GIS and Spatial Data

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Image source: www.conservation.bm

What GIS systems being used for…

- City, county, state, tribal, planning
- Wildlife biology, natural resources
- Public health
- Data visualization
- Business planning
- Agriculture, etc.

GIS definition

Software

Hardware

Data

GIS

People

Method

GIS can be use in

- Transportation
- Management and planning
- Emergency services
- Human safety
- Environment
- Urban planning

- Natural disasters
- Education
- Government
- Medical
- Industry and businesses
- Defense

Types of data

- 1. <u>Spatial data</u>:
  - Place of feature
  - Co-ordinate based
  - Vector data – discrete features:
    - Points
    - Lines
    - Polygons (zones or areas)
  - Raster data:
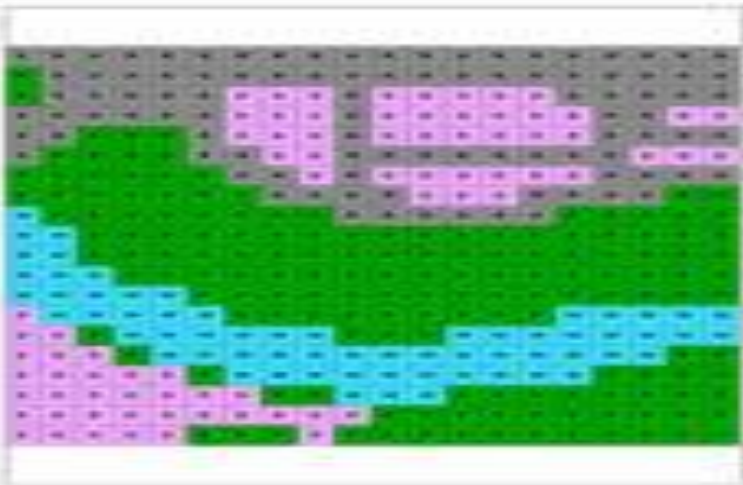   - A continuous surface like real world
- 2. <u>Attribute data</u>:
  - What feature is
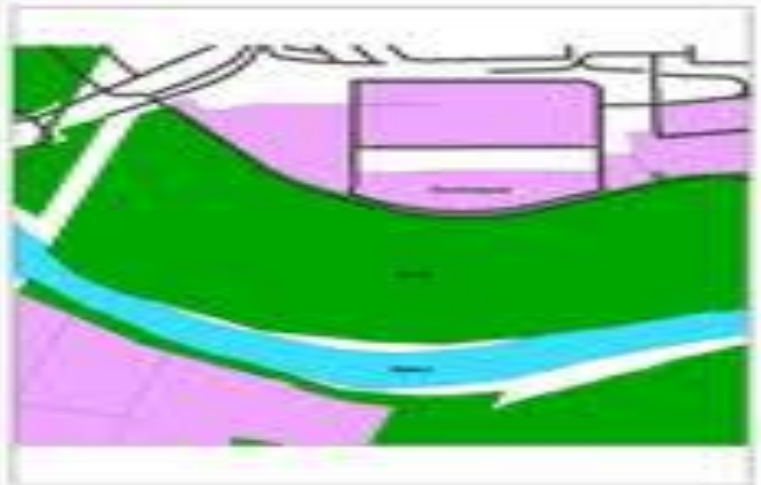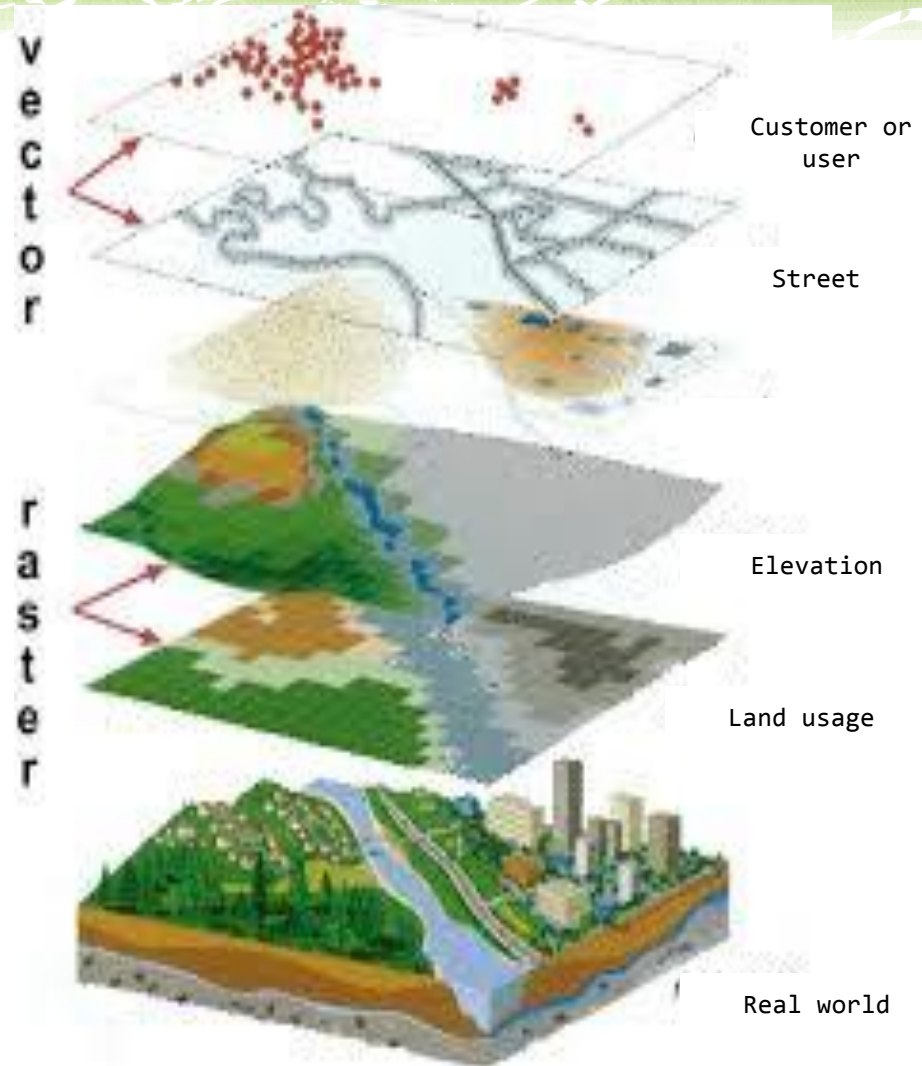   - Maps, statistics, text, images, sound, etc. (POEC5319 Introduction to GIS).

REAL WORLD

RASTER

VECTOR

Spatial data types

The most common spatial data are : points, lines, polygons, raster data, vector data and attribute values.

Image source:*rmbl.info/gis/gisbackground.html*

Vector data

□ **Vector** data provide an understanding way to show real world **features** in the GIS environment.

□ Every thing that you can see in the real world could be shown in vector data.


Image source:www.building.co.uk

Point data

□ A point is a 0 dimensional object and has only the property of location (x,y)

□ Points can be used to model features such as accidents, public facilities , building, etc.

Lines

- A line is a one-dimensional object that has the property of length
- Lines can be used to represent road, streams, faults, dikes, maker beds, boundary, contacts etc.
- Lines are also called an edge, link, chain, arc, 1-cell
- In an ArcInfo coverage an arc starts with a node, has zero or more vertices, and ends with a node

Polygons

- A polygon is a two-dimensional object with properties of area and perimeter.

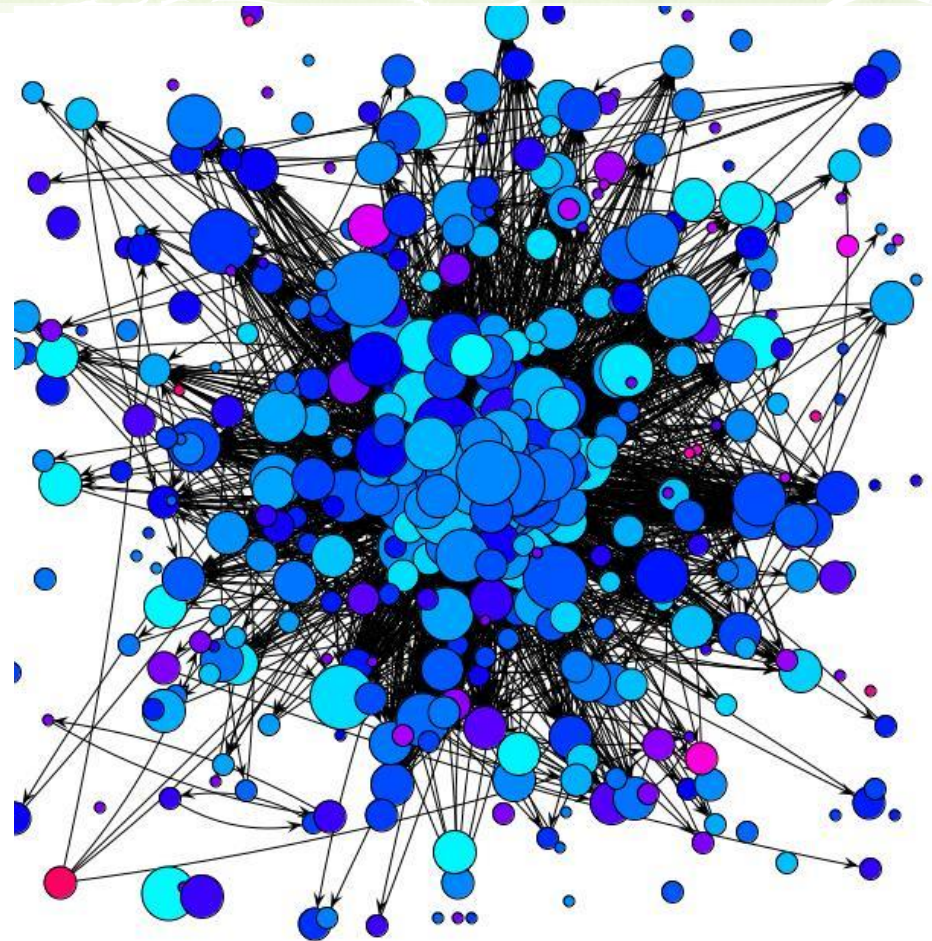- A polygon can represent a city, geologic formation, dike, lake, river, etc.
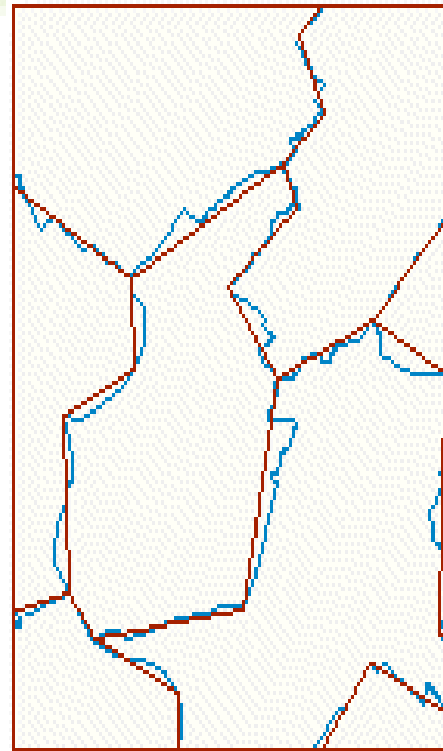
Point
Remove
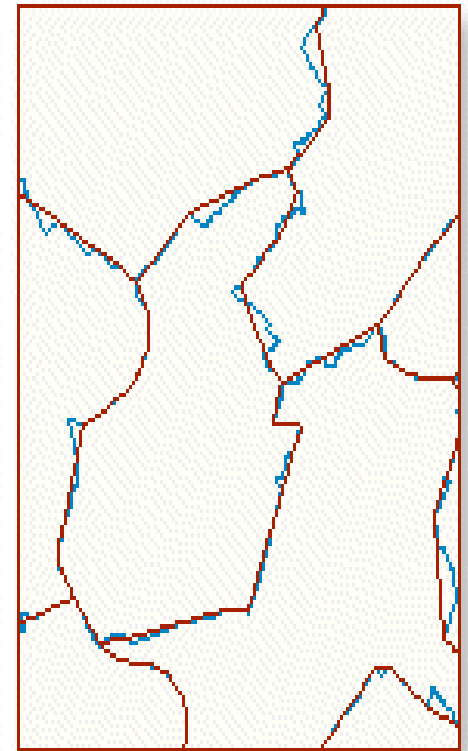
Bend
Simplify

Original

Simplified

Networks

- Networks data include road systems, power grids, water supply sewerage systems, drainage network and so on.

Attribute data types

Categorical :

nominal
- land use types, county names, street and high ways name

ordinal
- road class; stream class

Numerical

interval
- temperature
- rain

ratio
- income, age, rainfall

Primary data capture

- **Remote sensing**

- **Scanning**

- **Surveying**

- **Census data**

- **GPS collections**

- **LiDAR**

Secondary data capture

- Published or documents data (originally primary data)

- Different kind of maps and papers and photographs

- Vectorization(the process of converting Raster data into Vector data)

- Measurements

- Photogrammetry

- COGO(is a contraction of the term coordinate geometry, a methodology for capturing and representing geographical data)

What is GPS?

 The Global Positioning System (GPS) is a satellite-based navigation system that can be used to locate positions anywhere on earth and made up of a network of 24 satellites placed into orbit by the U.S. department of Defense.

 GPS is used in a variety of ways, such as:
    To determine position locations; for example, you need to radio a helicopter pilot the coordinates of your position location so the pilot can pick you up,
    To navigate from one location to another; for example, you need to travel from a lookout to the fire perimeter,
    To create digitized maps; for example, you are assigned to plot the fire perimeter and hot spots, and
    To determine distance between two points or how far you are from another location.

Source

- Ron Brigg, UTDallas. POEC5319, Introduction to GIS
- http://en.wikipedia.org/wiki/Global_Positioning_System
- Barbara Parmenter, Tufts University, GIS Data Structure