GeoSim: A GIS-Based Simulation Laboratory for Introductory Geography

Clifford A. Shaffer*, James M.A. Begole*, Laurence W. Carstensen Jr.**,
Robert W. Morrill** and Edward A. Fox*
Department of Computer Science* and Department of Geography**
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
email: geosim@cs.vt.edu

We demonstrate three modules currently under development for **Project GeoSim**, a multidisciplinary effort by members of Virginia Tech's Departments of Geography and Computer Science, College of Education, and Learning Resources Center to develop computer-aided education (CAE) software for introductory geography and related classes. **GeoSim** modules are designed to teach students the concepts of dynamic geographic processes through interactive exploration. The modules combine the information presentation and analysis capabilities of Geographic Information Systems (GIS) with interactive techniques of computer simulation. Through a multidisciplinary approach aimed solely at educational needs, we automate the use of GIS and simulation so a full understanding of spatial and statistical analysis techniques is not a prerequisite to learning from them.

GeoSim modules will become part of existing comprehensive courses without relying on instructors to modify their courses to "fit them in," or worse to buy expensive equipment on which to operate them. The modules fit closely into existing models of introductory geography as illustrated by current popular texts. The modules will run on IBM compatible 80x86 machines, Macintosh II computers, and UNIX systems running X-Windows.

All **GeoSim** modules share the same menu-driven interface. In general, the modules begin with a multimedia tutorial presenting the information to be learned, followed by a simulation to allow the student to actively use the information.

The three modules to be presented are as follows.

International Population allows students to investigate the effects of altered birth, death, and net migration rates on the population pyramids and total population levels for any country or region in the world. The simulation supports comparison of two countries simultaneously, and permits three different scenarios to be displayed at one time for each country.

Modeling of Migration in the United States relates county migration patterns in the U.S. between 1950-1990 with data on place characteristics. Students will be asked to select and weight push and pull factors to model migration patterns. They will learn about the scientific method by making hypotheses regarding effects on migration patterns and then immediately testing these hypotheses.

Mental Maps is a simple graphical quiz program that tests students' knowledge of the location and characteristics of cities by having the student point to a position on an outline map drawn on the computer screen and then answer a series of questions. After the student selects city placements, a "mental map" showing the student's perception of the geography of the country is generated and displayed.

GeoSim modules are available through anonymous FTP or gopher at "geosim.cs.vt.edu."