

# Introduction to Geographic Information System

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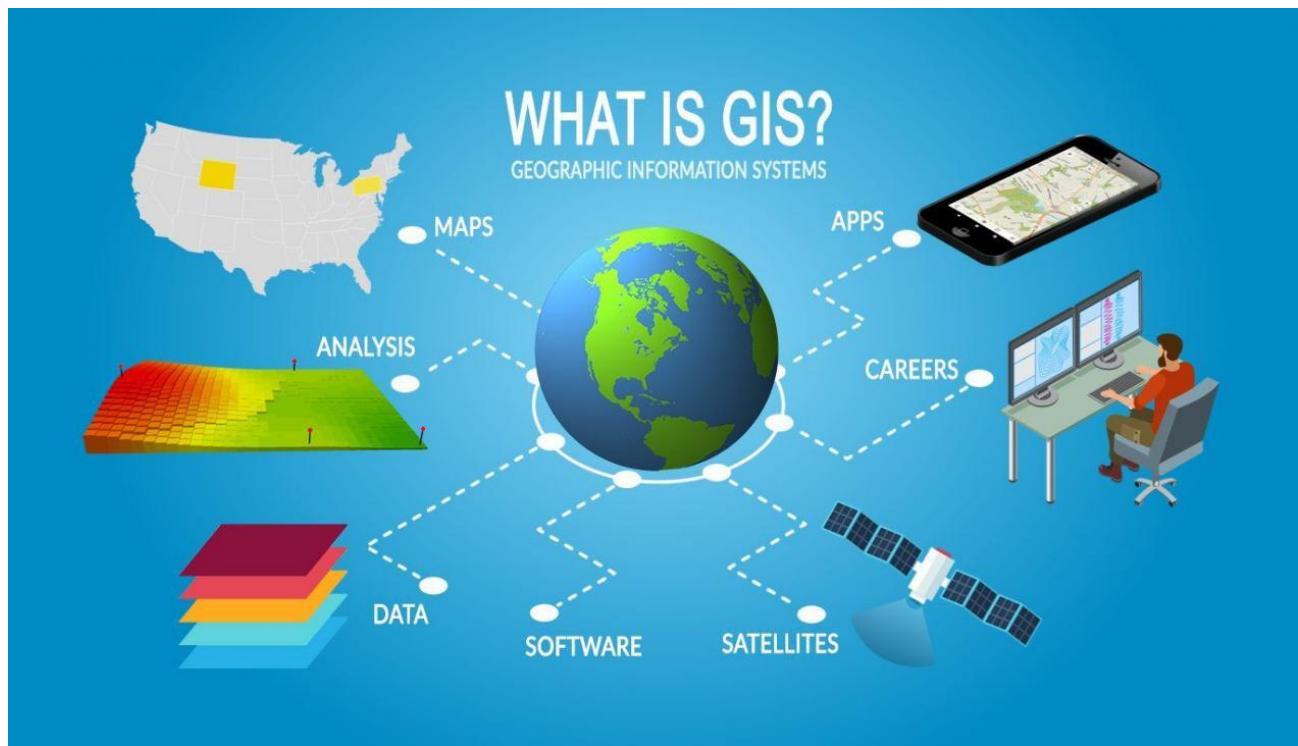
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Introduction to Geographic Information System

## What is GIS?

- A spatial system that creates, manages, analyzes, and maps all types of data.

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## History of GIS:

In 1854, **John Snow**, an epidemiologist and physician, was able to determine the source of a cholera outbreak in **London** through the use of spatial analysis. Snow achieved this through plotting the residence of each casualty on a map of the area, as well as the nearby water sources. Once these points were marked, he was able to identify the water source within the cluster that was responsible for the outbreak. This was one of the earliest successful uses of a geographic methodology in pinpointing the source of an outbreak in epidemiology.



## GIS data sources:

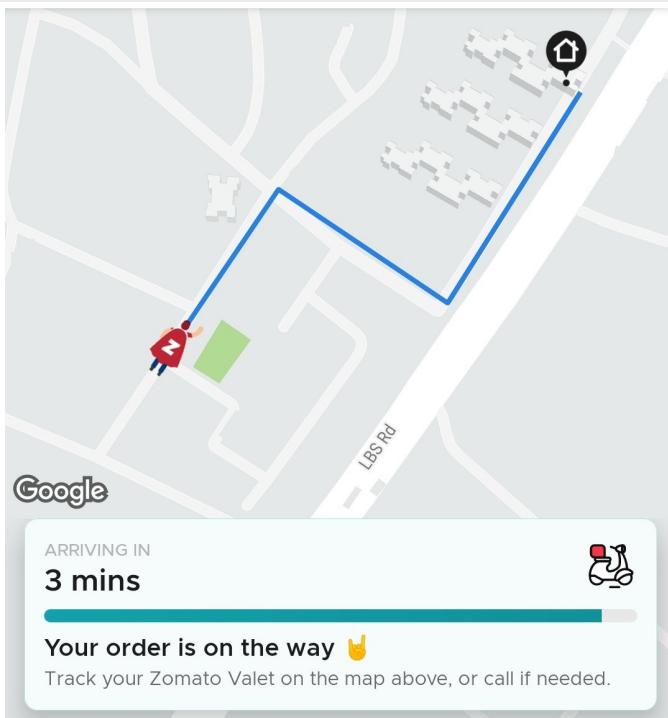
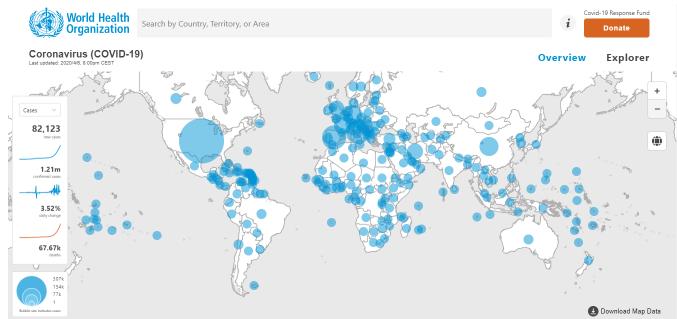
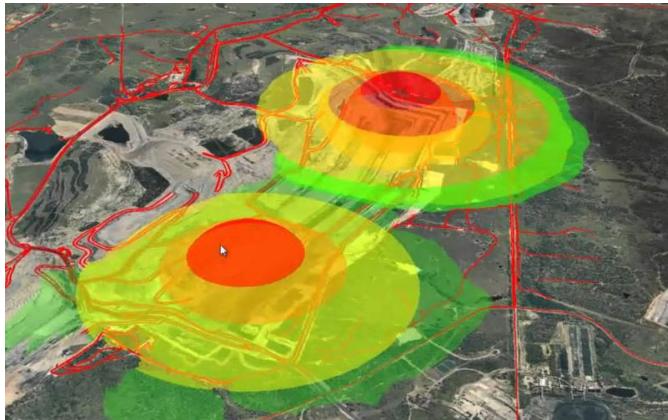
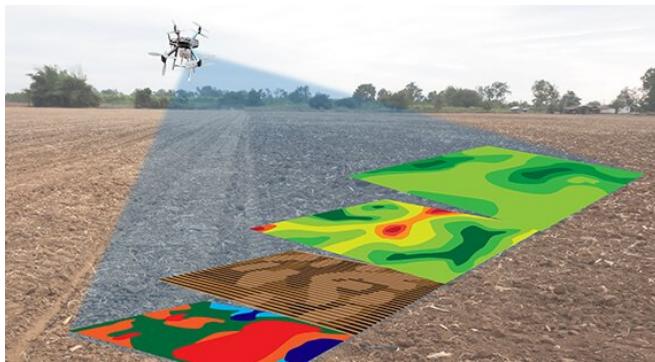
Data capture and compilation is very time consuming and costly. Up to 80% of cost of GIS goes in GIS data capture and compilation

- Primary Data: Data specifically for use in GIS.
  - Remote Sensing (satellite image, LiDAR, multi beam survey), GPS, digital aerial photographs.

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- o DEMS(Digital Elevation Model ), scanned paper maps.

## Applications:



## Concept of Spatial data

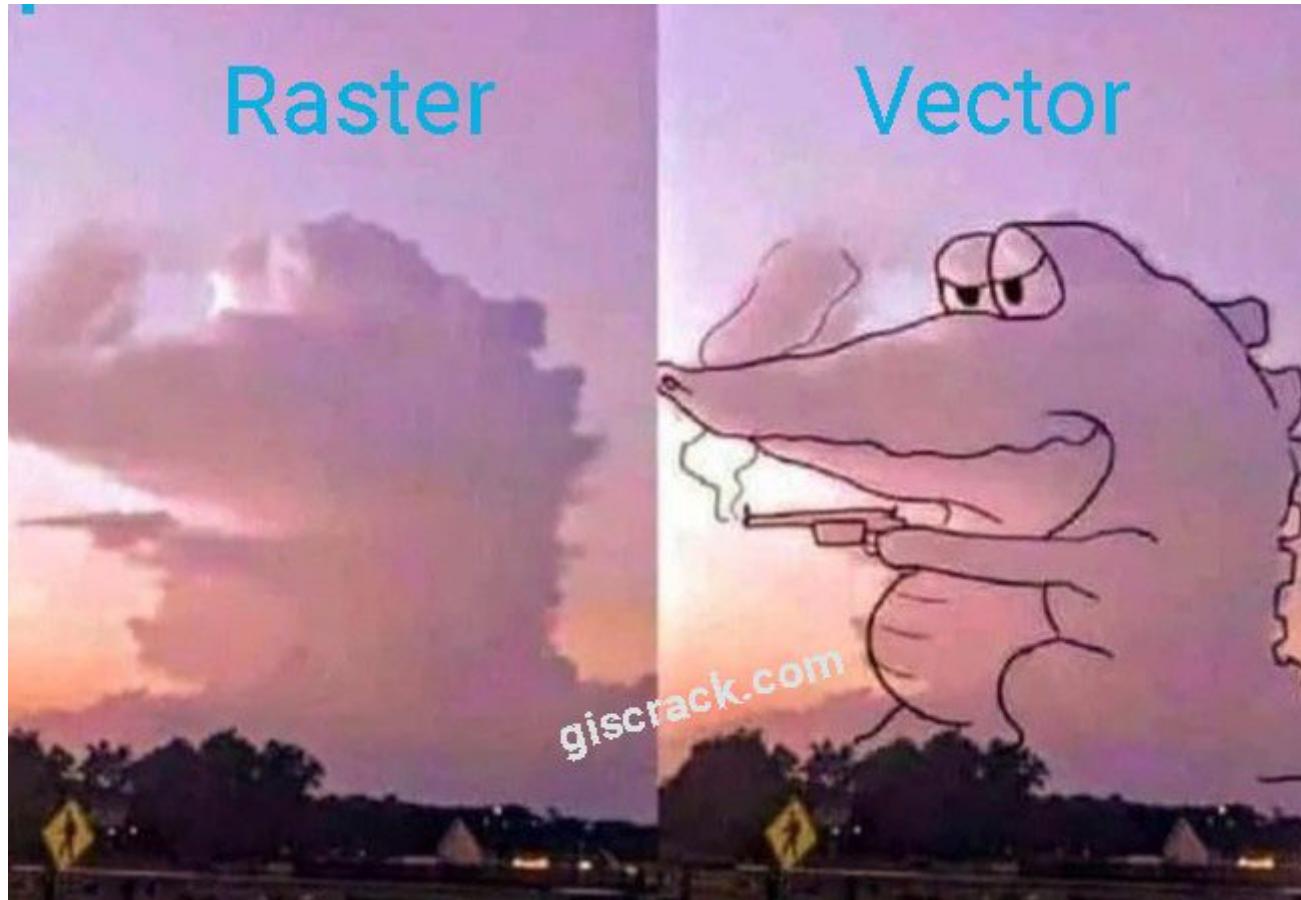
Spatial data is any type of data that directly or indirectly references a specific geographical area or location.

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Data model: a set of guide lines for the representation of the logical organization of the data.

GIS data model:

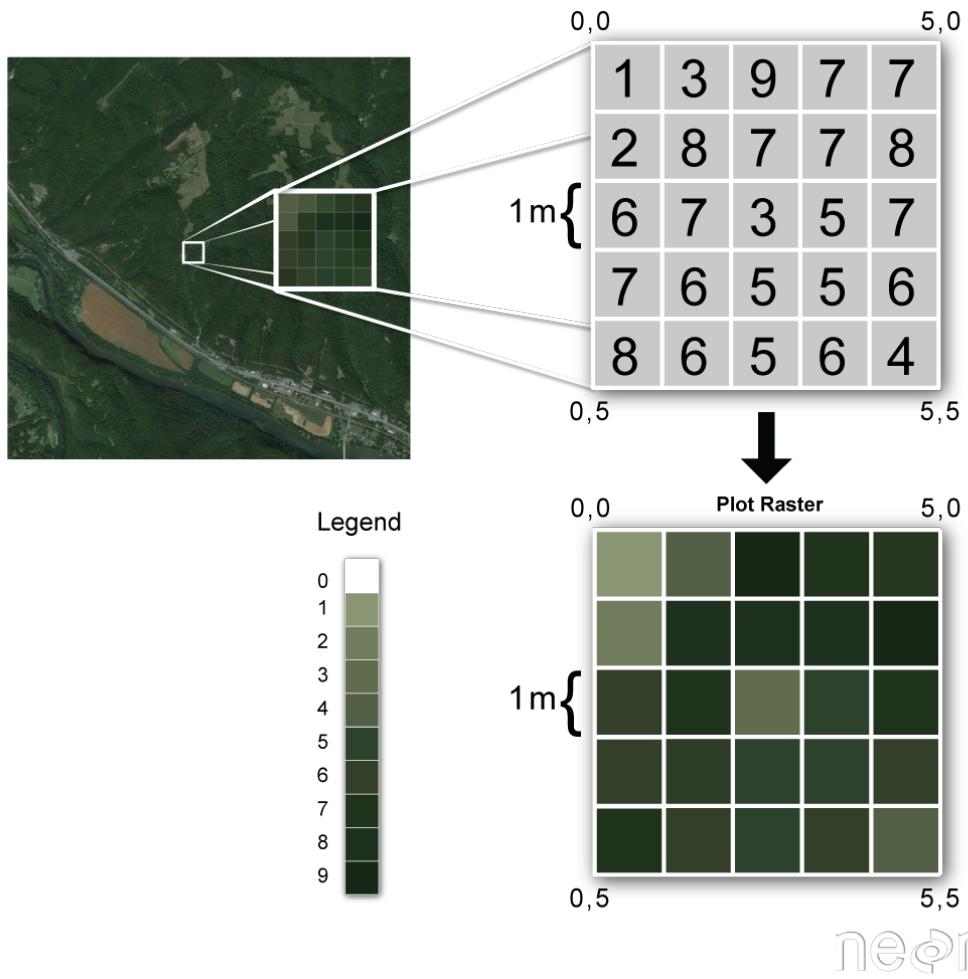
- Raster
- Vector



Raster data model:

- Present information through a grid of cells
- Displays one value in each cell
- Digital imagery from UAVs, satellite, LiDAR and radar imaging

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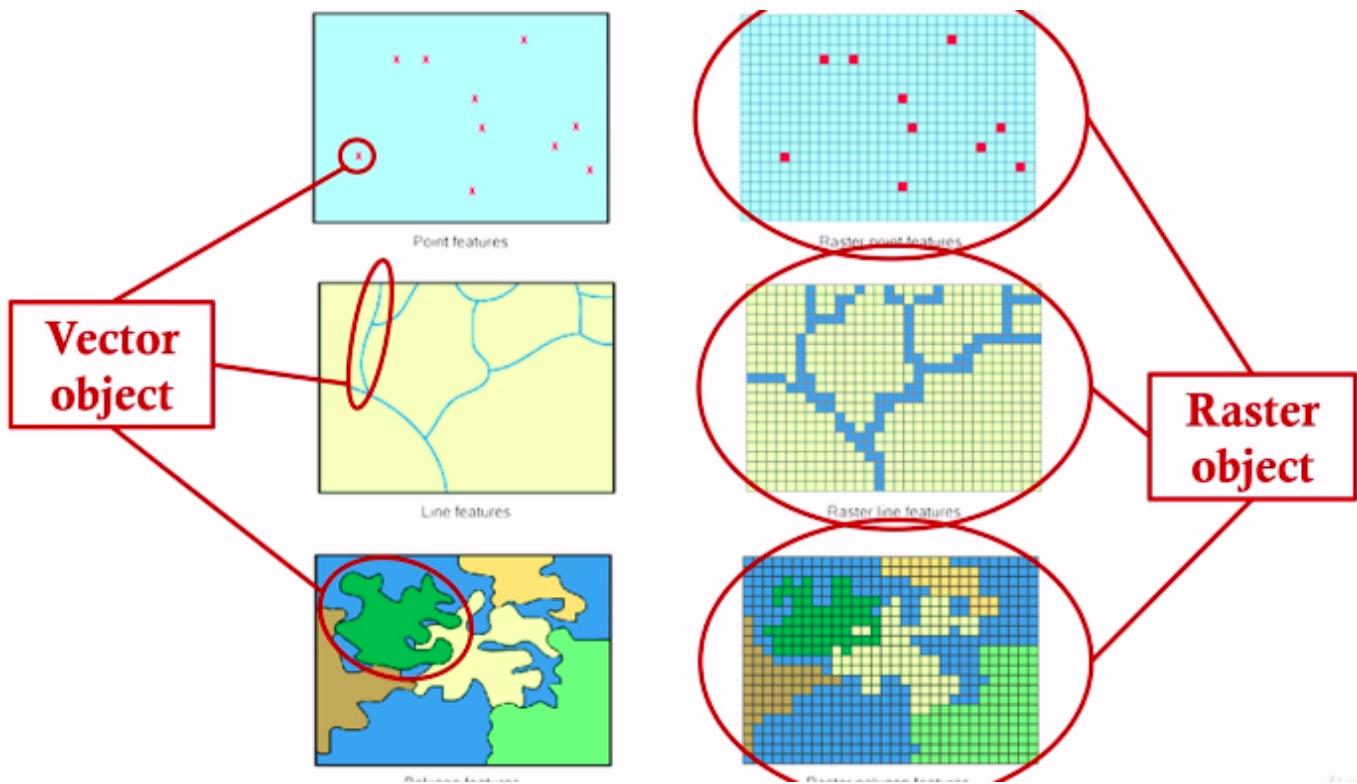


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## Vector data model

- Used to represent points, lines, and areas.
- All are represented using coordinates.
- **Points:** defined by simple x,y coordinates
- **Lines:** consists of various points
- **Polygons:** Straight lines between points, connecting back to the start

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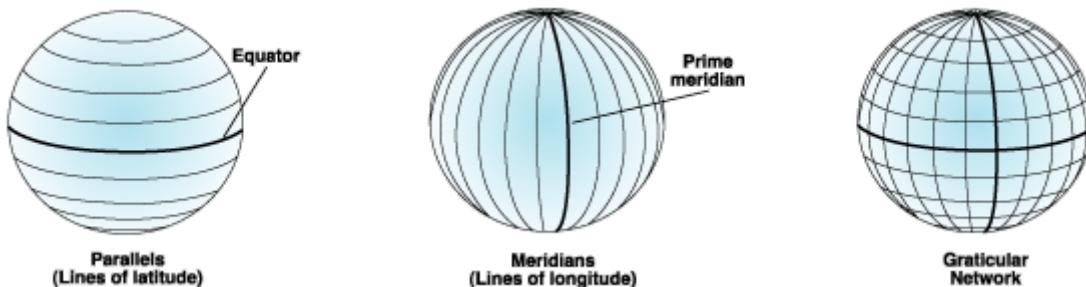


## Geographic Coordinate System

What is the shape of the Earth?

Locational system:

Latitude and longitude.



- Parallels are equally spaced between the equator and the poles
- Any two parallels are always the same distance apart
- Meridians are spaced farthest apart at the equator and converge to a single point at the poles
- Parallels and meridians cross one another at right angles

## Map Projection system:

- Conic (Albers Equal Area, Lambert Conformal Conic) - good for East-West land areas

[Skip to main content](#) Inverse Mercator) - good for North-South land areas

- Azimuthal (Lambert Azimuthal Equal Area) - good for global views

## Georeferencing:

GeoReferencing is the method of assigning the real-world coordinates to each pixel of the raster.



### “ Geo tagging and Geo referencing:

- When you take a photo and enable your GPS, it stores the physical location where the photo was taken. **Geo tagging** is the process of **assigning coordinates to photos**. It stores a single latitude and longitude in the image file. (You can observe the latitude and longitude data of an image clicked in the image properties taken from your smart phone when GPS is on.)
- Geo referenced image are the images that have latitude and longitude for every pixel. Satellite images provided by space agencies are georeferenced i.e. every pixel has a lat long value. You can also georeference any aerial image or map by geo referencing it. There are various file formats of satellite images. Geo-tiff is the most common file format. The **GeoTIFF** stand for **Geographic Tagged Image File Format**. Geographic TIFF is format extension for storing **Georeference** and **Geocoding\*** information in a TIFF format. It can store a broad range of georeferencing information, as well as projected coordinate systems.

## References:

[What is GIS? | Geographic Information System Mapping Technology](#)

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A geographic information system (GIS) is a system that creates, manages, analyzes & maps all types of data. GIS connects data to a map, integrating location data with all types of descriptive information.

Course on principles of GIS (GNR605), CSRE IIT Bombay



## What is Geographic Information Systems (GIS)? - GIS Geography

Viewing and analyzing data on maps impacts our understanding of data. Geographic Information Systems (GIS) helps us know what belongs where.

Est. reading time: 11 minutes

### ⌚ Task 1B: Geo referencing aerial image using QGIS

CLOSED ON SEP 24

UNLISTED ON SEP 24