GEOGRAPHICAL INFORMATION SYSTEM
CONCEPT & PRINCIPLES
(lec-1)

Dr. Supriya

Assistant Professor (Guest)

Department of Geography

Patna University, Patna

©Dr. Supriya_bhuvankosh

Contents

➢**What is GIS?**
➢**Standard Definitions**

➢**Concept of GIS**
➢**Conceptual Model of GIS**

➢**Data Vs. Information**
➢**Data in GIS**

➢**What Next?**
➢**Must Read**

Learning Objectives

1. Enables to understand GIS & Its Concept
2. Familiarized with the important definition of GIS
3. Develop skill of modeling of Real world in GIS

Learning Outcomes

1. Understand the concept of GIS
2. Illustrate major attributes of GIS
3. Apply the GIS concept in modeling of real world

©Dr. Supriya_bhuvankosh

WHAT IS GIS?

❑ **GIS is a System of computer software, hardware and data and personnel to help manipulate, analyze and present information that is related to a spatial location –**

 o **Spatial/ Geographical location– usually a geographic location**

 o **Information– visualization of analysis of data**

 o **System– linking software, hardware, data and set of process**

 o **personnel– a thinking explorer who is key to thepower of GIS**

A Geographical Information System (GIS) is a Computer assisted system for acquisition, storage, analysis and display of geographic data.

Standard Definitions

❑ A computer system designed to allow users to collect, mange, and analyze large volumes of spatially referenced and associated attribute data.

❑ A powerful set of tools for collecting, storing, retrieving at will, transforming and displaying spatial data from the real world. (Burrough;1986)

❑ Any manual or computer based set of procedures used to store and manipulate geographically referenced data. (Aronoff; 1989)

❑ A decision support system involving the integration of spatially referenced data in a problem solving environment. (Cowen; 1988)

Standard Definitions…..

❑ A geographic information system (GIS) lets us visualize, question, analyze, and interpret data to understand relationships, patterns, and trends.   (ESRI)

❑ In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information (that is data identified according to their locations).   (USGS)

In most simple way, GIS can be put as – "A Computer system for managing spatial data".

Concept of GIS

Survey and GIS Summit 2006

GIS

Spatial/ Location

Attributes/ Data

Computer Assisted System

- HARDWARE
- SOFTWARE
- INFORMATION SYSTEM
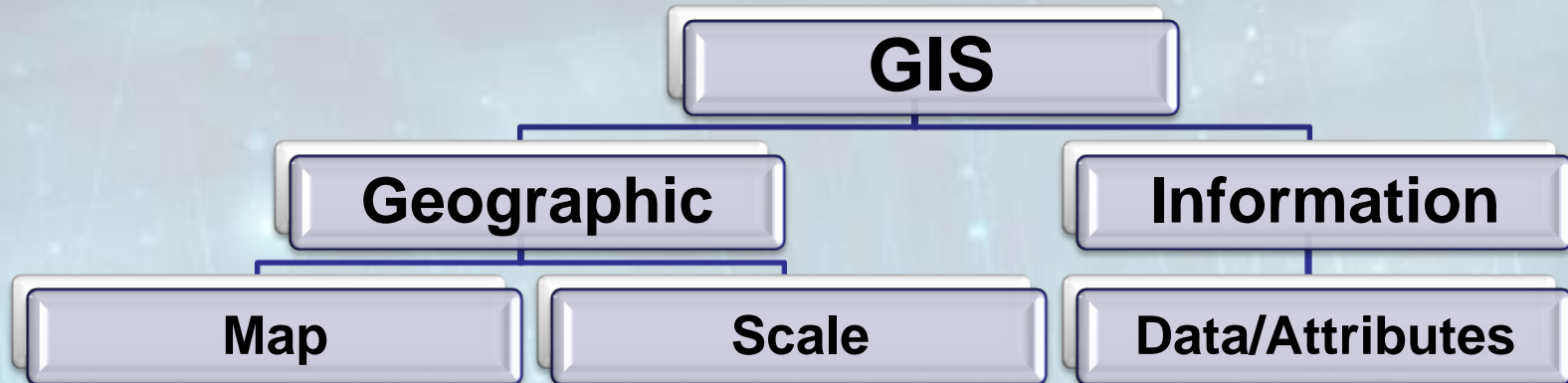
Geographic Data

- Spatial data
- Attribute data

Set of Process

- Acquisition
- Storage
- Analysis
- Display

Personnel

- Technicians
- Users

Concept of GIS……

```
                    ┌──────────────┐
                    │     GIS      │
                    └──────┬───────┘
          ┌────────────────┴────────────────┐
   ┌──────────────┐                   ┌──────────────┐
   │  Geographic  │                   │ Information  │
   └──────┬───────┘                   └──────┬───────┘
    ┌─────┴─────┐                            │
┌────────┐  ┌────────┐              ┌─────────────────┐
│  Map   │  │ Scale  │              │ Data/Attributes │
└────────┘  └────────┘              └─────────────────┘
```

The word "Geographic" implies- *Locations* of data items that can be calculated in terms of geographic coordinates (longitude, latitude)

"Information" implies- The *data* in GIS *organized* to yield useful knowledge often as colored maps, images, tables, graphics etc. to interactive queries.

"System" implies- GIS is made up from several *inter-related and linked components with different functions* such as data capture, input, manipulation, visualization, query, analysis, modeling and output.

©Dr. Supriya_bhuvankosh
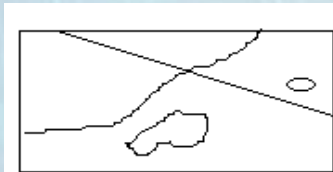
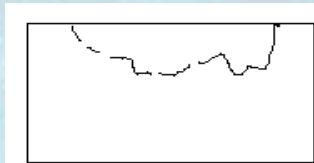# Conceptual Model of GIS

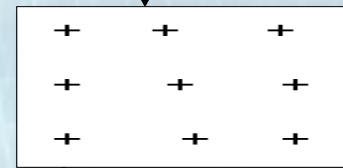Real World

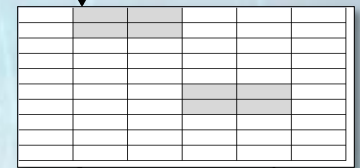Object- based Model

Field- based Model

USER VIEW LEVEL

Exact Object

Inexact Object

Irregular
Sampling Points

Regular
tessellation

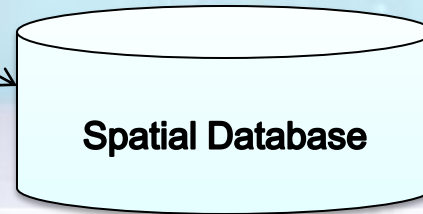Approximation

Object
Recognition

Interpolation /
Gridding

DATA MODEL LEVEL

Vector Model

Raster Model

Spatial Database

GIS: Modeling of real world

©Dr. Supriya_bhuvankosh

Data in GIS

It is the most important part of GIS. There are two distinct data types required in GIS – Spatial and Non-spatial

Spatial Data: *Correspond to discrete entities recognizable in the real world such as river, roads,, parks, cities, villages etc.*
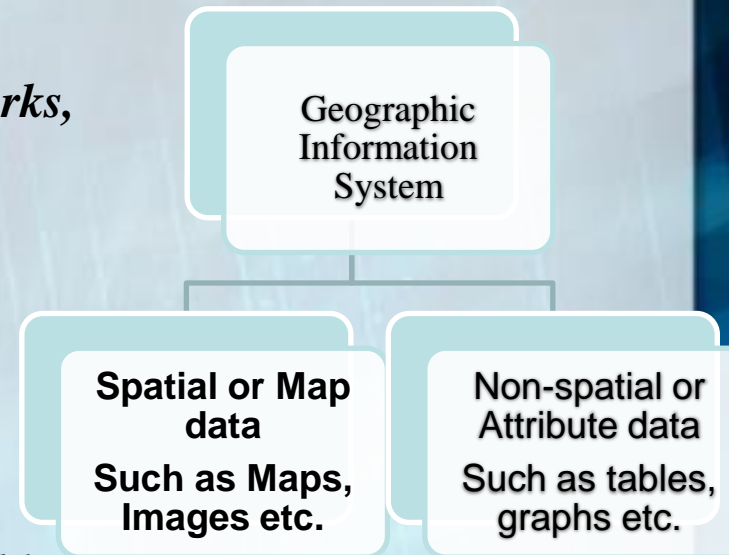
In other words, the entities of real world which can be mapped, drawn as drawings or even photographed. Geographic Data Types: Points; Lines; Areas – Polygons

Non - Spatial Data: *Correspond to the **attribute information associated** with discrete entities recognizable in the real world such as population of a city or town, no. of mountains, parks, urban area etc.*

In other words, these are characteristics of features that are not mappable, but are descriptive of the features (Name of owner, timber volume etc.). They can be stored as database.

Attribute data may come from different sources such as paper records, existing databases, spreadsheets, DBMS etc.

Geographic Information System

Spatial or Map data
Such as Maps, Images etc.

Non-spatial or Attribute data
Such as tables, graphs etc.

What Next?

✓**Uniqueness** of GIS against Other information Systems

✓**Data Vs. Information**

✓**Principles of GIS**

✓**Capturing Data**

✓**Storing Data**

✓**Representing features**

✓**Query & Analysis**

✓**Representation**

✓**Output**

✓**Map scale**

✓**Component of GIS**

MUST READ

- Albert , C.P.Lo. & Yeung. K.W., (2007) Concept and techniques of Geographic information system ; PHI Learning PVT Ltd. New Delhi
- Burrough,P.A. and McDonnell, R.A., (1998) : Principles of Geographic Information Systems, Oxford University Press, Oxford. De Mers, Michael N., (1999) : Fundamentals of Geographic Information Systems, John Wiley & Sons, NewYork.
- Fraser Taylor, D. R. (1991): Geographical Information System, London.
- DevidattChauniyal, Sudoor Samvedanevam Bhaugolik Soochna Pranali.
- Heywood, I. et al. (2004) : An Introduction to Geographic Information Systems, Pearson Education.
- Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., (2001), Geographic Information Systems and Science, Wiley, Chichester.
- Siddiqui, An Introduction to Geographical Information System.

Contact me:
Mob/ WA: 9006640841
Emai:supriyavatsa52256@gmail.com
Webpage: http://bhuvankosh.com

©Dr. Supriya_bhuvankosh