Simple Grid Mapping Software for Resource Management and Education

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Abstract

Time and budget constraints are often limiting factors in resource management projects, especially in third world countries. Therefore the development of cheaper and faster alternative computational tools should be promoted. "Gridmapper" is a geographical information system (GIS) capable of working with inexpensive hardware. It is easy to understand, offering a user- friendly interface in Windows. By using small quantities of information, this system can generate usefull maps and carry out basic statistical analyses. It has been tested successfully in environmental projects, in educational programs, and in the field for previewing and analyzing spatial data on portable computers.

Keywords

GIS; resource management; education

Introduction

Geographical information systems assist resource managers in describing, explaining and predicting spatial patterns and processes through the use of computers. They are capable of handling large data sets, building sophisticated and realistic computer models, and testing probing hypotheses in the computer rather than in the field (Maguire 1991).

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Nevertheless, a range of problems with GIS systems remain unsolved. Installing the majority of today's GIS is time-consuming. Like most other software, as their complexity has increased, so has the demand for more sophisticated hardware and peripheral devices (Perratore et al. 1993). Finally, the migration of data between different systems is precarious at present.

Time and budget are often limiting factors in resource management projects and in environmental education, especially in third world countries. Therefore, the development of cheaper and faster alternative tools is recommended.

Historically, Basic has been a widely-used program language, especially among beginning programmers (Stardrake 1991). Visual Basic has certain advantages because it allows interactions in Windows with other applications such as spreadsheets, image processors, word processors, data bases and statistical packages. One of the most common interactions is the sharing of information in a standard text file among other applications.

The objective of this study was to develop a shareware tool for the rapid interpretation of spatial data and, to offer a simple GIS programed in a transparent platform in Visual Basic for the users willing to add their own specific analyses to the program. In this paper I will present some examples of the possible uses of this tool with spatial data from the rain forest of Los Tuxtlas, Veracruz, Mexico.

Platform and Software

The minimum hardware platform necessary to run this program is a PC 386 with 3MB of RAM with Windows 3.0. The compiled version of the system as well as the Visual Basic program fit on a 1.44 MB floppy disk.

Gridmapper is a shareware program which was designed to work with inputs of spatial data stored in a standard text file (.txt), and to produce outputs as statistical summaries, maps, and other data presentations on the screen.

Data Representation

Raster displays are now the dominant hardware technology because they support several features that are essential to most modern graphic applications (Foley et al 1992).

Apart from the technical advantages of raster graphics, this kind of representation was adopted in the Gridmapper because conceptually a grid is

easy to understand, as traditionally grids were used to obtain information from paper maps and from the field.

Data Display and Analysis:

Today's sophisticated GIS are able to use raster and vector graphic representation and they can perform a wide range of data analyses. Although Gridmapper is a simple program, it is capable of performing the basic analyses that a typical GIS can perform. Some examples of its capabilities are described below:

1. Gridmapper can search for a value or a range of values in the data set and display it using a color palette and a set of symbols on a map. Figure 1 is a general view of the program interface. The central window shows the distribution of a rain forest in southern Mexico, near Los Tuxtlas Veracruz.

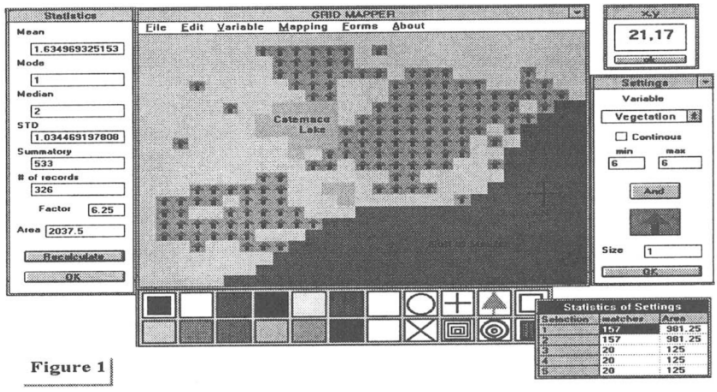

Figure 1

2.Gridmapper can calculate areas from the subsets of data selected by the user. Table 1 presents total areas, by vegetation type, in this area of rain forest.

Table 1. Total areas of vegetation in km^2.

Vegetation Type	Km²
Rain forest	981
Grass	937
Cloud forest	19
Oak Wood	81
Mangrove	19

Table 2. Areas with rain forest along different ranges of altitude

Altitude(masl)*	Km²
Over 1000.	200
500-999	481.25
0-499	300

* meters above sea level

3. Gridmapper can automatically display continuous variables.
4. Gridmapper can present a statistical summary (mean, mode, standard deviation, and summations) about each continuous variable (Figure 1).
5. Gridmapper can overlay maps on the screen.
6.Gridmapper is capable of searching for points in the grid that have coinciding attributes among the different layers (e.g. equivalent vegetation type, equal altitude and equal annual rainfall). (Table 2)

Applications

Gridmapper has been successfully used in educational programs at the undergraduate level. It introduces students to GIS techniques, using standard PCs without special devices.

Gridmapper has also been tested in a range of environmental projects where time constraints prohibited installation of a traditionalGIS. Gridmapper proved to be an efficient substitute.

Future Work

Several projects have been developed with this program. Results suggest that, with further improvements, it will be a useful and comprehensive tool for resource management, professionals and in environmental education programs.

A home page on the Internet will be dedicated to present, explain and distribute Gridmapper in the near future.

Conclusions

Time and budget are often limiting factors in resource management projects, as well as in environmental education programs.The development of cheaper and faster alternative tools is especially desirable in third world countries..

Gridmapper is a GIS program that is capable of working with inexpensive hardware. It is easy to understand, has a friendly interface, and operates within a simple matrix of data. With small amounts of information, this system can generate useful maps and carry out basic statistical analyses.

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