MIS-APPLICATION OF AUTOMATED MAPPING, AN ASSESSMENT

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BIOGRAPHICAL SKETCH

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ABSTRACT

The on-going trend of software boom is becoming more pronounced with the increased affordability of personal computers. More packaged programs than in the past have been used by individuals with insufficient backgrounds in the subject matters, so much so that the computers are merely toys which generate "pretty" pictures but not acceptable by professionals in the discipline. The author attempts to address the practical problems in relation to thematic mapping software for micro-computers and to enumerate the desirable and undesirable features for such use.

INTRODUCTION

The word "mis-application" denotes wrong or unjust use of a resource. This trend of mis-application is an epidemic disease in the field of automation, more so now than ever before, particularly with the introduction of an increasing number of user friendly micro-computers which encourage users of "average" intelligence to "guess their way through." I recently came across an interesting definition on computer in Peter Lyman's article <Lyman, 1984: 20>, quoting Alan kay, Chief scientist at Atari, to say the following:

> The computer is not a tool - that is a weak characterization of the thing. The tools on the computers are the programs that make it into various kinds of levers and fulcra. The computer itself is a medium like paper - zillions of degrees of freedom, used in many ways that the inventors of it can't and don't need to understand, making a fundamental change in the way people think about the world.

What strikes me as interesting is the analogy between the "computer" and the "paper" medium which suggests both the democratization of knowledge via technological advancement and the underlying danger of misuses from an immense degree of flexibility.

COMPUTER-ASSISTED MAPPING

The use of computers and related technology to create visual images instead of numbers and words is not new to some of us. Up until the recent offering of slick, powerful micro-computers and a wide selection of mapping (as in cartographic and as opposed to CAD drafting) software at affordable prices, computer-assisted mapping has been rather cumbersome to operate - one having to invest much time and labor in setting up input and program files by adhering to rigid rules and structures. It was also painstakingly true that the making of one map via automation is hardly worthwhile and mass production is essential to take advantage of the computer's speed and greater dexterity. The above viewpoint is rapidly changing with the availability of low-cost and highly detailed geographic coordinate base files for mapping by means of micro-computers.

Two broad classes of mapping programs for micro-computers can be identified: single-purpose versus multi-purpose application programs. Examples of the former include DIDS (Domestic Information Display System), STATMAP, and MULTIMAP I; all of which create color-coded or choropleth maps. The latter includes Golden Software's graphics system for three-dimensional perspective drawing and contour mapping, and DOCU-MAP which permits a selection of display formats: land cover, contour, choropleth, proportional circle symbol, prism, and three-dimensional perspective.

CARTOGRAPHIC RESPONSIBILITIES

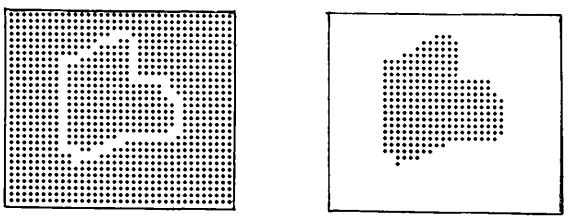
Single-purpose application programs share the following characteristics that they are menu-driven to facilitate usage and that they are designed for one specific use. Menu instructions no doubt reduce user frustrations and are extremely helpful in getting the beginning users over their fear of using computers. But it has two major flaws. In order to provide menu instructions, the program must be restrictive to a number of choices thereby restraining users of exceptional calibre to be creative beyond the permissible options. Also, the experienced users will probably find it tedious to proceed through menu after menu. A more serious implication of the ease of use of these mapping programs is the possibility of increased experimentation without an adequate understanding of the mapping process involved.

Programs such as DIDS, STATMAP, and MULTIMAP I provide the following interactive features:

1. data manipulation to transform continuous variables into categorical variable to create map classes;
2. changing the number of classes;
3. changing the class interval breaks or ranges;
4. enlarging or "zooming" in on portions of the overall map;
5. changing the colors for different data classifications;
6. including or suppressing the boundaries of the geographic areas;
7. customizing the title, legend, and peripheral information.

Any decision making involved in this mapping process requires a prior knowledge of the cartographic language, in particular that of map design and cartographic objectives. Keates <1982: 111>, in refering to map making activity, points out that "Although the initiation of the map, the formulation of its general concept or plan, the specification of content, and the collection of necessary data are all essential states in the preparation of the map, there still remains the construction of the map in its final form. This must include the design and specification of the cartographic symbols, and its technical production." From the perspective of communicative effectiveness, choropleth maps of fewer classes tend to communicate much better to the general audience. From the accuracy point of view, no class choropleth mapping is unquestionably the ultimate solution. The decision on the number of classes (or no classes at all) and the division of these classes will be one of the first questions that comes to mind in the event of choropleth mapping. To users with some cartographic background, the decision is of primary importance because the eventual result varies with different methods of classification and numbers of classes. To others, any arbitrary value will suffice the purpose as long as a map appears as the end product. The difference here is a definite lack of professional responsibility in the latter case.

In constrast, multi-purpose mapping programs confine their users to a lesser degree. What is needed here is the skills to give "commands" to the computer and to give them in an orderly manner. If we assume that every mapping system has its equivalents for the commands MOVE, DRAW, COLOR, ROTATE, SCALE, etc. to achieve three-dimensional drawing, transformations, curve drawing and surface representation, it suffices to illustrate that the sequence MOVE→DRAW→COLOR produces a different result from COLOR→MOVE→DRAW (Figure 1).



COLOR→MOVE→DRAW MOVE→DRAW→COLOR

Figure 1: Results of Different Mapping Instructional Sequence

Here, a greater degree of choices expands the mapping application and provides the users freedom to make their own judgement. But it also demands an adequate mapping "literacy" to decide what one wants and then make it happen. The task is not always easy. For one thing, there is a wealth of mapping techniques to graphically present data in

ways that make it easily understood and the mapping programs offer a rich store of such choices (such as land cover, contour, choropleth, proportional circle symbol, prism, three-dimensional perspective, etc.). Because of a certain level of flexibility inherent in many of these programs for user-supplied values, it has become necessary for the users to have some familiarity with map displays of varied forms in order to provide the appropriate user specifications. The selection of the most suitable mapping methods for presenting data needs to be carefully matched not only to the data but to the audience for which it is intended. Accepting the fact that certain types of map portrayal may be more appropriate and effective than others, users with insufficient backgrounds have a greater tendency to generate "absurd" maps of no significant value.

CONCLUSION

A micro-computer working environment encourages the "hands on" model of learning in which the user is active in working with the tool (e.g., mapping programs). Most micro-computer software are menu-driven to relieve the users from the agony of mechanical and operational difficulties, thus enabling them to focus more on the activity involved. What is lacking here is the teacher who "consults". Unless the computers are made "smart" enough to detect mistakes or until such time has come, a basic understanding in the constructions and functional uses of specific map displays is imperative to alleviate examples of poor or badly designed maps.

There is no magic formula to mapping. After all, a cartographic product is a work of art, within which its internal order and harmony reflect its creator's own effort. Despite the general lack of specific rules for design specifications, the users need to be conscious of the inherent constraints in mapping for maps convey locational facts via selected mathematical and cartographic manipulations. The ultimate use of a map is for communication and it makes no sense to create unmeaningful, incomprehensible, or illegible maps.

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