Methods and Software Systems for Computer-aided Environmental Mapping

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Computer aided mapping or the urban environment differs from other environmental mapping. It was set up and developed according to the characteristics of the spatial distribution of each environmental factor in the artificial urban environment, and according to the needs of planning, management and evaluation of that environment. Based on the practical experience of producing the Atlas of Environmental Quality in Tianjin in recent years, this paper summarizes the methods and software systems used in computer aided mapping of the urban environment.

The primary methods of urban environmental mapping include locating environmental factors, data processing, urban environmental dynamic analyses, computer aided mapping, urban environmental system analyses and evaluation; also multielement multilayers and multistructure mapping methods for contract analyses of urban areas. The six types of map structures we have used are grid cell, isodensity, scatter (distracted) point, polygon, network and three dimensional map. These six structures can be linked or transformed by urban environmental mapping systems software.

This paper introduces the urban environmental mapping software system. The system was set up depending on the needs and characteristics of urban environmental mapping. It is written in FORTRAN IV and Assembler languages, and is compatible with minicomputers such as PDP 11/23-24, NOVA-3D and DJS-130,140. The system is able to deal with environmental monitoring data, investigative and single statistic maps, human air photo interpretation,

environmental system analysis and evaluation data. It is able to position and quantify environmental factors and brings data into the urban environmental data system-- to establish data files, to organize and manage data, to classify and analyze data, and to draw the six structural types of map by computer. It provides three kinds of graphic output: plotter output, line print output, and display in a VT-100 terminal.

The basic structure and main contents of the software system include four parts: (1) data treatment and analysis software, for instance, polygon digitizing data treatment program, data testing and correcting program, data organization management program, map digital analysis program; (2) basic mapping software, which can offer address information, control information and mapping information to control and drive a plotter; (3) mapping function software, offering basic functions including drawing map symbols, writing numerals and characters, drawing different lines; and (4) urban environmental mapping software, which can be used not only to draw the six structureal types of map described above, but also to draw map projection grids, map scale and other essential map elements.

This paper also goes further into the process of urban environmental mapping in connection with the work of the Atlas of Environmental Quality in Tianjin.