

SEMINAR ON AUTOMATION IN CARTOGRAPHY: SOFTWARE

This seminar focused on the software which supports cartographic and related activities. It dealt with the dissemination and use of the software, as well as technical problems, and the cost and utility of specific geographic applications. The first session, held Monday afternoon, was chaired by MICHAEL MCCULLAGH of the University of Nottingham (United Kingdom). The second session was held on Tuesday afternoon and chaired by JOHN DAVIS of the Kansas Geological Survey.

LARRY W. CARBAUGH represented the Bureau of the Census' Data User Services Division and spoke on the Bureau's data files for computerized cartography. Since 1970 the Bureau of the Census has developed and made available for purchase a variety of computer products including computer programs, geographic coordinate files and data summaries for geographic areas, designed for use in automated cartography. The dissemination of these products has, however, obligated the Bureau to provide some measure of support either in terms of software consultation or the distribution of correction and update material. This fact, combined with the differences in computer hardware and the increase in the number of data files, has added to the complexity of the dissemination problem.

GEOFFREY DUTTON reviewed the "Software of the Harvard Lab for Computer Graphics and Spatial Analysis." For the past ten years the Laboratory has been involved in the design, development and dissemination of software for use in automated cartography. Programs which it distributes include GRID, CALFORM and POLYVRT. Programs currently under development include INPOM, ASPEX, CELLMAP, PRISMAP and GEOGRAF. The paper reviewed the current software development activities of the Laboratory and its attitude towards the design and dissemination of software for use in automated cartography.

Representing the Kansas Geological Survey, ROBERT J. SAMPSON discussed "The SURFACE II Graphics System," which is designed to manipulate single valued surfaces. It is both a research tool and a production device. Examples of both applications were presented.

ROBERT MERCREADY of George Washington University and the Department of Defense discussed the "Software of a Department of Defense Fully Integrated Computer Mapping System." This computer mapping system was developed by Harvard University's Lab for Computer Graphics and Spatial Analysis, and was designed primarily for non-computer personnel. It combines into a single package four independent computer mapping programs: SYMAP, GRID, CALFORM and SYMVU; a statistical program, SPSS; and a world-wide geographic base file derived from World Data Bank I. It has been applied successfully to high priority Department of Defense projects, and its success clearly underscores the value of computer graphic manipulation and presentation of complex, interrelated variables.

"Neighborhood Computations for Large Sets of Data Points" is the title of a paper by KURT BRASSEL of the Department of Geography, State University of New York at Buffalo. In it he explained an algorithm for the generation of a geographic base file for information pertinent to point locations (data points). Given the locations of the data points, the algorithm generates area delineations which are based on a Thiessen polygon approach. The Thiessen polygons are then used to build up a data structure describing the neighborhood relationships of the set of data points. In this algorithm the Thiessen neighbors are searched for among points in a certain neighborhood of the centroid only. This search, therefore, is essentially local and allows for efficient processing of large sets of data points.

NICHOLAS CHRISMAN, in the second presentation of the Harvard Laboratory for Computer Graphics and Spatial Analysis, described the GEOGRAF program, scheduled for release in 1977. He stated that the attitude towards space inherent in an automated system should be a more fundamental consideration than technical constraints. A topological approach to spatial representation offers a more complete and sensitive tool than that available through grid systems. Two main weaknesses of the existing topological systems must be overcome to fulfill the potentialities: 1) An automated system to combine two networks into a single intersection network must be designed to compete in cost with the simplicity of grid overlay; and 2) a means of storage must be designed which can respond easily to the varied requirements of cartography and spatial analysis. The GEOGRAF

project at the Laboratory for Computer Graphics is an attempt to provide a solution to these problems. This paper reviewed the design decisions and presented a tentative schedule for certain targets.

KRISTER SELANDER of the Nordic Institute for Studies in Urban and Regional Planning discussed some developments in computer graphics for urban and regional planning in Sweden. His paper is reproduced in the section entitled "Seminar on Automation in Cartography: International Developments" on pp. 542-549.

ARTHUR NOMA of the Defense Mapping Agency's Topographic Center presented an overview of that agency's integrated semi-automated cartographic system for producing topographic maps.

Computer programs for drawing isoline or contour maps from scattered data points can be categorized into three general groups: triangulation procedures, global fit procedures, and local fit methods. Computer algorithms for contouring spatial data differ in subtle ways that affect the appearance of the maps which they produce. If a contouring system is very flexible, many errors may be avoided by selecting the best combination of parameters and methods for a particular map and a specific objective. This requires, however, an evaluation of the performance of different mapping techniques under different conditions. JOHN C. DAVIS of the Kansas Geological Survey presented the results of an empirical analysis of contour maps of a subsurface horizon as an example of such a comparison.

One of the conclusions reached at the seminar was that there is a need for a standardization of programs developed as software packages. Moreover, decisions need to be made regarding the best approach to the dissemination of software, to standards of documentation and to the amount of hardware needed.