

Geographic Information Systems

As a scientific environment

Geographic Information Systems (GIS)

Geography – The study of where features are located on the Earth's surface.



Geographic coordinate systems

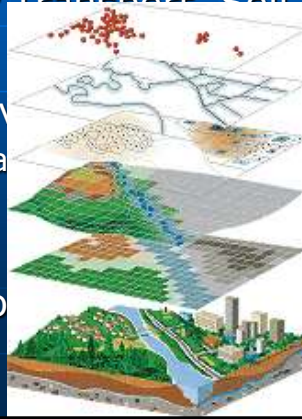
latitude
longitude

- Represent exact positions on the Earth
- 42.3216, -71.089118 (lat. long. for Boston)

Georeferencing / Geocoding – The process of assigning geographic coordinates to features to represent their location.

Spatial Phenomena

- Land Use – Urban, Rural, Building Types
- Flood Risk, Water Transport, Soil Type
- Topography – Elevation, Aspect
 - How does topog' affect landscape
- People – Travel to services, Emergency



Geographic Information Systems (GIS)

Geographic feature representation: *points, lines, polygons, rasters.*



Points – U.S. Cities



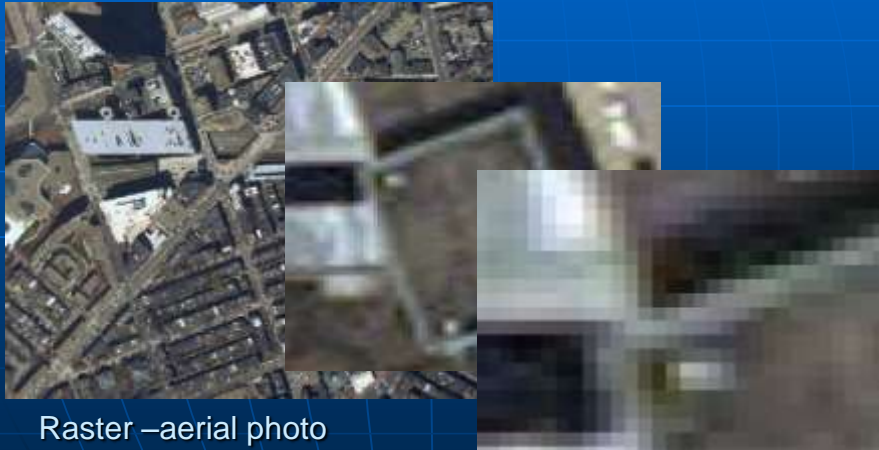
Lines – U.S. Interstates



Polygons – U.S. States

Geographic Information Systems (GIS)

Geographic feature representation: *points, lines, polygons, or RASTER/pixels* .



Data Types

- Vector – Discrete Entities *within* space
 - Points
 - Lines
 - Polygons

- Raster – Contin's Field/Surface *across* space
 - Elevation
 - T....

Geographic **Information** Systems (GIS)

Information about the geographic features – stored in tabular form

The image displays three screenshots of GIS attribute tables:

- Attributes of cities:** A table with columns: NAME, ST, POP2000, MED AGE, FEMALES, MALES. It lists various U.S. cities and their demographic data.
- Attributes of Streets:** A table with columns: HWY TYPE, NAME, SPEED MPH, ZIP 1, ZIP 2, STATE. It lists highway types, names, speeds, and zip codes for various states.
- Attributes of states:** A table with columns: STATE NAME, SUM1, POP2000, (POP98 - SUM1). It lists U.S. states and their population statistics.

Points – U.S. Cities

Geographic **Information** Systems (GIS)

The image shows an aerial photograph of Boston with an 'Identify' window overlaid. The window displays the following information:

- Identify from: **Boston Photo**
- Location: 233,945,953 896,862,412 Meters
- Field Value table:

Field	Value
Red	74
Green	69
Blue	99
- Identified 1 feature

Raster – Boston aerial photo

Attributes

- Vector – Multiple Attributes (Properties)
 - Attributes are of each feature (point, line, poly)

- Raster – Single Attribute (Value) e.g. H
 - Each cell has a different value of this attribute

Geographic Information **Systems** (GIS)

- Hardware
- Software
- Data
- Methodology
- People
- Management

A collection of computer hardware, software, and geographic data designed for **capturing**, **storing**, **updating**, **manipulating**, **analyzing**, and **displaying** all forms of geographically referenced information.

Three essential views of GIS



1. Smart, interactive, functional Map

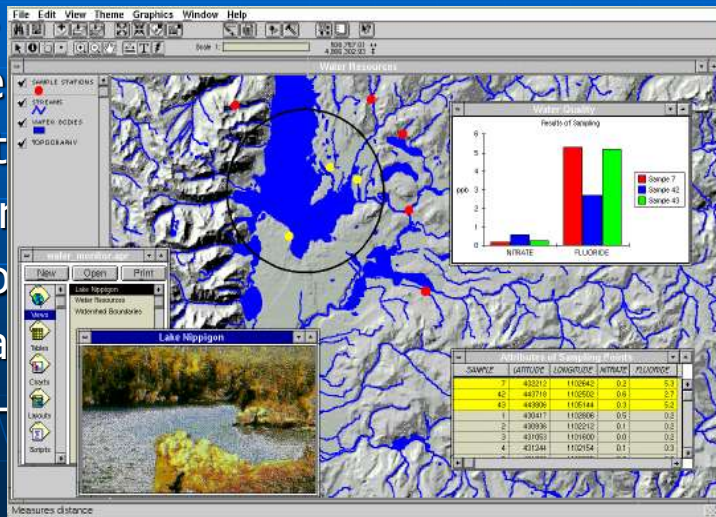
2. A set of tools and procedures
– A language to perform tasks



3. A well-managed system of information

Visualization: many different ways

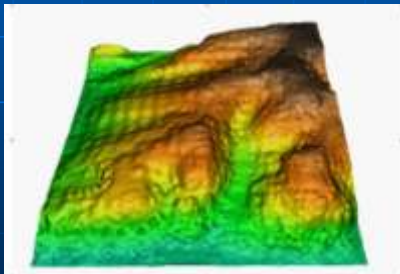
- Maps
- Tables
- Charts
- Reports
- Photos
- 3-D a
- Multi-

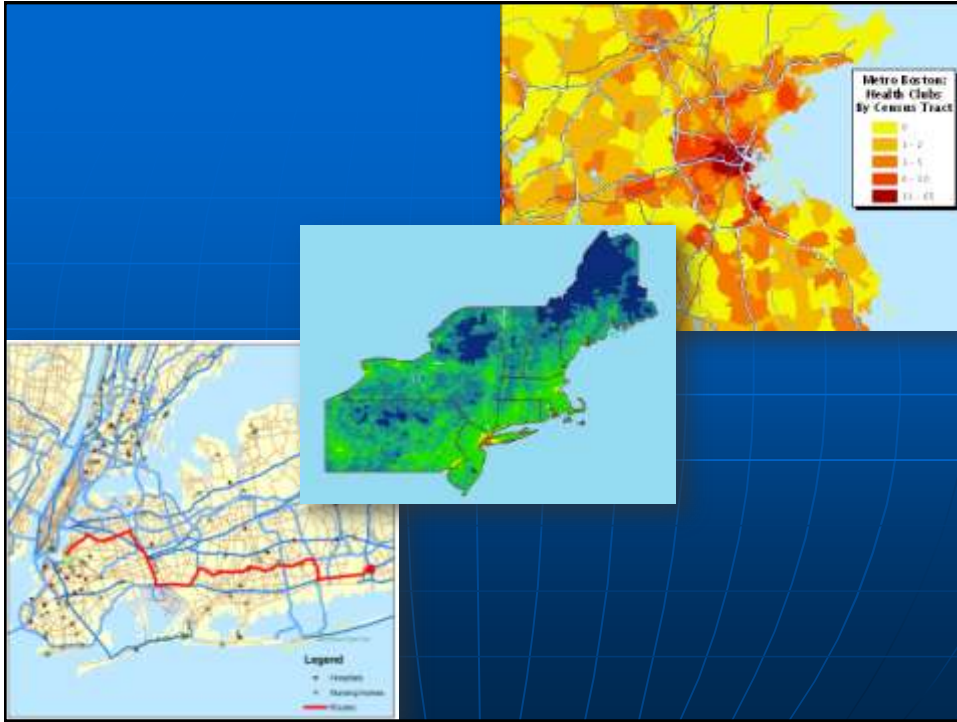


GIS – 3 / 4 Kinds of apps

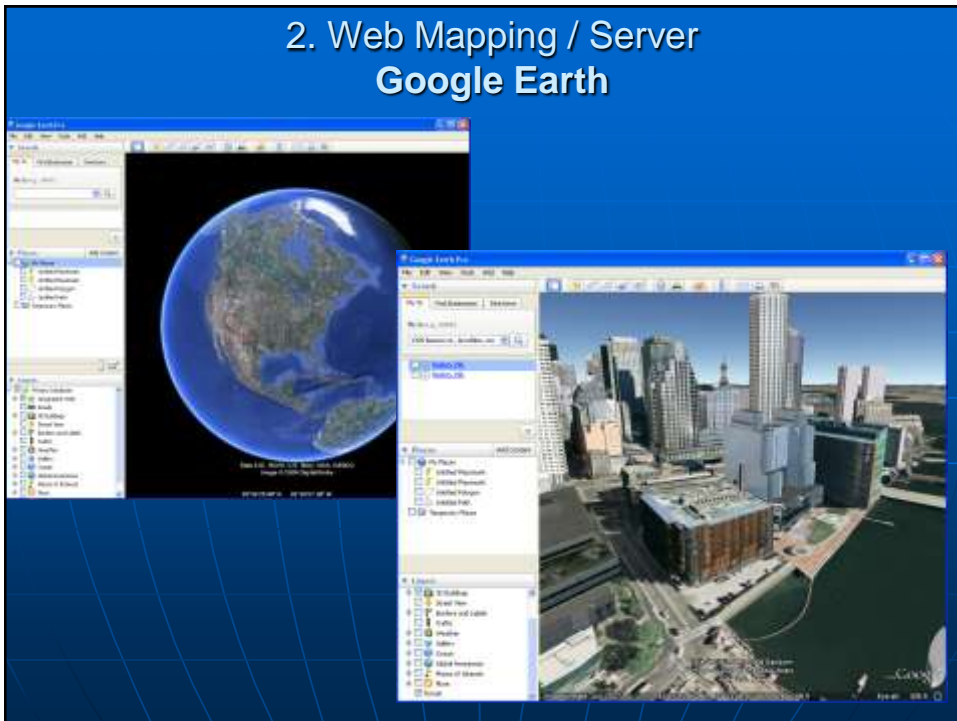
- Desktop Application / Full Package
- Web Mapping / Server
- Web Browser with GIS Tools
- Apps, Distributed GIS/ Open source

Desktop GIS

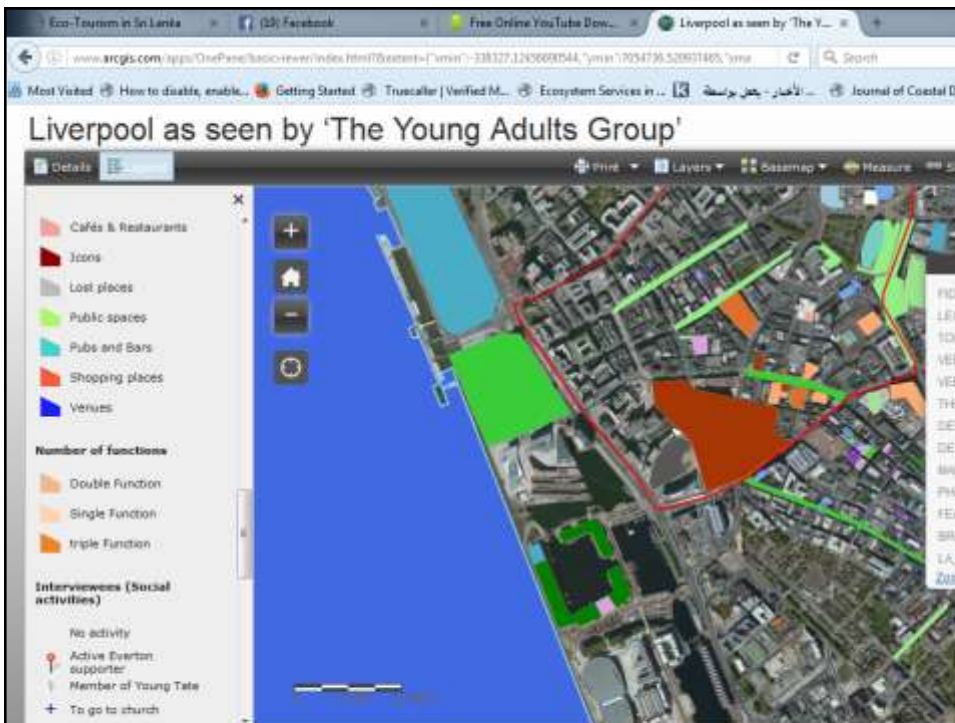




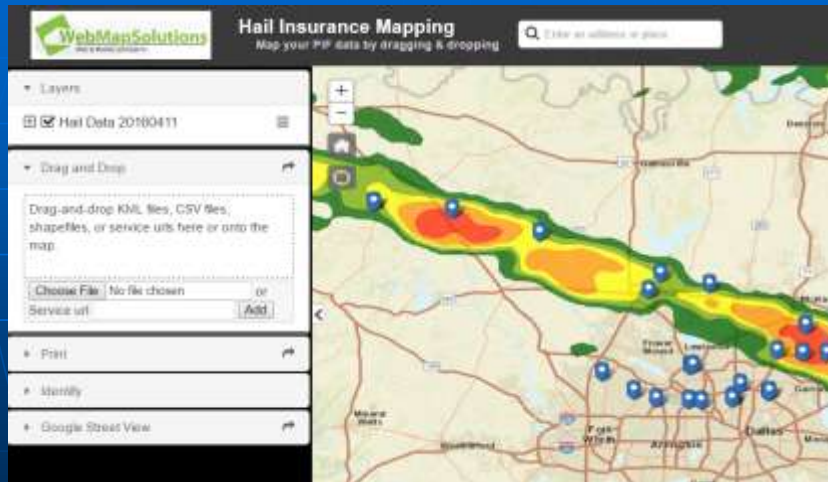
2. Web Mapping / Server Google Earth



3. Web Browser with GIS Tools



4. Apps, Distributed GIS/ Open source



Thank You

- <http://maps.google.com>
- <http://bit.ly/10AxS5T>
- <http://maps.yahoo.com>
- <http://earth.google.com>

Safaa Ghoneim

Website: http://scholar.cu.edu.eg/safaa_ghoneim