Developing a Geographic Information System (GIS) for Simulating City Bus Movements

Jermaine Hemby
Winston-Salem State University

Research Alliance in Math and Science
Computational Sciences and Engineering Division
Mentor: Budhendra Bhaduri
http://www.csm.ornl.gov/Internships/posters05/j_hemby_pa.pdf

Abstract

The Oak Ridge National Laboratory's (ORNL) Geographic Information Science and Technology (GIST) Group has been developing and refining a high-resolution population distribution model and database, called LandScan USA. It is in geographical information system raster and ASCII data formats. LandScan USA provides detailed demographic information to support geographic analysis anywhere in the United States. It is important to understand the effects of environmental exposure on school kids, as they commute from residences to schools. Another important aspect of modeling exposures to human population is to simulate their commuting behavior, by mode of transportation and time of day. ORNL has demonstrated the capability of the high resolution population distribution model to estimate both daytime and nighttime population distributions by time of day in a pilot study conducted prior to this one. It will implement the refined high-resolution population distribution model utilizing the commuting-based algorithms to estimate grid cell-specific daytime and nighttime population distributions for the selected metropolitan area.

Objective

- Create GIS of Philadelphia, Pennsylvania, school bus routes
- Understand what effect environmental exposure has on school children
- Apply GIS information to model that will simulate movement of each bus with exact times and stops

Approach

- Search Internet for Philadelphia, Pennsylvania, bus route schedules

- Use bus route schedules to create GIS of each bus route, using ArcView GIS

- Examine each GIS and gather information needed for model that will simulate bus movement with exact times and stops

- Consolidate information into one folder for ease in locating

- Apply information to C++, openGL, and cGal files to simulate bus movement

Software

- ArcView GIS – software used to create GIS
- Layers information on top of each other in any order needed by user
- Links location to information (e.g., people to addresses, buildings to parcels, or streets within a network)
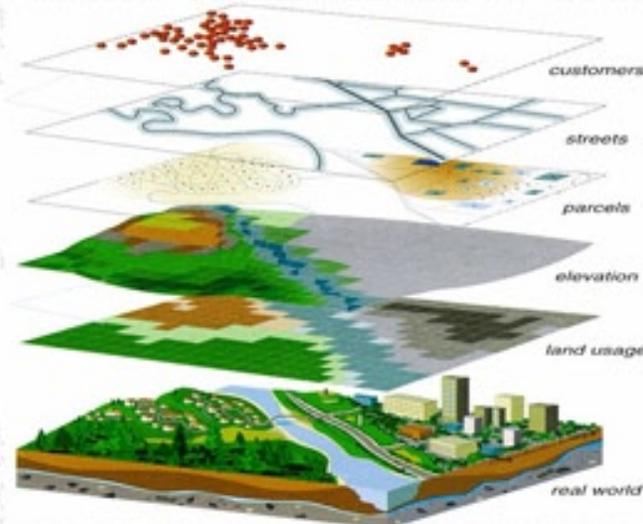
Purpose

Understand potential hazards in environment that school children are exposed to as they travel to and from school

Benefits

Enhanced space-time visualization for understanding different hazards school children are exposed to at different times of day

Expected Results

High-resolution population distribution model for U.S metropolitan areas that will simulate school bus routes behavior with exact times and distances

Complimentary Project

- Development of high-resolution daytime population estimates for U.S. ports

- http://www.csm.ornl.gov/Internships/posters05/j_brown_pa.pdf

Office of Science
U.S. DEPARTMENT OF ENERGY

UT-BATTELLE
OAK RIDGE NATIONAL LABORATORY
U.S. DEPARTMENT OF ENERGY