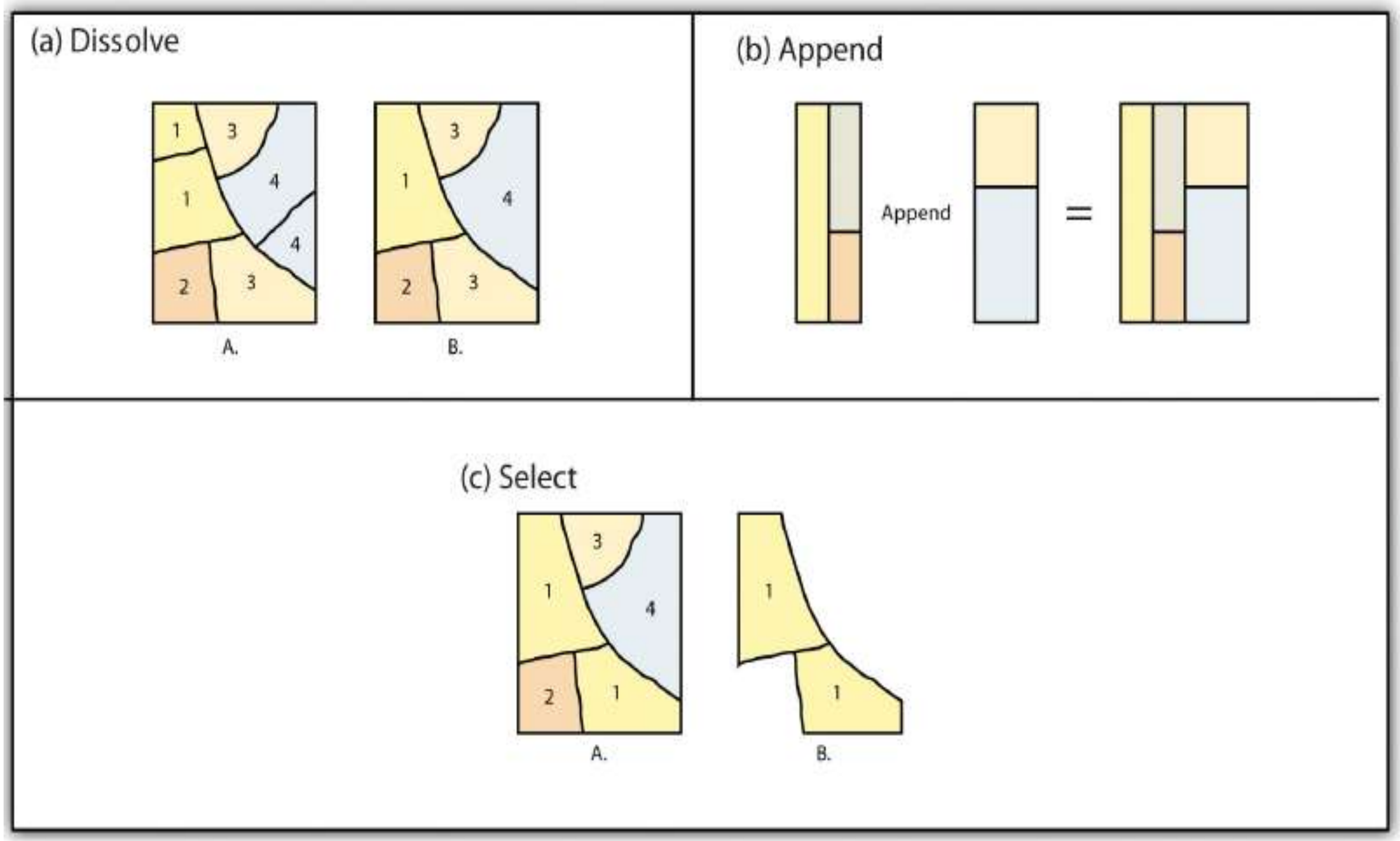
Therefore, it is often useful to perform a dissolve after the use of the append tool to remove these potentially unnecessary dividing lines.

4- Select

- It is used to define a subset of the larger set of data points or locales. The output layer contains only those features that are selected during the query.

For example, a city planner may choose to perform a select on all areas that are zoned “residential” so he or she can quickly assess which areas in town are suitable for a proposed housing development.

Examples: Dissolve, Append, Select



Multiple Layer Analysis

- Among the most powerful and commonly used tools in a geographic information system (GIS) is the overlay of cartographic information.
- In a GIS, an **overlay** is the process of taking two or more different thematic maps of the same area and placing them on top of one another to form a new map

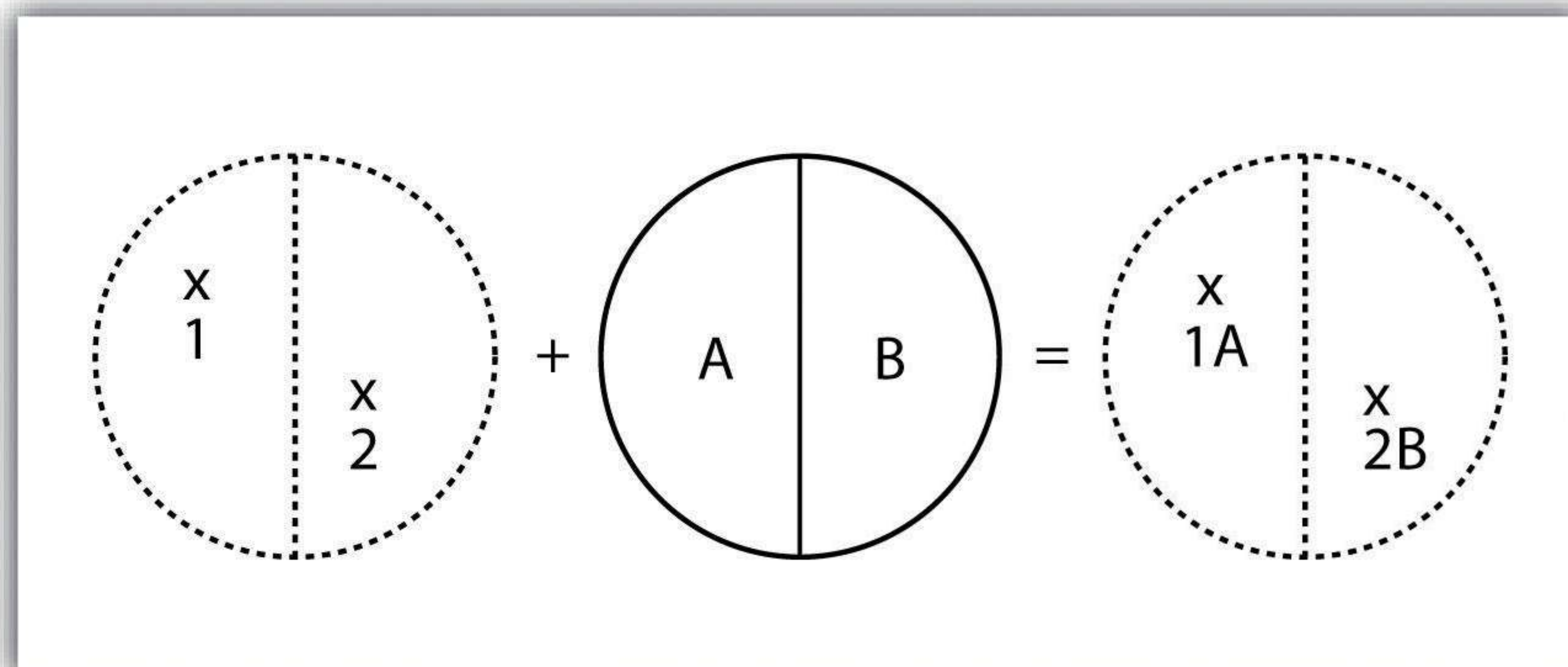
Overlay Operations

1- point-in-polygon overlay:

operation requires a **point input layer** and a **polygon overlay layer**. Upon performing this operation, a new **output point layer** is returned that includes all the points that occur within the spatial extent of the Overlay.

- All the points in the output layer contain their original attribute information as well as the attribute information from the overlay.

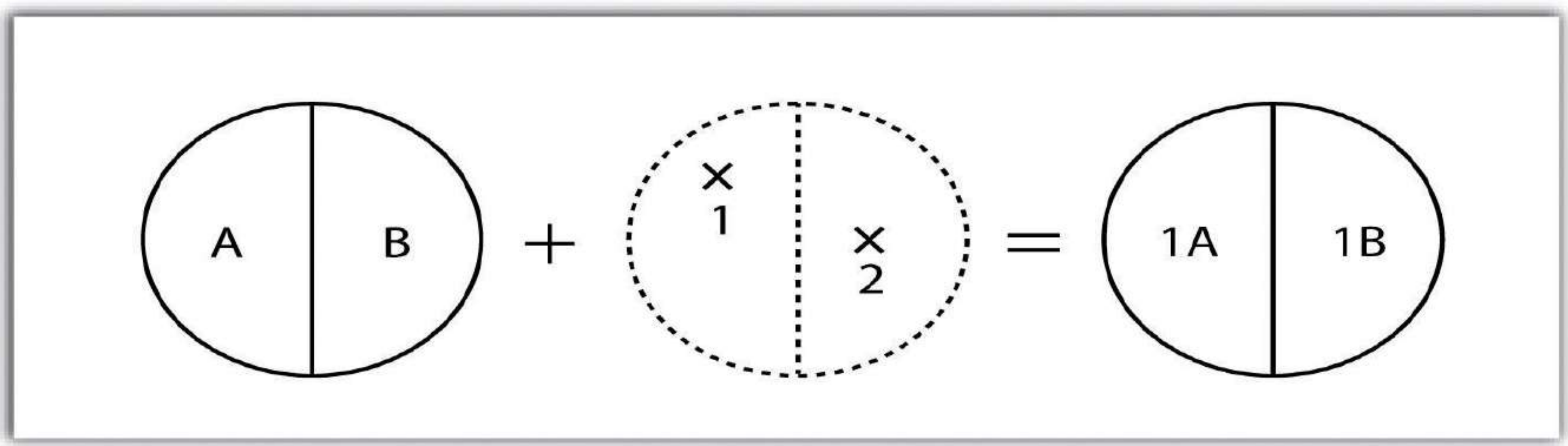
Overlay Operations



Overlay Operations

2- polygon-on-point overlay:

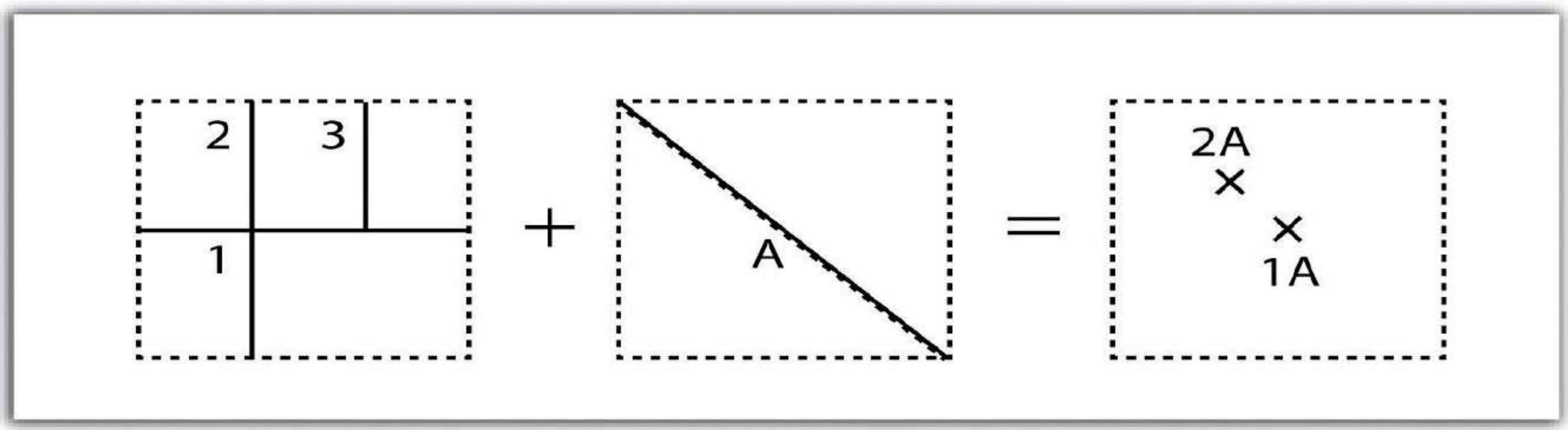
An overlay technique that creates a polygon layer from those input polygons that overlay features in a point layer.



Overlay Operations

3- line-on-line overlay:

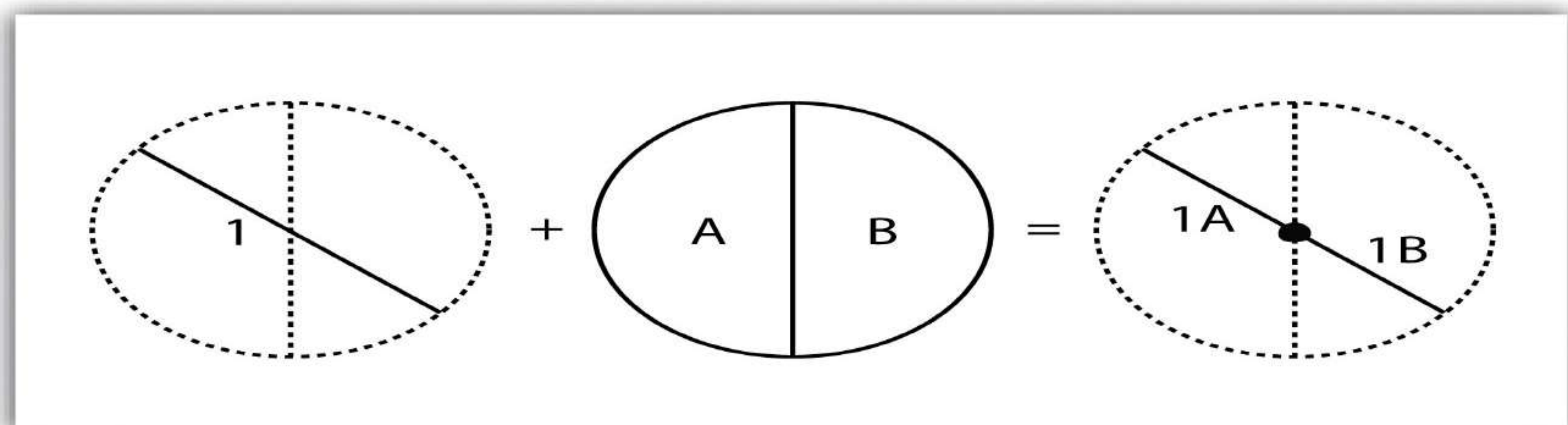
An overlay technique in which output from this operation is a point(s) located at the intersection(s) of the two linear datasets.



Overlay Operations

4- line-in-polygon overlay:

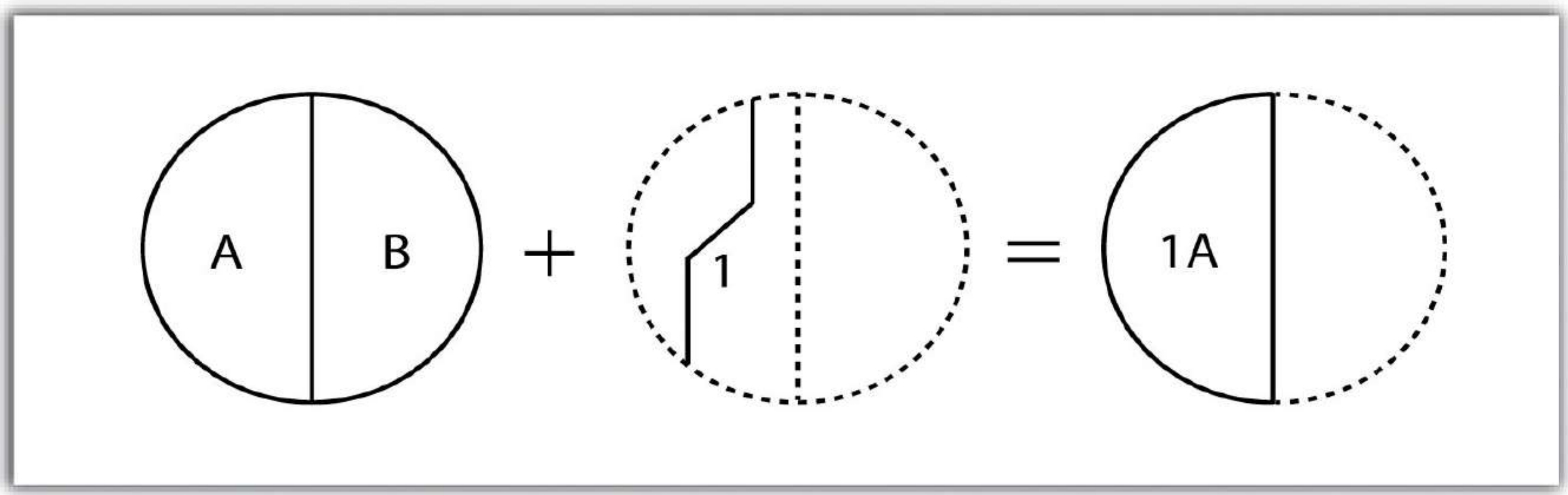
An overlay technique in which each line that has any part of its extent within the overlay polygon layer will be included in an output line layer.



Overlay Operations

5- polygon-on-line overlay:

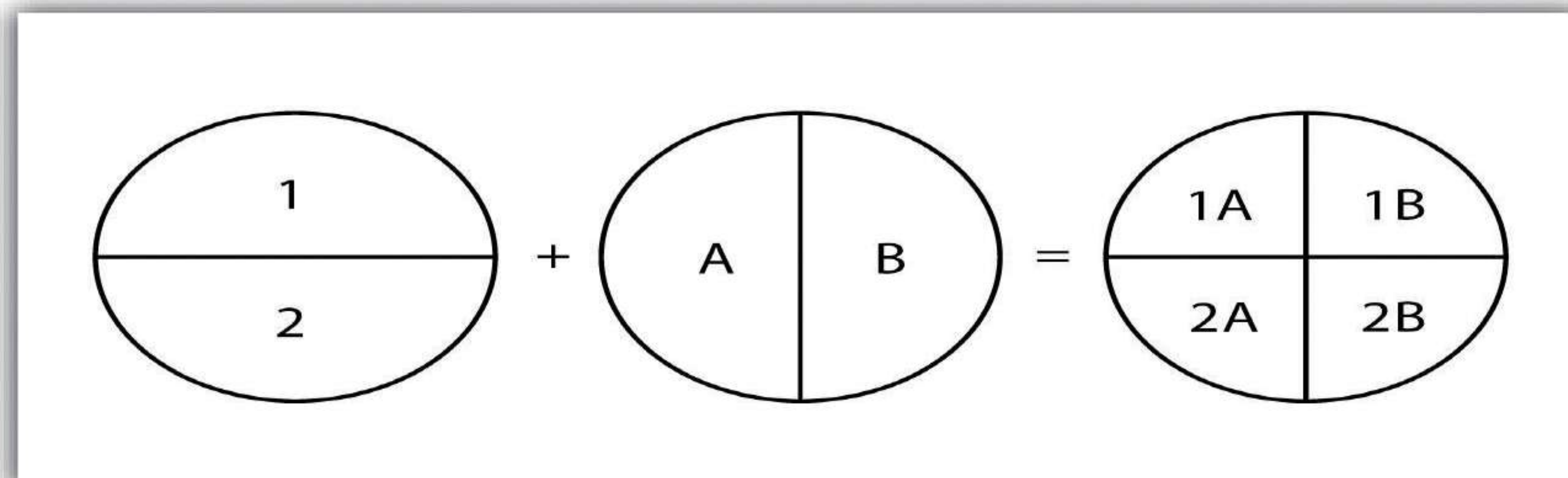
An overlay technique in which polygon features that overlay lines are selected and subsequently preserved in an output layer.



Overlay Operations

6- polygon-in-polygon overlay:

An overlay technique in which a polygon input and overlay layers are combined to create an output polygon layer with the extent of the overlay.



Overlay Operations

7- Union:

An overlay method that preserves all features, attribute information, and spatial extents from an input layer.

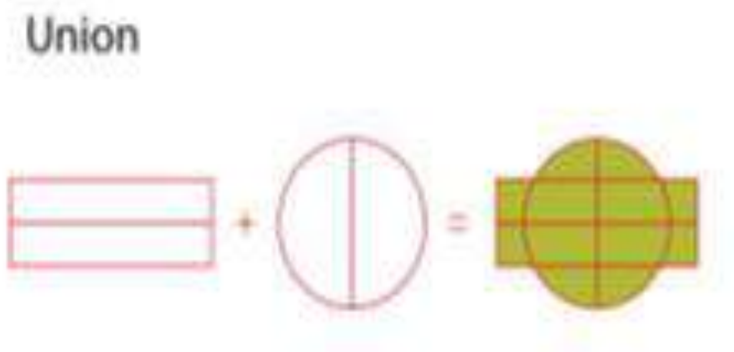
8- Clip:

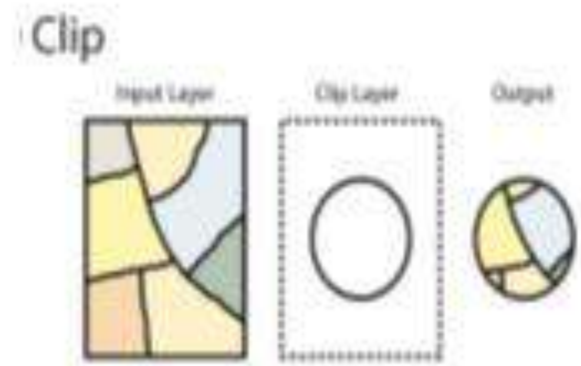
A geo-processing operation that extracts those features from an input point, line, or polygon layer that falls within the spatial extent of a clip layer.

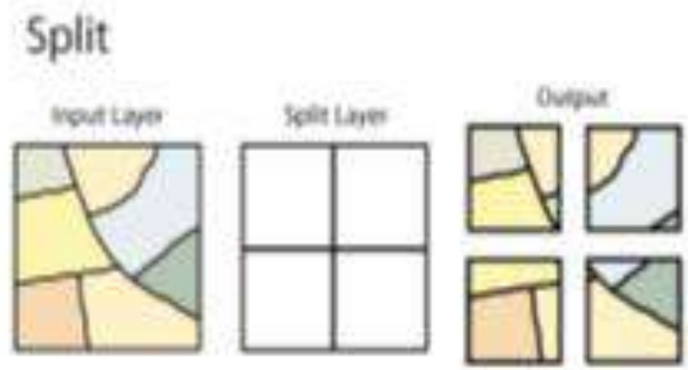
9- Split:

A geo-processing operation that divides an input layer into two or more layers based on a split layer.

Overlay Operations







Basic Geo-processing with Raster's

Reclassifying, or recoding a dataset is commonly one of the first steps undertaken during raster analysis. **Reclassification** is basically the single layer process of assigning a new class or range value to all pixels in the dataset based on their original values.

- For example, an elevation grid commonly contains a different value for nearly every cell within its extent. These values could be simplified by aggregating each pixel value in a few discrete classes:-

(i.e., 0–100 = “1,” 101–200 = “2,” 201–300 = “3,” etc.) This simplification allows for **fewer unique values and cheaper storage requirements**.

Input Raster

456	416	364	326	243
448	364	315	276	218
359	325	268	234	164
306	296	201	133	44
274	231	184	65	5

Reclassified Raster

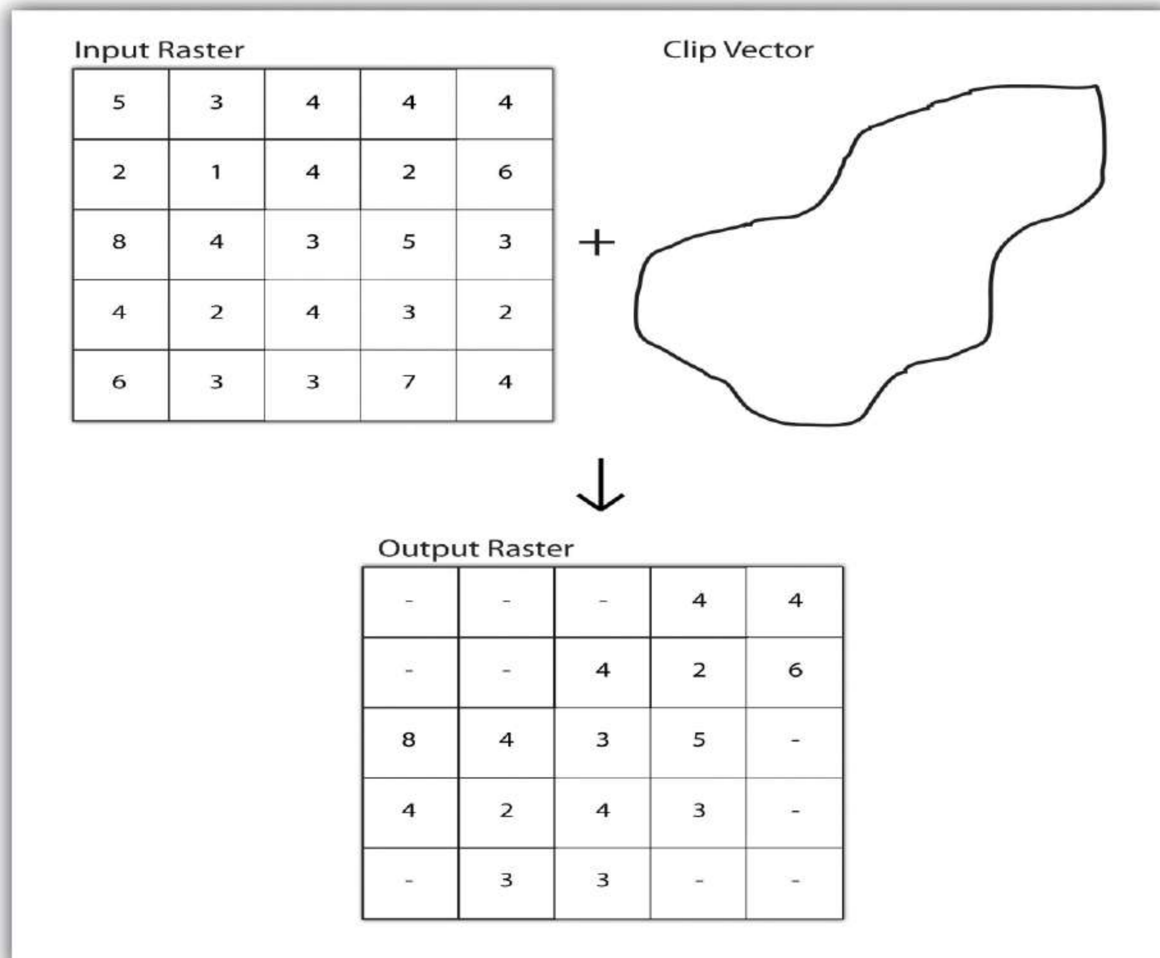
5	5	4	4	3
5	4	4	3	3
4	4	3	3	2
4	3	3	2	1
3	3	2	1	1

Basic Geo-processing with Raster's

clip

The raster clip process results in a **single raster** that is identical to the input raster but shares the extent of the polygon clip layer.

Basic Geo-processing with Raster's

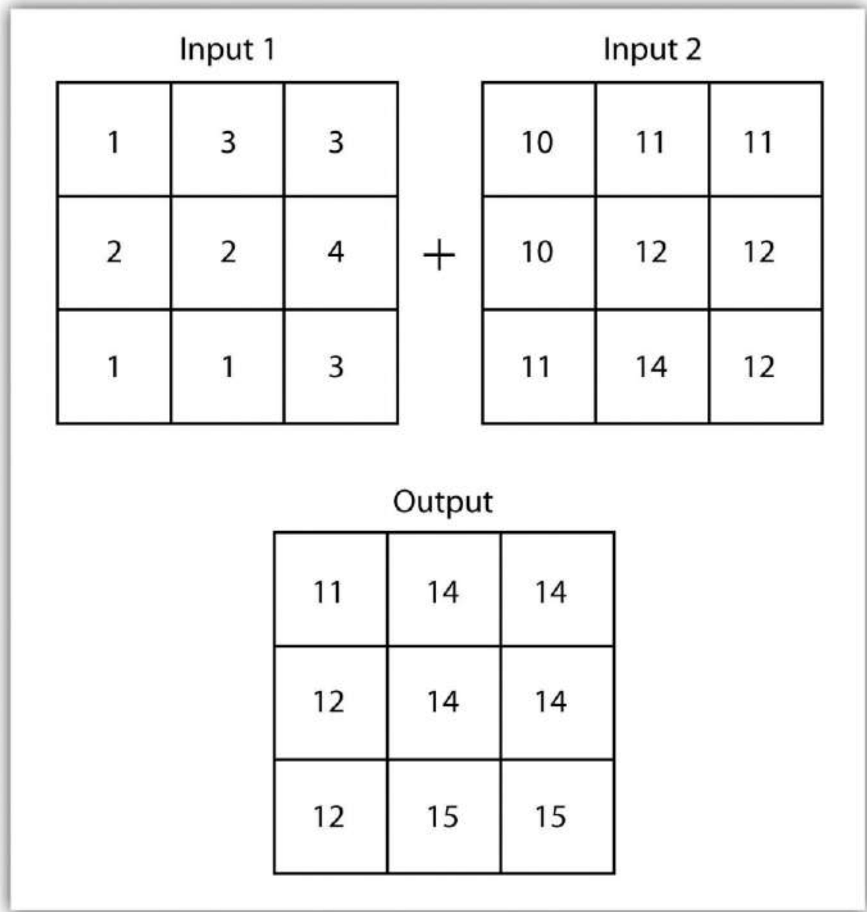


Basic Geo-processing with Raster's

- The **mathematical raster overlay** Pixel or grid cell values in each map are combined using mathematical operators to produce a new value in the composite map.

The numbers within the aligned cells of the input grids can undergo any user-specified mathematical transformation. Following the calculation, an output raster is produced that contains a new value for each cell

Basic Geo-processing with Raster's



Basic Geo-processing with Raster's

- **Local operations** can be performed on **single or multiple raster's.** When used on a single raster, a local operation usually takes the form of applying some mathematical transformation to each individual cell in the grid.

For example, a researcher may obtain a **digital elevation model** (DEM) with each cell value representing elevation in feet. If it is preferred to represent those elevations in meters, a simple, arithmetic transformation (**original elevation in feet * 0.3048 = new elevation in meters**) of each cell value can be performed locally to accomplish this task.

Basic Geo-processing with Raster's

Input Raster

456	416	364	326	243
448	364	315	276	218
359	325	268	234	164
306	296	201	133	44
274	231	184	65	5

Output Raster (x10)

4560	4160	3640	3260	2430
4480	3640	3150	2760	2180
3590	3250	2680	2340	1640
3060	2960	2010	1330	440
2740	2310	1840	650	50