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Geographic Information Systems.

Assignment No 1

Q.1) Define GIS. Explain the different components of GIS?

Ans. A geographic Information system is a computer system that is used for capturing, storing, querying analyzing and displaying geospatial data or geographical data.

Components of GIS:

1. Hardware :
Satellite (capture image) , give the location of particular place , Dron are also use .
2. Software : Arc GIS, QGIS, spatial data , software analysis data.
3. People : People are use hardware & software .
4. Data : People give data.
5. Organization : Company bring all the 4 component together and perform operation.

Q.2 Explain GIS systems, GIS science and GIS application in detail?

Ans. GIS system:

GIS requires both hardware and software, and people such as the database creators or administrators and the users of the product. Thus, together it makes a GIS system.

GIScience:

Geo-Information Science is the scientific field that attempts to integrate different disciplines studying the method and techniques of handling spatial information. (GIScience is a study of all methods and techniques used to understand and process data)

GIS Application:

1) GIS in Advertising:

GIS provides more in-depth analysis, assessment, and understanding marketing by exactly targeting the audiences who are need of the product or object. we find them (audiences) with the help of GIS.

2) GIS in Government Needs:

GIS gives organization an integrated platform for creation, maintenance,

and dissemination of land records data. GIS provides a common platform for data sharing, which enhances workflow, decision making & coordination across the state.

3) GIS in Mapping and Technology:

GIS software produce maps and other graphic displays with the help of this technology people get to know their exact location. Mapping is a central function of geographic information systems which provide a visual interpretation of data.

4) GIS in Environment Management:

EIA Environmental Impact Analysis is an important policy initiative to conserve natural resources and environment. Many human activities produce potential adverse environmental effects which include construction and operation of highway, rail, roads, airports, radioactive waste disposal and other effect of by nature flood, landslide, oil spills, wastewater management etc.

5) GIS in Insurance:

With the help of GIS find the location which has disaster occur and sell policy to that area. GIS can keep track of where the customers are located, site business

- target marketing campaigns and optimize sales territories and model retail spending patterns.

Q2. GIS in Medical:

- GIS enable the visualization and monitoring of infectious diseases. Additionally, these systems record and display the health care needs of the community as well as the available resources and materials.

Q3. Define GIS. Explain the types of geospatial data?

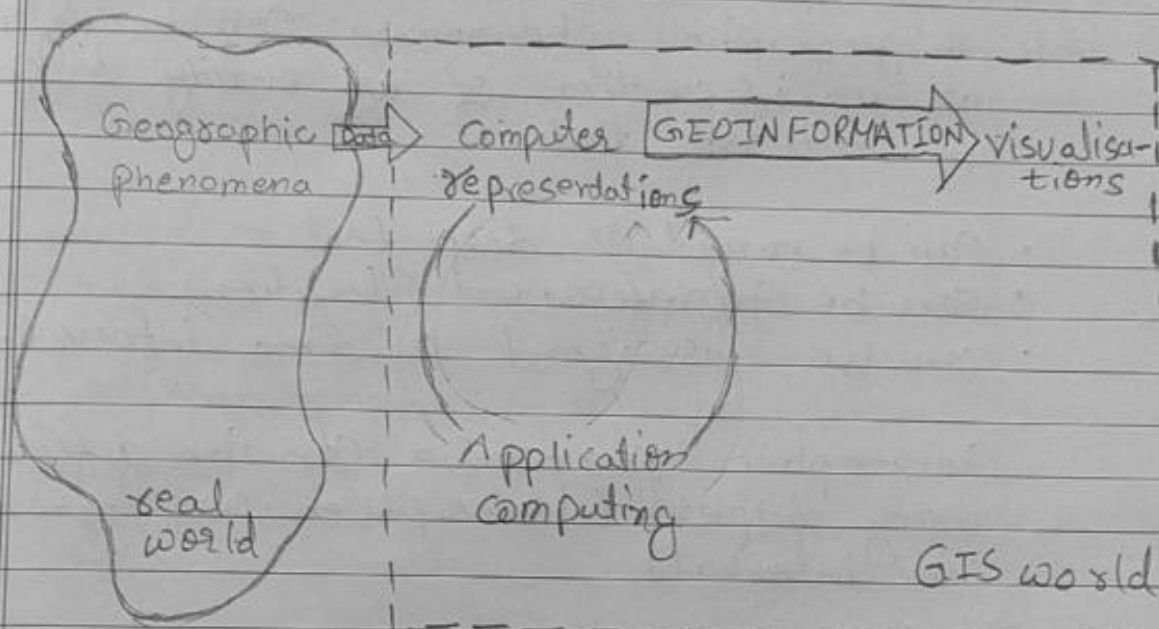
Ans. A Geographic Information System is a computer system that is used for capturing, storing, querying, analyzing and displaying geospatial data or geographical data.

Geospatial Data:

- 1) It is divided into spatial Data and attribute Data.
- 2) Spatial Data stores the location and it is further divided into Discrete and Continuous.
- 3) Discrete data may only be recorded as certain value while Continuous data may be any value within a certain range.
- 4) Attribute data stores the location.

Q.4 With the help of a diagram, explain the process of converting the real-world data to GIS data?

Ans.



→ From real world we accept data there are different method to collect data using satellite, manual survey - now data going to the computer then computer fire query once analysis is done then visualisation occur in the form of graph, ^{map}, table and we will put in the GIS world.

Q.5 Define geographic phenomena. List and explain the types of Geographic Phenomena in detail?

Ans. A geographic phenomena can be defined as manifestation of an entity or process of interest that:

- Can be named or described
- Can be georeferenced (location)
- Can be assigned a time interval.

Geographic phenomena can be defined using triplet: (description, georeferenced, time interval).

→ Types of Geographic Phenomena.

→ Geographic Fields

- 1) It is a geographic phenomena for which every point in the study area, a value can be determined.
- 2) It can be considered as a mathematical function "f" that associates a specific value with a particular position in study area.
- 3) Types:
 - Continuous Field
 - Discrete Field

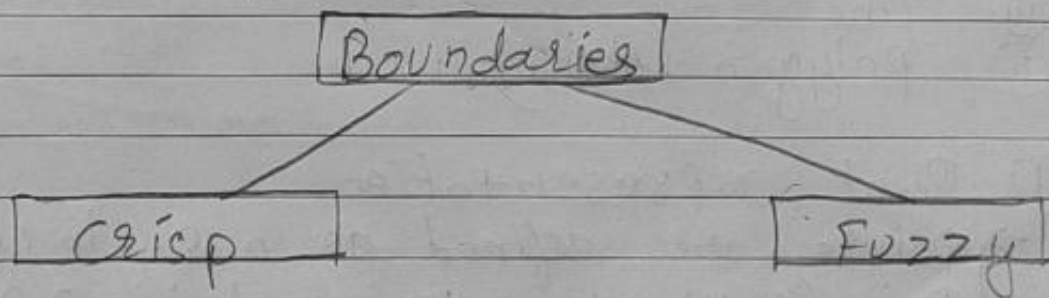
→ Geographic Objects

- 1) When a geographic phenomena is not present everywhere in the study area but it is sparsely distributed, we call it as Geographic Objects.
- 2) An object can be defined using 4 parameters:

- Location
- Shape
- Size
- Orientation

Q.6 Define boundaries. List and explain its types in detail?

Ans. Boundary is used to separate or define a particular shape or size of an object or field.



→ Crisp Boundaries: A crisp boundary is one that can be determined with almost arbitrary precision, dependent only on data acquisition technique applied. eg: Boundary in between malad and kandawali is perfectly distinguishable and fixed.

→ Fuzzy boundary: In this, boundary is not a crisp or a precise line, but it is rather an area of transition itself.

eg: cyclone can move in the map the boundaries are not fixed it is Fuzzy boundary.

Q.7 Explain the three parameters of vector Representation?

Ans: In vector representation, an attempt is made to store explicitly the georeferences of the phenomena.

2) A georeference is a coordinate pair from geographical space, and is also known as "vector".

3) Three parameters of vector representation:

(i) point

(ii) line

(iii) polygon (Area)

(i) Point representation

→ points are defined as a single coordinate pair (x, y) when we work in 2D, and (x, y, z) when we work in 3D.

→ points are used to describe only the LOCATION of a place along with its characteristics, generally considered as ZERO dimensional.

2) Line representation

→ Line data are used to represent ONE dimensional objects such as roads, railways, etc.

→ Lines are used to describe the LOCATION of a place along with SIZE (Length)

3) Polygon (Area) representation

→ Polygon data are used to represent TWO dimensional objects such as grounds, parks etc.

→ Polygons are used to describe the LOCATION of a place along with SIZE (Area) and SHAPE.

Q.8 Define topology. Explain the different topological relationships?

Ans. → Topology deals with spatial properties that do not change under certain transformations.

→ For example, features drawn on a sheet of rubber can be made to change in shape and size by stretching and pulling the sheet.

→ However, some properties of it does not change:

Area are still bounded by same boundary

→ Topological relationship.

- 1) They are built from simple elements into more complex elements:
points define line segments, and line segments connected to define lines, which in turn define polygons.
- 2) The space is a three-dimensional "Euclidean Space" where for every point we define its three-dimensional coordinates as a triple (x, y, z) of real numbers.
- 3) The space is a "Metric Space", which means that we can always compute the distance between two points.
- 4) The space is a "Topological Space", which means, for every point in the space, we can find neighbourhood for it.

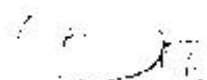
but not contain the different spatial relationship

2. Disjoint



Location which is the boundary is not same is called disjoint.
eg. Matad do Nto valley.

3. Touches



Area A touches area B if and only if they touch each other with single wall.

eg. Our home and neighbour house.

4. is equal to

Area A equal to area B if and only if whenever these area's are equal.

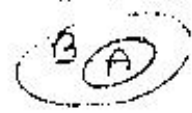
eg. Plate in building.

5. is inside




One area inside another area like parking lot is inside building.

6. contains



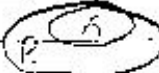
Area A contains Area B if and only if complete area of B is inside A and their boundaries are not touching.

(4) Covered by: 

Area B is covered by area A


if and only if complete area of B is inside A and their boundaries are touching each other.

Q.10

(7) Covers: 

Area A is covered by B if and only if complete area of B is inside A and their boundaries are touching each other.

eg: Resort covers Suningpol.

(8) Overlaps: 

Area A overlaps area B if and only if some part of area A is intersecting with B.

eg: Matad Shope extra area covers.

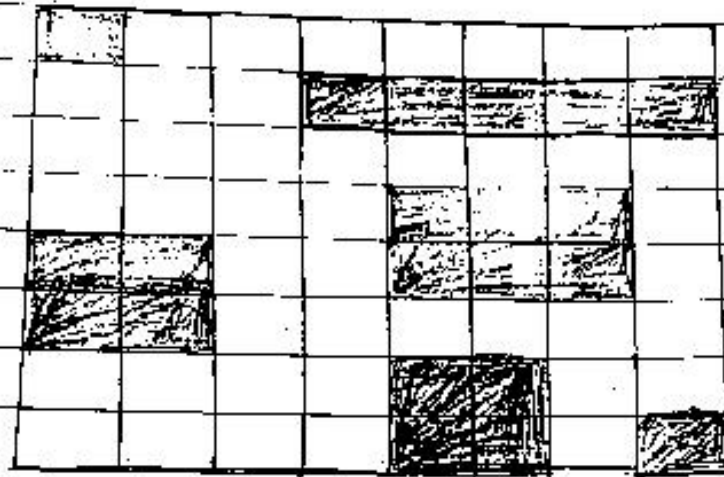
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Q.1 Find run-length encoding, cell by cell encoding and quad tree for the following Raster :



Ans.1 Run-Length Encoding :

Row	1	1
Row	2	4 8
Row	3	
Row	4	5 7
Row	5	1 2, 5 7
Row	6	1 2
Row	7	5 6
Row	8	5 6, 8

2) Cell-by-cell Encoding:

Row	1	1	0	0	0	0	0	0	0
Row	2	0	0	0	1	1	1	1	1
Row	3	0	0	0	0	0	0	0	0
Row	4	0	0	0	0	1	1	1	0
Row	5	1	1	0	0	1	1	1	0
Row	6	1	1	0	0	0	0	0	0
Row	7	0	0	0	0	1	1	0	0
Row	8	0	0	0	0	1	1	0	1

③ Quad Tree:

③ Squad Tree:

