

Spatial data analysis out line

At the end of this unit, students will be able to:

- Identify the spatial analysis from other analysis.
- List and identify analysis functions and analytical operations
- Jot down the requirement for spatial data analysis.
- Identify vector and raster function.
- Identify how spatial analysis and functions results can be represented via GIS technologies.
- Identify the deferent map types based on map, scale purpose and content
- Identify the marginal information portrayed on the map commonly

GIS Analysis Operations and Applications

- What is GIS analysis?
- Mention and discuss the main categories / types of analysis functions and analytical

Operations

- What are the requirements for spatial data analysis?
 - Mention and discuss the basic functions to vector and raster analysis with examples
 - How can presenting the result of GIS?
 - What is map, Classification of Map, based on Purpose, based on the Information the convey, variation of maps based on scale?
 - tfrzi65ka
- maps?

What is GIS analysis?

- What is the difference between GIS analysis and spatial analysis?
- What about GIS analytical operation and spatial operation?
- term '*analysis*' refers to data manipulation and data querying
- If the analysis deal with location it is called GIS/spatial/geographic data/ analysis.

Mention and discuss the main categories / types of analysis functions and analytical Operations

5.2.1. Types of spatial analysis vary from simple to sophisticated.

spatial analysis can be divided into six major categories:

- Measurements
- queries and reasoning
- Transformations (data transformation)
- Optimization (module)
- hypothesis testing
- descriptive summaries(map)

Spatial operation

simple Spatial operation that used for some sort spatial analysis functions.

A. Selection by Attribute

Set Algebra(define conditions)

($<$, $>$, \leq , \geq , $=$, $-$, $+$ and $*$) mathematical operation.

Boolean Algebra(combine a *set* of conditions)

(or, not, and)

B. Selection by location(based on their spatial association; four categories)

1.Adjacency (common boundary share)

2.Containment (*inside* features of another)

3.Intersection (common)

4. distance (interconnected)

Cont..

Spatial **operations** use geometry **functions** to take **spatial** data as input, analyze the data, then produce output data that is the derivative of the analysis performed on the input data.

1. Spatial search operation
2. Buffer operation
3. Voronoi diagram operation
4. Delaunay triangulation operation
5. Network operation
6. Spatial overlay operation

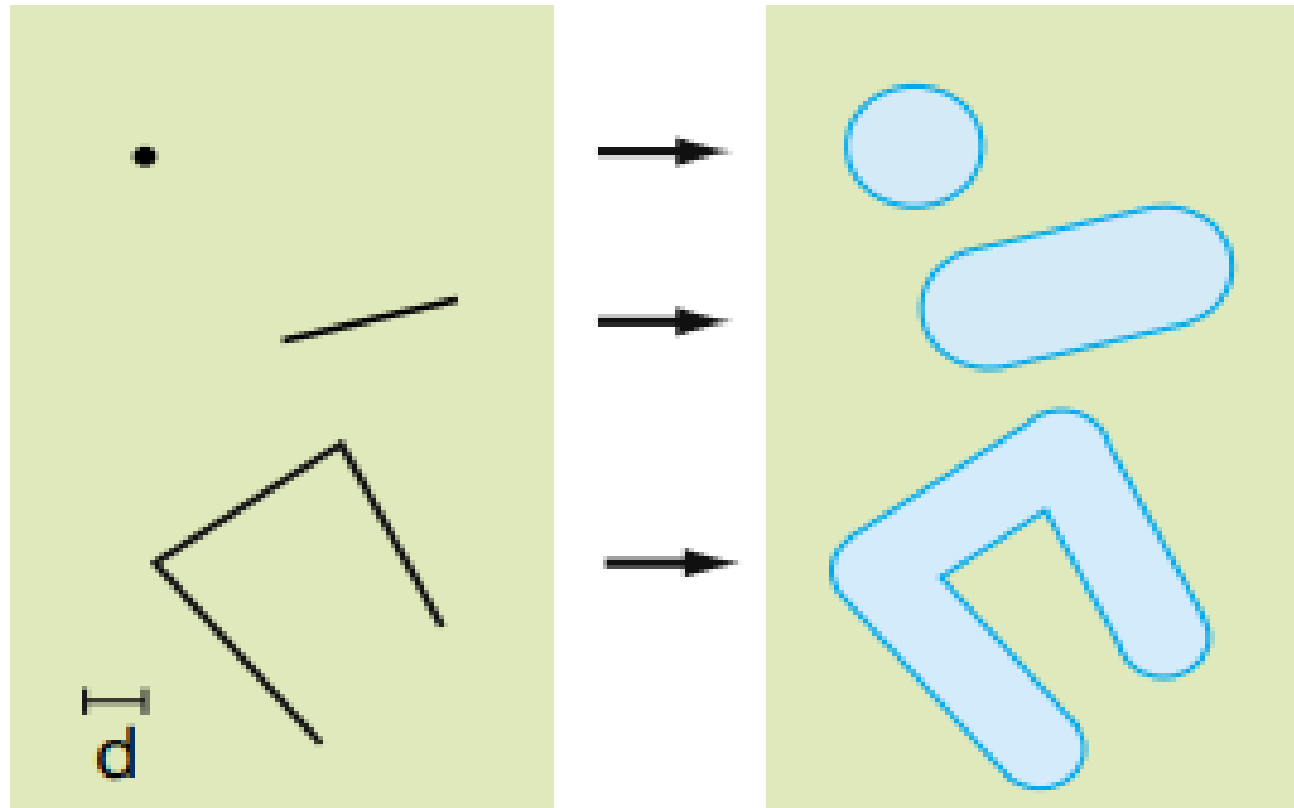
1. Spatial search operation

example

- indexing
- Searching with Query
- Generally related with SDB

Buffer or multiple ring buffer operation

Buffer



what are the requirements for spatial data analysis?

1. Identify data type both Spatial data and none spatial data
2. Know data source
 - A. resources (open or commercial)
 - B. data resolution: spatial, temporal, spectral and radiometric
3. Data accuracy

Instruments used for collecting data.

- Sensor quality
- Needed hardware and software(open and commercial)
- Resolution
- Clear procedure

Mention and discuss the basic functions to vector and raster analysis with examples.

A. spatial data function.

1.Format Transformations e.g. Vector to raster

2. Geometric Transformations

E, g correctly overplayed, assign ground coordinate. **Relative Position, Absolute position location**

3. Projection Transformations.

mathematical transformation that is used to represent a spherical surface on a flat map.

Attribute Data Functions

- Retrieval
- Classification
- Verification

Spatial function on raster

Function name	Description
Apparent reflectance	Adjusts image brightness values (DN) for some satellite sensors.
Arithmetic	Performs an arithmetic operation between two partially or completely spatially overlapping rasters or a raster and one or more constant values.
Aspects	Identifies the downslope direction of the maximum rate of change in value from each cell to its neighbors
Band arithmetic	Performs an arithmetic operation on the bands of a raster dataset.
Binary threshold	Creates a raster output that divides your raster into two distinct classes.
Classify	Classify the raster data based on their DN value
color model conversion	Converts the color model of an image, for example, from either the hue, saturation, or value (HSV) to red, green, and blue (RGB), or vice versa.
Composite bands	Combines raster's to form a multiband raster or band stack
constant	Creates a virtual raster with a single pixel value for all its pixels.
stretch	Enhances an image by changing properties, such as brightness, contrast, and gamma, through multiple stretch types.
slope	Calculates the rate of change of elevation for each DEM cell.
NDI	Calculates the Normalized Difference Vegetation Index (NDVI) values using a two-band raster consisting of the red and near-infrared bands.

How can presenting the result of GIS analysis ?

Most of the result of GIS represents by **maps** and some times either by **graph** and **tables** .

What is map, Classification of Map, based on Purpose, based

What is map ? a symbolic representation of selected characteristics of a place.

Types of map

B. scale based

Size of Scale

Representative Fraction (RF)

1. Large Scale

1:25,000 or larger

2. Medium Scale

1:1,000,000 to 1:25,000

3. Small Scale

1:1,000,000 or smaller

NOTE: Scale is inversely and directly proportional to mapped area and spatial resolution respectively.

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Types of map based on their purpose.

1, General Reference ; Included along like lakes and rivers, and you'll be thinking of a general reference map.

2, Topographical : elevation, contour line, landscape

3, Thematic a layer map

4, Navigational Charts; including both reference and topological map with location pointer

Cont..

5, Cadastral Maps and Plans; a lot more specific

6, Time zone maps

7. Dynamic Maps (interactive)

But some literature classify map in to two major categories.

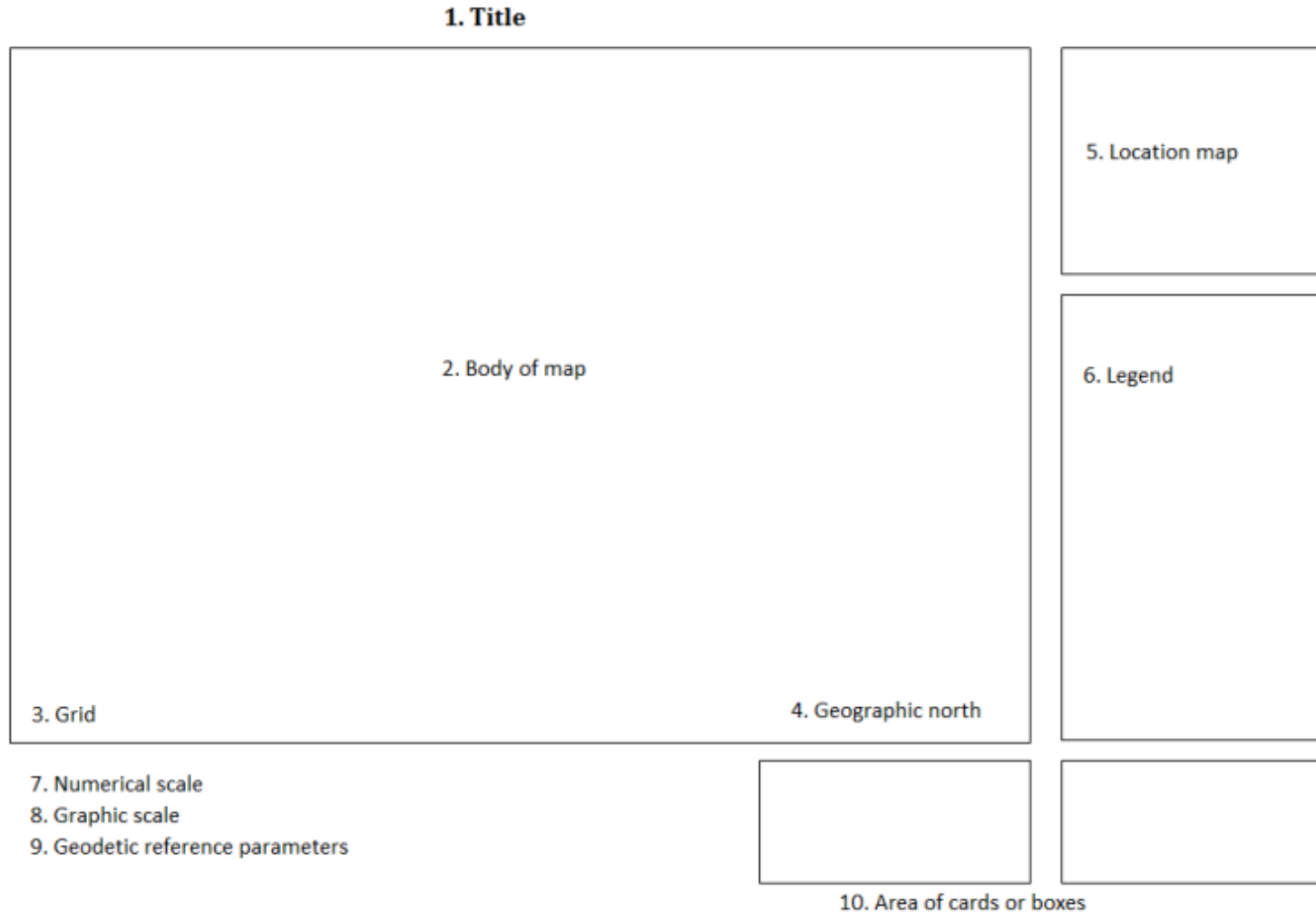
Physical maps show the shape of the land - hills, lakes, forests, the coast and so on and **Political** maps show how the land is used by people - counties, provinces, countries, town boundaries, etc.

5.6.3. Content based map type

- General Reference.
- Thematic **Maps**.
- Topographic **Maps**.
- Cadastral **Maps** and Plans.
- Navigation Charts.
- Series **Maps**.

Discuss, what are the major marginal information/elements to be included on the final maps?

5.7.1. Marginal of map template [ISRI,2016](#)



Cont..

1. **Map** Title (or **Map** Sheet Name) **Map** title is the name or heading of the particular **map** sheet. ...
2. North arrow
3. grid
4. Legend
5. Scale
6. Scale bar
7. Author
8. Date ride
9. Name of Publisher and Copyright Owner of the **Map**

<https://mgimond.github.io/Spatial/uncertainty-in-census-data.html>

Cont..

Good map example



Figure 2.4: Map elements. Note that not all elements are needed on every map.

THANK YOU!!!

REFERENCES

- Pascual, M.S., 2011. GIS Data: A Look at Accuracy, Precision, and Types of Errors. GIS Lounge. URL <https://www.gislounge.com/gis-data-a-look-at-accuracy-precision-and-types-of-errors/> (accessed 1.20.21).
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