What is Geographic Visualization?

Human beings have a remarkable capability to process and understand visual information. Visualization takes advantage of this capability by graphically representing data, and allowing scientists and decision makers to visually pick out patterns in those data. Geographic visualization (GVis) facilitates exploration, analysis, synthesis, and presentation of geospatial information. GVis is part of a broader rapidly developing field of research known as Geographic Information Science (GISci). GISci integrates research traditions including cartography, remote sensing, and geographic information systems.

Collaborative GeoVirtual Environments

Exploratory analysis of complex, multi-dimensional space-time data sets demands new and innovative tools. As an extension from the Apoala Project (see note below), individuals in the GeoVISTA Center and the Center for Academic Computing are working together to explore the potential of same-time-different place collaboration among scientists at remote locations as they explore complex spatiotemporal data.

Many potential scientific, educational, and decision-making applications for Geographic Visualization (GVis) involve small groups working together on a problem solution, but existing tools are designed for use by individuals. We developed a prototype GVis environment focused on same time–different place collaboration. Such environments have potential application to regional and local planning/decision-making, scientific research by distributed interdisciplinary teams, and web-based education. Our prototype, consisting of a series of linked desktops, is designed to facilitate collaboration among users who are exploring time series of climatic data for a large drainage basin. The exploration involves interaction with shared dynamic (animated and interactive) displays. The prototype is constructed from a set of Java/Java3D tools. These include VisAD, a DEM viewing module that works with VisAD, and our own extensions for data queries and networking. In relation to query, we focused on temporal query tools designed to help users explore both linear and cyclic components of the data. The prototype collaborative GVis environment allows multiple users to view and manipulate the changing climatic data simultaneously and thus to share knowledge as they identify drainage basin scale patterns and processes. Though the Java language operates across platforms and operating systems, dealing with different levels of hardware performance and Internet access speeds represent future challenges for implementing ideas explored here. The data used in the demonstration are extracted from a much larger climate data set for the Susquehanna River Basin of Pennsylvania, New York, and Maryland -- specifically daily maximum temperature, minimum temperature and precipitation extending from 1983-1993.

Collaborative GeoVirtual Environments to Facilitate Environmental Management: Prototype Internet 2 Applications

Building on a strong GISci base that involves several faculty with related research and teaching interests, the Department of Geography recently established the GeoVISTA (Geographic Visualization Science, Technology, and Applications) Center – devoted to fundamental and applied scientific research on the visualization of georeferenced information, development of geographic visualization (GVis) technologies, and the application of both in science, industry, decision-making, and education. http://www.geovista.psu.edu/

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1999 WebGIS Conference, October 28-29
The Penn Stater Conference Center Hotel, State College, PA