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11/19/06
EECS 487

Geographic Information Systems (GIS)

Geographic Information Systems or GIS, are a way to create maps using computer software. According to gis.com, GIS is, "a collection of computer hardware, software, and geographic data for capturing, managing, analyzing, and displaying all forms of geographically referenced information" (http://www.gis.com/whatisgis/index.cfm). You can use programs such as ArcGIS or ArcView to manipulate spatial data to generate a map or model of almost anything you would want.

There are three ways to view what you can do with GIS. One is the Database View. This is when people think of GIS as being a large geographic database; or a structured database in which you can view the world in geographic terms. The second view is the Map View. The Map View is when one thinks of GIS as being used for examining features on the earth's surface to analyze data. Some things created using GIS that can be thought of as examples of The Map view are interactive maps, 3D scenes, summary charts and tables, time-based views, and schematic views of network relationships. Interactive maps are probably how most people come into contact with GIS. They are used in maps on handheld mobile devices and many maps in web browsers. The last view is the Model View. The Model View is where one sees GIS as an instrument for creating new datasets from existing datasets; or derived datasets.

There are many practical uses for GIS. Some of these include scientific investigations, resource management, asset management, environmental impact planning, urban planning, cartography and route planning (www.wikipedia.org). One example of a real world use of GIS is when Bank of America used spatial data to "show the geographic distribution of the bank's network in relation to deposit potential in the New York City market area" (www.gis.com).

The red dots show were bank coverage is strong and no dots show where bank coverage is weak. This data allows Bank of America to determine where a new branch could be located to allow people more access to their bank.

Bank of America's use of GIS also illustrates how different types of data can be combined using GIS to produce a useful result. This is known as data modeling. A map of New York and a list of coverage areas of a bank can both be useful on their own. However, when you combine the two, you get a clear visual of how much coverage you have in New York County versus Hudson County. Additionally, another example of data modeling would be a climate contour map. A map of a wetlands and the recording of the amount of rainfall in that area may be difficult to relate to each other. However, when combined using GIS, you can create a climate contour map and have the ability to easily see which locations get the most rainfall. This map can then be combined with any additional spatial data in the area of the mapped wetlands.

For more information on what GIS is, there is a demo at http://www.esri.com/flashmedia/whatisgis.swf. It shows how you can combine different maps to create new ones, how spatial data is brought together to make maps and how objects in the real world (such as houses and roads) are mapped using GIS.
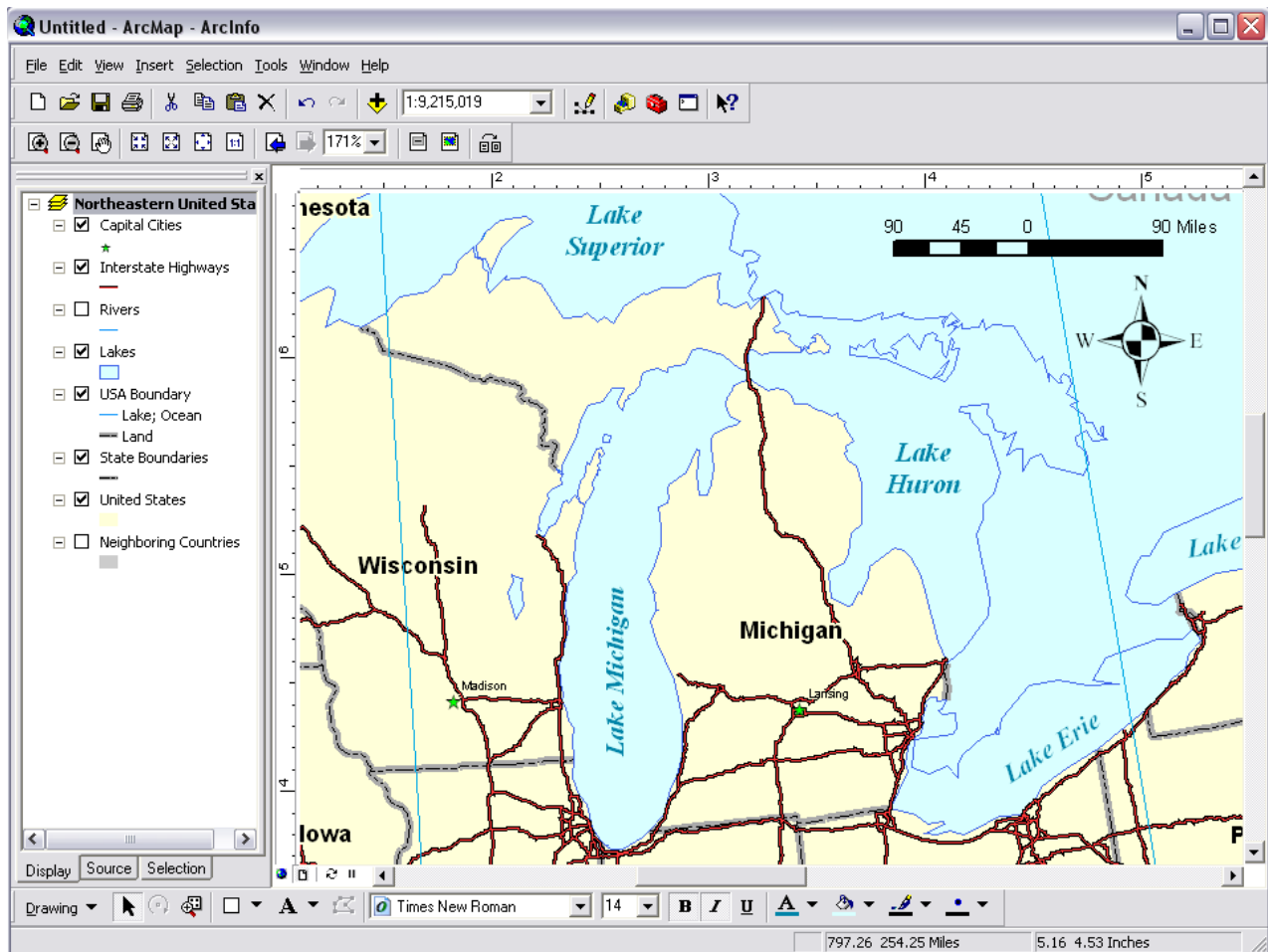
   The above is a map of the state of Michigan I made using ArcGIS. The left-hand side of the snapshot shows the different types of spatial data I imported into the program. The checked boxes indicate the data I wished to display in my map. Additionally, I added a scale and a compass rose to the top right corner of my map.

   GIS can be used for a variety of purposes. It can be used to model roads, populations, environmental disasters or even just for planning a trip. Overall, GIS plays an integral part in analyzing data and solving problems.

Sources:

- http://www.gis.com/
- http://en.wikipedia.org/wiki/Gis
- ArcMap Software on CAEN