Literature review:

On GIS Concepts.

Phanindra Balaji. R

H18phara.

Business Intelligence

Summarization of chapter 9: DATA DISPLAY AND CARTOGRAPHY

1.Cartographic Representation
In cartography maps are made and studied, there are different types of maps made based on the need and usage of the map readers.
2.Types of Quantitative Maps
It's about various kinds of map and the usage of those maps with different situations.
dot map, choropleth map, graduated symbol map, chart map, flow map, isarithmic map.
3.Typography :
Here it describes about where and what text format should be used on the maps. It also describes about the selection of variation of maps.
4.Map Design :
Gives the idea about how to plan on map to give better visual understanding. Explains how visual hierarchy plays the role in building a map and how to achieve a proper model to give complete idea of a mapping region by using 3-D.
5.Animated Maps
It can be used to show the changes over the time, space or attribute
6.Map Production
Gives a visual idea of how the maps designed in GIS system.

In the types of quantitative maps, it is little difficult to analyse which kind of maps are to be used on different kinds of scenario.

There are many news topics discussed in the chapter, the usage of spline text tool in writing the labels on the maps. The different ways of interpreting and designing the maps.

Summarization of chapter 10: DATA EXPLORATION

Data exploration is a very important part in the GIS as it has hundreds of layers and thousands of attributes to work on. As it is also considered to be overwhelming when we work on the GIS data.

1.Data Exploration: In this part we go through different ways of data visualization like graphs and gives an idea of what kind of graph is to be used for certain kind of exploration.

2. Map-Based Data Manipulation: The chapter gives us information on how we can use map for data exploration, how more map visualization can be combined to provide the new result, how to compare two different map result etc.

3. Attribute Data Query: In this topic we use SQL query language with respect to GIS.

4. Spatial Data Query: The process of retrieving data by working with spatial features.

5. Raster Data Query: Queries can be passed by cell location value or selecting feature.

Being aware of the query languages, both spatial and raster query languages are something new to my knowledge. Visual analytics were also very interesting. I found Dynamic graphing little difficult to understand.

Summarization of chapter 11: **Vector Data Analysis**

Vector data analysis uses the geometric objects of point, line, and polygon. The accuracy of analysis results depends on the accuracy of these objects in terms of location and shape. Topology can also be a factor for some vector data analyses such as buffering and overlay.

1. Buffering**:** Based on the concept of proximity, buffering creates two areas: one area that is within a specified distance of select features and the other area that is beyond. The area that is within the specified distance is called the buffer zone. There are several variations in buffering. The buffer distance can vary according to the values of a given field. Buffering around line features can be on either the left side or the right side of the line feature. Boundaries of buffer zones may remain intact so that each buffer zone is a separate polygon.

2. Overlay: An overlay operation combines the geometries and attributes of two feature layers to create the output. The geometry of the output represents the geometric intersection of features from the input layers. Each feature on the output contains a combination of attributes from the input layers, and this combination differs from its neighbours.

3. Distance measurements: Process of measuring distances between two feature and between two layers.

4. Pattern analysis: Pattern analysis refers to the use of quantitative methods for describing and analysing the distribution pattern of spatial features. At the general level, a pattern analysis can reveal if a distribution pattern is random, dispersed, or clustered. At the local level, a pattern analysis can detect if a distribution pattern contains local clusters of high or low values. Pattern analysis includes point pattern analysis (nearest neighbour, Ripley's K-function), Moran's I for measuring spatial autocorrelation, and G-statistic for measuring high/low clustering.

5. Feature manipulation: Tools are available in a GIS package for manipulating and managing maps in a database. These tools include Dissolve, Clip, Append, Select, Eliminate, Update, Erase, and Split.

Error propagation, G-statistic and Ripley's K-function were little difficult to understand. Slivers and buffering concepts are new to me. And this chapter is little interesting because it has many real time applications to work on.

Summarization of chapter 12: **Raster Data Analysis**

Raster data analysis is based on cells and rasters. Raster data analysis can be performed at the level of individual cells, or groups of cells, or cells within an entire raster. Some raster data operations use a single raster; others use two or more rasters. Raster data analysis also depends on the type of cell value (numeric or categorical values).

1. Data Analysis Environment: The analysis environment refers to the area for analysis and the output cell size.

2. Local Operations: Given a single raster as the input, a local operation computes each cell value in the output raster as a mathematical function of the cell value in the input raster. A common term for local operations with multiple input rasters is map algebra, a term that refers to algebraic operations with raster map layers. Besides mathematical functions that can be used on individual rasters, other measures that are based on the cell values or their frequencies in the input rasters can also be derived and stored on the output raster of a local operation with multiple rasters.

3. Neighbourhood Operations: A neighborhood operation involves a focal cell and a set of its surrounding cells. The surrounding cells are chosen for their distance and/or directional relationship to the focal cell. Common neighborhoods include rectangles, circles, annuluses, and wedges.

4. Zonal Operation: A zonal operation works with groups of cells of same values or like features. These groups are called zones. Zones may be contiguous or non-contiguous. A zonal operation may work with a single raster or two rasters. Given a single input raster, zonal operations measure the geometry of each zone in the raster, such as area, perimeter, thickness, and centroid. Given two rasters in a zonal operation, one input raster and one zonal raster, a zonal operation produces an output raster, which summarizes the cell values in the input raster for each zone in the zonal raster.

5. Physical Distance Measure Operations: The physical distance measures the straight-line or Euclidean distance. Physical distance measure operations calculate straight line distances away from cells designated as the source cells.

6. Map algebra: A term referring to algebraic operations with raster layers.

In this chapter the most difficult parts are Neighbourhood Operations and Raster data extraction. And the most interesting part in this chapter is local operations of both (single and multiple rasters).

Summarization of chapter 15: **Spatial Interpolation**

Spatial interpolation is the process of using points with known values to estimate values at other points. In GIS applications, spatial interpolation is typically applied to a raster with estimates made for all cells. Spatial interpolation is therefore a means of creating surface data from sample points.

1. Control points: Control Points are points with known values. They provide the data necessary for the development of an interpolator for spatial interpolation. The number and distribution of control points can greatly influence the accuracy of spatial interpolation.

2. Types of Spatial Interpolation:

- Spatial interpolation can be global or local.
- Spatial interpolation can be exact or inexact.
- Spatial interpolation can be deterministic or stochastic.

3. Global methods: Trend surface analysis, an inexact interpolation method, approximates points with known values with a polynomial equation. A regression model relates a dependent variable to several independent variables in a linear equation (an interpolator), which can then be used for prediction or estimation.

4. Local methods: Because local interpolation uses a sample of known points, it is important to know how many known points to use, and how to search for those known points.

5. Density Estimation: Density estimation measures cell densities in a raster by using a sample of known points. There are simple and kernel density estimation methods.

6. Kriging: Kriging is a geostatistical method for spatial interpolation. Kriging can assess the quality of prediction with estimated prediction errors. Kriging assumes that the spatial variation of an attribute is neither totally random (stochastic) nor deterministic. Instead, the spatial variation may consist of three components: a spatially correlated component, representing the variation of the regionalized variable; a "drift" or structure, representing a trend; and a random error term. The interpretation of these components has led to development of different kriging methods for spatial interpolation.

In this chapter the most difficult concepts are Kernel density estimation, Kriging, Thiessen polygons and Radial basis functions. All the above-mentioned concepts the most difficult ones to understand. New to my knowledge, Semivariogram, interpolation and many other concepts were new to me.

Overall reflection: all the concepts and processes involved in these chapters are completely new to me. A wide range of different terminology was used. Even more work is needed to get used to the new terminology. And understanding the concepts was little easier as they were explained with the corresponding examples(both real time and unpractical). I am highly motivated to work on these new wide range of concepts.

My GIS definition:

According to me GIS is a tool, concept and a study. to understand, manipulate, analyse, visualize the geographical data. According to me GIS can be referred as separate subject because of its unique and wide range of concepts. So, we should not only consider it as a tool.

References:

1.http://resources.esri.com/help/9.3/arcgisengine/com_cpp/samples/com/SpatialAnalyst/RasterQuery/2b5b9231-7e7b-4ce0-b0b0-fda8fc02120b.htm

2.http://www.icpsr.umich.edu/NACJD/crimestat.htm

3. Course literature study book.

4.http://lidecc.cs.uns.edu.ar/~nbb/ccm/downloads/Literatura/OVERVIEW%20AND%20DEFINITION%20OF%20GIS.pdf

5. https://www.usgs.gov/products/data-and-tools/gis-data

6. https://gisgeography.com/best-free-gis-data-sources-raster-vector/

7. https://www.isprs.org/caravan/documents/Lao_GIS.pdf