

cartographic techniques

THE MAPPING SOFTWARE MARKET

In the February, 1989 issue of *Computer Graphics Review*, Lisa G. Thorell, a market analyst with Dataquest of San Jose, California, comments on trends in the mapping software market. In general, she notes that the mapping market has emerged as a growth leader in the CAD/CAM arena. "From 1987's \$495 million revenue base, the industry grew 28 percent to \$635 million. All the excitement is centered at the low-end, where PC mapping systems grew from \$35 million in 1987 to \$57 million, a walloping 65 percent growth rate. Vendor products, such as Environmental Systems Research Institute's PC/ArcInfo and Autodesk's AutoCAD, are pushing the front of this wave."

Thorell observes three complementary trends that account for the 1988 growth in mapping system sales. First is the availability of "good graphics performance and sufficient main memory on PCs to support the requirements of the classical and GIS mapping software products." Second is the increasing availability of "off-the-shelf" map databases. Third, she notes, is the growth of PC Local Area Networks, which allow PCs to connect "not only to main-frame-based mapping software, but also to corporate databases."

"Many exciting mapping developments" are predicted for 1989. Thorell points out that "Intergraph's much-awaited TIGRIS GIS, a full-scale object-oriented product, will debut. Fleet management products, such as ETAK's Navigator, will begin to attract the attention of commercial distributors and the transportation industry.

"Apple Computer, who coined the term 'desktop mapping,' will create a new low-tier market

segment—one closely associated with presentation graphics. Apple's ties to DEC places the Macintosh in a strong position to leverage the many mapping applications on DEC platforms, as well as within the VAX-based commercial database world. And, the GIS market should get a major boost from the impact of U.S. government GIS purchases to support the 1990 census." (*Computer Graphics Review*, February, 1989)

SOFTWARE REVIEW

Software reviews will normally be solicited by the editors, but unsolicited reviews are invited for consideration. If you are using a piece of software useful in working with map information, and are interested in contributing a review, please communicate this interest to the editors.

MapMaker Version 3.0.
reviewed by John B. Krygier,
University of Wisconsin-Madison

Select Micro Systems, Inc, 40 Triangle Center, Suite 211, Yorktown Heights, NY 10598. List Price: \$349.00 new, \$50.00 for upgrade. Choroplethic mapping program for the Apple Macintosh. Includes program disk and three 800k data disks containing boundary files (U.S. states, counties, and metropolitan centroids; world national boundaries and capital points) and data files (U.S. state income, population, retail sales, market statistics, county population and world population). Other boundary and data files available, \$50.00 - \$7500.00. Requires Apple Macintosh with at least 512k; drives Apple ImageWriter and LaserWriter printers; limited color capabilities. Pros: easy to learn and use, easy to import custom boundary and data files. Cons: limited graphic manipulation capabilities.

Select Micro Systems' Map-

Maker is one of the first commercial Macintosh software packages designed specifically for making maps. In this review I will not go into specifics on certain aspects of MapMaker which have been covered in previous MapMaker reviews (See Eugene Turner's evaluation of MapMaker in *The American Cartographer*, 15:1, 1988; also, a comparison of MapMaker and GeoQuery, another commercial desktop mapping package, in *MacUser*, 12/88). Instead I will look at several aspects of MapMaker which seem to be important in evaluating its usefulness for actual cartographic design and production. I will start with an investigation of MapMaker's capabilities for importing custom boundary and data files and then conclude with an evaluation of MapMaker's data and graphics manipulation capabilities.

While there are nearly 2.5 megabytes of boundary and census data bundled with MapMaker, it is obvious that the capability to import custom boundary and data files is important for cartographic production purposes. MapMaker seems to have been designed to allow such importing with relative ease.

There are two ways to bring boundary data into MapMaker: by importing graphics files or importing coordinate files.

MapMaker allows you to import MacPaint files and convert them to object-oriented files with a "Trace New Object" function. This function converts the areas of the MacPaint bitmap into "objects" which can be assigned values. The problem with this approach is that the resolution of the new MapMaker file is the same as the imported MacPaint file it was created from (72 dpi). This results in the jagged linework that characterizes MacPaint graphics and does not take advantage of MapMaker's 300 dpi

resolution. These files are also somewhat larger and therefore slower to manipulate than "true" MapMaker boundary files.

An alternative is to import coordinate files into MapMaker from some other software or from a digitizer. MapMaker can convert files in TEXT format into MapMaker boundary files. This has several advantages: the resolution of the boundary files is higher (300 dpi), the level of detail contained in the boundary file can be varied to suit the requirements of a particular project, and, if the TEXT file contains coordinates which have already been projected, MapMaker will preserve the projection through the conversion to MapMaker boundary file format.

MapMaker accepts latitude/longitude coordinates or projected x/y coordinates. Latitude/longitude coordinates can be brought into MapMaker without modification or they can be projected. Albers Equal Area Conic, Miller Cylindrical, or Mercator projections can be generated within MapMaker. Previously projected x/y coordinates can be brought in without modification.

Custom data files are even easier to import. Again, correctly formatted TEXT files can be imported or files from spreadsheet software such as Microsoft Excel can be used. Formats for boundary and data files are clearly explained in the MapMaker documentation.

MapMaker's data and graphics manipulation capabilities are relatively restricted. To be fair, MapMaker does not purport to be capable of high level statistics and graphics. The basics are there, but not much more.

MapMaker offers three ways to classify the data for mapping: equal intervals, N-tiles (equal number in each division) or manual entry for custom classifications. Summary statistics such

as count, total, lowest, highest, range, mean, variance, and standard deviation are available for the total data set and for each of the data divisions.

MapMaker graphic display is also quite basic. Two graphic elements--points and areas--are available. Both points and areas can have values, and both work in a similar manner. Points can be "symbols" or graduated shapes. A limited palette of several dozen symbol types are available. Graduated shapes can be either circles or squares, and can be displayed as an outline, solid or filled with a pattern. Areas refer to the "units" in the boundary files: counties, states, etc. Three options are available: choroplethic (several dozen fills are available), area cartogram, and dot density. These three can be used alone or in any combination. The dot density option seems to be rather useless. It fills an area (eg., a state) with a number of dots (user specifies diameter, value, and maximum number of dots) in a random manner. Available patterns and symbols are very limited and cannot be customized. Also, it is difficult to construct a series of patterns or symbols that denote a quantitative scale. Most of the available symbols and patterns seem useful only for qualitative distinctions.

MapMaker's text capabilities are limited; for example, they allow for text on one horizontal line at a time only. The boundary linewidths are not adjustable. The map legend, which automatically pops up when a new map is created, allows some flexibility but is more or less a fixed entity on the map. There are also no graphic tools (like those in MacPaint) to allow the drawing of lines or squares or other graphic elements on the MapMaker map. Six hues are available: green, magenta, blue, yellow, red, and cyan; these will print on the Apple Image

Writer (if a color ribbon is used), and show up on a Mac II color monitor.

To summarize, MapMaker's data and graphics manipulation capabilities are in most cases limited. In some cases the flexibility to overcome these limitations exists, such as with the manual entry option for setting data classification limits. In other cases the flexibility is nonexistent, such as with the limited and non-customizable symbol and pattern palettes and fixed boundary linewidth. Such problems limit the usefulness of MapMaker in the context of a cartographic production facility.

Although MapMaker was designed specifically for making maps, it is marketed as a "business map making system," not as a tool for production cartographers. However, in the microcomputer environment, cartographers have become accustomed to adapting (or adapting to) software not designed expressly for their needs. MapMaker's relative ease of use and its capability to import custom boundary and data files are advantages that outweigh its limitations. Given its modest list price, MapMaker would probably be a worthwhile addition to many cartographic labs.

INDIANA UNIVERSITY OF PENNSYLVANIA SOFTWARE DEVELOPMENTS

The Department of Geography and Regional Planning at Indiana University of Pennsylvania has announced the publication of several software packages. These packages are designed for either research or instruction. They run on IBM and compatible computers and require EGA/VGA video and hard disk drives.

The **Populated Places Register** will plot the location of populated places in the United States. Users can request places by name, by

partial name, within a latitude and longitude search window, or by ZIP code. Search criteria can be combined. Price \$99.95, site license \$149.95.

TIGERview is a demonstration program that shows users what they can expect from the U.S. Census Bureau's TIGER system. It provides a graphic display of the Boone County, Missouri TIGER file (the only one released to date). TIGERview will be modified to work with other TIGER files as they become available. This program has the same capacity as other advertised software that sells for \$250. The program includes the Boone County data files which the Census Bureau sells for \$60. The program and data files are distributed on high density diskettes for \$5.

For more information contact: Kevin Hunter, Department of Geography and Regional Planning, IUP, Indiana, PA 15705, (412) 357-2251.
(AAG/MSG Newsletter 5:1, 2/89)

AAG/MSG DISK EXCHANGE LIBRARY

The Microcomputer Specialty Group of the Association of American Geographers maintains an 817-disk library of public domain software. To follow is a list of the geography-related software for IBM and compatible computers available through MSG. The software is available for \$1.00 except as noted.

- G1** U.S. County Data Base (includes county name, county seat, FIPS, latitude, longitude, date of creation, ICPSR code)
- G2** Digital Terrain Analysis (uses digital elevation data for line of sight, 3-D oblique views, slope categorization and tinted elevation maps; written in pascal, includes source code)
- G3** Weather Prediction, Koppen Climate Classification, and climograph drawing programs

G4 Landsat (by S. Loomer; image processing package for MSS and data; requires EGA; \$4.00)

G5 UMDS (by V. Robinson; GIS program written for the United Nations)

G6 Cartographic Utilities (normalize, convert minutes and seconds to decimal, nearest neighbor analysis)

G7 Barchan Sand Dune Model (by P. Fisher)

G8 Mortality Analysis (U.N. mortality analysis package; \$3.00)

G9 World Map Display (primitive zoom and display of world map)

G10 Statistical Consultant (by R. Sechrist; \$5.00)

G11 Habitat Evaluation Procedures and Habitat Suitability Index (\$3.00)

G12 Iterative Proportional Fitting (by A. Krmeneć)

G13 Census Bureau State and Metro Area Data Book

G14 Age-Sex Pyramids (by D. Noonan)

G15 Spatial Autocorrelation Classroom Exercise (by D. Griffith)

G16 Boone County TIGER files and Display Program (by J. Taylor; two high-density disks; requires EGA; \$5.00)

G17 Census Bureau County and City Data Book, 1988 Sampler

G18 Census Bureau County and City Data Book, 1983 State files (\$3.00)

G19 PC-Mapro (by F. Gossette; map projection software; \$2.00)

To order IBM software, or for further information or a complete library listing, contact Robert Sechrist, Department of Geography and Regional Planning, Indiana University of Pennsylvania, Indiana, PA 15705. BITNET: RPSECRST@IUP. For information on public domain software for the Apple Macintosh, contact John M. Morgan III, Department of Geography and Environmental Planning, Towson State University, Baltimore MD 21204. Inquiries

about software for the Apple II should be directed to Jim Hughes, Department of Geography, Slippery Rock University, Slippery Rock PA 16057-9989.
(AAG/MSG Newsletter 5:1, 2/89)

CCA AUTOMATION GROUP DISK LIBRARY

The Canadian Cartographic Association offers a library of cartographic software and data at nominal cost, including:

P1 A special enhanced version of the program set described in the December, 1987 issue of BYTE for programming map projections. MS-DOS. 2 disks, \$20.

P2 A single disk version of P1 that only requires 360k disks. MS-DOS. \$10.

P3 A line generalization program contributed by Ron Eastman. MS-DOS. \$10.

For further information, contact Prof. J. Ronald Eastman, Graduate School of Geography, Clark University, 950 Main Street, Worcester, MA 01610.
(CCA Newsletter 14:3, 1989)

TERRABASE

TERRABASE is the latest contribution from the Department of Geography and Computer Science at West Point. The program combines the features and capacities of TERRANAL and LANDSAT plus much more. Included are data files from several areas including West Point, Washington D.C., and Leavenworth, Kansas. DTED (Digital Terrain and Elevation Data), TTADB (Tactical Terrain Analysis Data Base), and historical climatological data can be manipulated in combination. For a copy send twenty blank diskettes to Major Clark Ray, Department of Geography and Computer Science, USMA, West Point, NY 10996-1695.

(AAG/MSG Newsletter 5:1, 2/89)

MAP II

MAP II is a map processor for the

Apple Macintosh family of micro-computers. It is a grid-based software package designed for viewing, marking, measuring, analyzing, and making maps. In addition to cartographic image processing, MAP II has digital image processing capabilities.

MAP II manipulates information on both a visual and a quantitative level. It departs from traditional geographic information systems by its ease of input, its emphasis on map visualization and its ability to enter, edit, enhance, mark, measure and analyze maps using screen tools as well as map operation.

MAP II is currently under development at the University of Manitoba in collaboration with the Ohio State University. The program is scheduled for release by John Wiley and Sons, Inc. in Spring, 1989. The recommended configuration is a Macintosh Plus, SE or II with 2 mb RAM and a hard disk. It is anticipated that the cost of the program will be under \$100. For further information, contact: Micha Pazner, MAP II Project Director, Department of Geography, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2; (204) 474-6602. (*AAG/MSG Newsletter* 5:1, 2/89)

3-D CAD

AutoCAD Release 10 is currently being shipped by Autodesk (Sausalito, CA). Release 10 offers 3-D wireframe modeling, surface modeling, multiple viewports, and new data extraction capabilities. According to *Computer Graphics Today* (5:11,11/88), "The new version represents Autodesk's desire to monopolize the burgeoning world of 3-D PC CAD, as it has the 2-D world. The company's 2-D products represent a 50 percent market share [170,000 users]." Competitors in the 3-D PC CAD arena include PC Anvil 5000, DesignCAD 3D, Solution 3000, MicroStation, CADKey, and

RoboSolids.

The upgrade is available to users in the United States and Canada with IBM PC/XT/AT, PS/2, and 100 percent compatible computers. A similar version for the Macintosh II has also been announced. The suggested retail price for release 10 is \$3000. No site licensing is offered.

DESKTOP MAPPING NETWORK

The Desktop Mapping Network is a public forum on Connect Inc.'s Professional Information Network, an electronic information service. The service is accessible from Apple Macintosh computers, and from any IBM PC, PS/2 or compatible that can run Microsoft Windows.

The main purpose of the network is to facilitate sharing of information of geographical analysis and mapping on personal computer systems. To join the Desktop Mapping Network, call your software source or Connect Inc. at (409) 973-0110 ext PC or 1-800-2MACNET (U.S. only). (*CCA Newsletter* 14:3, 1989).

ADOBE ILLUSTRATOR FOR THE PC

Adobe Systems has developed Adobe Illustrator, Windows version for the IBM PC and compatibles. The object-oriented software offers autotrace, pen tool, freehand drawing, zoom, preview, constrain, copy and page, and other advanced drawing functions.

Minimum requirements for the new Adobe Illustrator are 640k standard memory, 256k expanded memory, a hard disk plus one floppy drive, and EGA, VGA or Hercules monochrome interface and display. Drawing files (EPS format) can be sent to any PostScript output device for printing. (*Pre- 1:1, 1/89*)

VOYAGER 1.0

Voyager 1.0 is an "interactive desktop planetarium" designed and developed by a professional astronomer for the Apple Macintosh. A database of astronomical information is accessible at the click of a mouse on any of the thousands of objects displayed on a "sky chart." The package facilitates views of the galaxy from other planets, and exploration of the constellations. Voyager retails for \$99.95 from Carina Software, 830 Williams Street, San Leandro, CA 94577; (415) 352-7328. (*MacUser*, 2/89)

ROOTS

ROOTS is a computer program intended to simplify the data input and editing process necessary to create map overlays. These overlays, each representing a unique geographic characteristic, collectively form a cartographic data base. This program is NOT designed to analyze overlays, nor to manipulate or display final map products. Those are tasks for other software tools such as the Map Analysis Package or the ODYSSEY Geographic Information System.

ROOTS is an extension of an earlier program named TRACE and was developed to perform all the tasks necessary for the creation of an accurate cartographic data base, from initial map digitizing through generation of a topologically correct and fully labelled map data file. Most mapping systems perform each step in the process of digitizing in a separate program, requiring the user first to digitize, then check, then edit, then recheck, and finally label the map file. Less sophisticated programs provide no error-checking at all and assume that user has accurately matched all end points or even traced common polygon boundaries precisely the same for both bordering polygons. Experi-

ence at Harvard and elsewhere indicates that as much as 80 percent of the time required for computer-based analysis of a cartographic data base is consumed in the input and editing phases of a project. ROOTS has been developed to provide graphic feedback and topological structuring and labeling as an integral part of the digitizing process, so that a complete map overlay can be created in a single pass. In addition, ROOTS includes vector to raster conversion software to support output to analysis programs such as the Map Analysis Package, IDRISI, and GRASS.

ROOTS has been written for the Apple Macintosh and for the Harris/MASSCOMP UNIX workstation. The program will work on any Macintosh of at least 512K of memory, including the Mac Plus, the SE, and the Macintosh II. A version for the IBM-PC/XT/AT and true compatibles is also now available. Other versions may be developed independently at other sites. Contact the Laboratory for Computer Graphics & Spatial Analysis, Harvard University Graduate School of Design, for information on the status and availability of such conversions.

SUPERMAP

SUPERMAP consists of a single CD-ROM which contains data for the 1980 United States census of population and housing, as well as a wide variety of other social and economic data. In addition, SUPERMAP software retrieves, manipulates, and displays graphically, data subsets as selected by the user. The entire system is now available through the use of a desktop computer. Chadwyck-Healey, Inc., 1101 King Street, Alexandria, VA 22314. (800) 752-0515. \$990.00 for County level census data and mapping for the entire U.S. (regional sets also available).

cart lab bulletin board

This forum is offered to encourage communication among practitioners at a time of rapid technological transition. Questions, comments, and announcements of approximately two hundred words in length are invited.

The arrival of Macintosh hardware and Adobe Illustrator software has had a significant impact on production procedures at the University of Wisconsin Cartographic Laboratory, as it has in many other facilities. We are currently confronting two main problems, and would appreciate hearing from others with similar concerns.

First, the lack of map projection software for the Mac forces us to deal with the problem of reformatting files generated by the World map projections package for the IBM PC into Illustrator's EPS format. It would also be very useful to be able to edit AutoCAD drawing files in Illustrator. Has anyone out there solved this already?

Secondly, we have been generating some Illustrator products via a local vendor's Linotype 300, but are just beginning to experiment with Illustrator 88's color separating functions. We would like to talk with anyone experienced in such matters.

Contact: University of Wisconsin Cartographic Lab, 550 N. Park St., Madison, WI 53706 (608) 262-1366/0688.

USGS MEMBERSHIP IN INTER-AGENCY COMMUNICATIONS COMMITTEE

The USGS recently was selected for membership in the Federal Research Internet Coordinating Committee. Other organizations represented on the Committee are the Defense Advanced Research Projects Agency, the Department of Energy, the Department of

Health and Human Services, the National Aeronautics and Space Administration, and the National Science Foundation.

The principal goal of the Committee is to develop electronic communications interfaces and protocols that will enable the universal exchange of information on research activities throughout the United States. Such a network could speed the exchange and application of research results and data and help avoid duplication of effort. The Department of the Interior's GEONET communications network that is operated by the USGS may play a significant role in attaining this goal.

(*New Publications of the U.S. Geological Survey*, 11/88)

fugitive cartographic literature

Interesting articles about cartographic information often appear in unexpected outlets. The goal of this section is to bring those publications to the attention of our readership. We invite synopses (or abstracts) of papers appearing in journals other than those devoted to cartography, geography, and map librarianship. Contributions of this kind should be limited to five hundred words.

Yamahira, Takuya; Kasahara, Yutaka; and Tsurutani, Tateyuki (1985). How map designers can represent their ideas in thematic maps. *The Visual Computer*, 1:174-184.

reviewed by Alan M. MacEachren,
Penn State University

In this paper the authors (from NEC Corp. Laboratories) outline a user interface they have devised to assist planners in creating choropleth maps. Their system is a data classification aid that allows users to interactively manipulate data class limits depicted on a frequency histogram. The system appears to begin by presenting a histogram of the data using four equal value steps. New class