SEMINAR ON DATA STRUCTURES

This seminar was chaired by DAVID RHIND of the University of Nottingham (United Kingdom) and dealt with theoretical data structures supporting geographic and cartographic systems.

THOMAS PEUCKER of Simon Fraser University (Burnaby, British Columbia, Canada) presented "A Theory of the Cartographic Line." The line, composed of n segments, is partitioned into subsets until each subset has a band with a width less than a predetermined threshold. At each step the partitioning process is performed by selecting as starts and ends of the subsets those points which touch the sides of the bands. Applications of the theory are useful for locating line intersections, line matching (determining if two lines are actually the independently encoded representation of one line), and point-in-polygon search.

JAMES CORBETT, who delivered a plenary paper on "Topological Principles in Cartography," commented on the use of file data structures which describe the neighborhood of a point or a segment. Historically, the basis for such file structures is embedded in our legal system, a system which uses descriptions of visible objects and landmarks and distance measurements originating from these visible points.

LAWRENCE H. COX of the Census Bureau's Statistical Research Division discussed "Applications of Lattice Theory to Automated Coding and Decoding." The collection and dissemination of data from a set (e.g., a geographic region) may be viewed as the result of aggregation and analysis on a subset basis. These subsets define a partition of the original set and are generally encoded in a manner consistent with the partial ordering induced by set inclusion. It is not uncommon for this partition to be the intersection of several independent partitions, each representing a meaningful scheme of disaggregation of the data (e.g., the division of the United States into States and counties and into standard metropolitan statistical areas for the publication of economic statistics). Given the atomic sets in the induced partition and their associated codes, the lattice representation of the set-theoretic hierarchy generated by these subsets is constructed. This facilitates the comparison of the various

schemes of aggregation present and the computation of best possible upper and lower bounds for sets not directly constructable from this hierarchy. List processing techniques which reflect the setwise partial ordering are employed, resulting in a data structure well-suited to set-theoretic computations which is designed to tabulate and analyze data coded to the hierarchy. These structures are of particular value in the identification and protection of statistical data of a sensitive or confidential nature.

DEAN EDSON is with the U.S. Geological Survey's Topographic Division in Menlo Park, California. This division is in the process of examining and redefining the mapping program for which the organization is responsible in order to better serve the country's needs for basic cartographic data. It is anticipated that in addition to the need for a family of general-purpose maps, which USGS will continue to produce, there will be a growing requirement that such material be presented in digital form. It is intended that the National Mapping Program will provide cartographic information in graphic and digital form to the extent needed. His paper dealt with a cartographic data base which is specifically structured for this purpose.