GIS Data Modeling

- What is a data model?
- GIS data models
 - CAD (Computer Aided Design)
 - Raster data model
 - Vector data model

What is a data model?

- The heart of any GIS is the data model.
- A data model is a set of constructions for describing and representing selected aspects of the real world in a computer.
- model that is best for all cases

The role of a data model in GIS



Levels of data model abstraction

- **Reality**: real world phenomena
- Conceptual model: human-oriented model of selected objects
- Logical model: implementation-oriented representation of reality, often expressed in the form of diagrams and lists
- **Physical model**: portrays the actual application in a GIS, often include tables stored as files or databases.

GIS data models

- CAD (Computer Aided Design)
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The CAD data model

 A CAD model focuses on feature drawing only so that it does not represent any kind of relationships between objects.



graphical and image GIS data models





Raster data model

- Raster data model uses an array of cells, or pixels, to represent real-world objects.
- Difference between raster and image data models:
- 1. Image data do not have attribute table attached
- 2. Raster data have attribute table

Vector data model

- Simple features
- Topological features
- Network data model
- TIN data model

Vector representations



	point	line	area
Scale	city wells	highway political boundary streams	agriculture land urban land city highway airport

Topological features

- Topological features are simple features
- structured using topological rules.
- Topology is the science and mathematics of relationships. In GIS, topology is used to validate the geometry of vector datasets.

Network data model



TIN (Triangulated Irregular Network)data model



Vector Data Structure



Geographical data are spatial data

- Spatial data = Objects with some form of spatial structure
- They have positions in X, Y, (Z) Longitude,
- Latitude, (Elevation)
- (Roads, buildings, plants, lakes)









But, data can also be: Non-spatial

Attribute Data:

Data that describe the properties of the object *For example*: Building owner; Population of a city.

