**DESIGN AND PRODUCTION OF THE ELECTRONIC VERSION
OF THE NATIONAL ECONOMIC ATLAS OF CHINA (EVNEAC)**

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Abstract

Electronic atlas is a completely new presentation form and
technology to reflect the tempo-spatial distribution pattern of
geographic phenomena. This paper expounds the features &
objectives, software design and functions of the Electronic Version
of the National Economic Atlas of China (EVNEAC).

1. Features and Objectives of the Atlas

China's economic growth is among the fastest in current world.
Therefore it is imperative to adopt electronic atlas, a completely
new presentation form and technology to reflect China's economic
growth appearance and its spatial distribution because the
traditional cartographic methods cannot fit the situation. The
features and objectives of the atlas are as the following:

* The Electronic Version of the National Economic Atlas of China
  (EVNEAC) is a new media for information storage & access by
  computer in digital form. Similar to the published National
  Economic Atlas of China (NEAC), it is an authoritative
  national scale image information base on China's social &
  economic development and its spatial distribution.

* EVNEAC is based on the update and additions to the information
  on the existing NEAC, and an atlas database is built to
  reflect the status of China's economic development. It's
  redesigned and produced in the forms of electronic-screen
  maps, and can be viewed both as a new version of the NEAC and
  as a completely new product.

* EVNEAC reveals China's reality and represents the independent
  and complete national economic and the unique feature of
  socio-economic development of China, especially the critical
  changes and high-speed growth since China's drive to economic
  reform and opening to the outside world.

* EVNEAC is intended for both domestic and foreign readers. For
  the former, it serves as a scientific base and a teaching
  volume for various administrative, research and educational
  institutions (mainly for central and provincial level) in
  analyzing national conditions, making macro decisions, working
  out economic policies, developing long-standing planning,
  decentralizing production forces, proceeding with eco-
  sociological study, and propagating the great achievements of
  China's socialist construction. For the latter, it provides

the readers outside the country with a status quo view of China's economic and social conditions and an overall conception of the scale, level, structure, spatial pattern and speed of China's current economic development, thus promoting international communication and China's further opening to the outside world.

* EVNEAC is developed and produced in the hardware environment of PC-486 Microcomputer, the property of which is: 16 MB Memery, 66 MHz Frequency, 500 MB Hard disk, 20" VGA Monitor with resolution of 1024*768 (lines), and 16 bit color adapter. The software environment is MS-WINDOWS, and Visual C++ Language. Such hardware & software environment can ensure EVNEAC to be with advanced property and easy to publicize.

2. Software Design of EVNEAC

The software design of EVNEAC was accomplished by using object-oriented method and MS-Visual C++ Language. A map is composed of several features, including the mathematic basis of maps, mainly the grid of parallels and meridians, the geographic base elements for spatial location and discernment, e.g., drainage basins, administrative boundaries, roads, residential areas, etc., and the thematic elements for depicting qualitative & quantitative features of cartographic phenomena, as well as cartographic annotations. Each feature is presented through relevant representation methods and has corresponding legends. Each feature is also abstracted as an object called coverage. It is the mapping of coverage that is based on to realize the function of electronic maps. Following is the procedure of coverage making:

2.1 to assign data source, including locational data and cartographic index data, and to access corresponding datafiles;
2.2 to select symbolization method and specify relevant parameters;

2.3 to grade cartographic index data and make graph-scaling-ruler;

2.4 to specify the related information for manipulating coverages, including sequence relationship among coverages, and display, query and printing of various coverages, ect..

2.5 to design and build legends;

2.6 to realize the visual presentation of coverges.

A powerful integrated software has been created to build above coverges and the whole atlas. It was designed and developed in six levels:

Level 1--basic resources, including color base, line-type base and character base;

Level 2--symbol producing tools, including 14 basic graph elements, and the producing rules for linear symbols and area symbols;

Level 3--Geo-basis symbol base, including point, line and area symbol base for producing Geo-base maps.

Level 4--thematic map symbol models, i.e., the structural statistic symbol models which was designed to present the qualitative & quantitative features of socio-economic phenomena, e.g., the pie-graph model consisting of arc-shaped pie fan-shaped pie, the bar-graph model with different combination of bar-graphs, the pyramid-graph model, and the percentage grid model, ect..

Level 5--design and compilation of Coverage , including data acquiring, processing and gradation, selecting symbolization methods, setting up graph-scaling-ruler, building legends and graphic editing.

Level 6--production of electronic maps, i.e., through integrated operation of coverages, and by setting up map names and managing different coverages, to produce various kinds of thematic maps.

3. Designing the Functions of EVNEAC

EVNEAC is a kind of analytical atlas product. Varied map files contain not only Bitmap file, but also cartographic data and related graph processing information. So when these map files are opened, under the support of EVNEAC software, the maps are demonstrated and can show series of analytical functions. The functions of it are:

3.1 Atlas Content Enquiry: to search for specific maps as well as the data and captions through browsing the atlas content.

3.2 Map Display and Zooming Out: to display a region wholly or locally with a zooming out window for a designated map theme.

3.3 Map Roam: to move a displayed map continuously on screen in different directions. For some large and complex maps, map roam can aid in reading particular information.

3.4 Two-map Contrast Display: to display simultaneously two maps of the same or different areas, as well as to zoom out a certain thematic map before showing on the same screen the administrative boundaries and name of counties & cities for the area for the sake of contrast reading.

3.5 Spatial Search: following the designation of a cartographic unit from displayed maps on the screen, to search for a certain feature information of this unit and to tabulate relative data using the window.

3.6 Screen Enquiry: by means of inputing the region name or an expression of a certain cartographic index, to find extent of the region on screen-displayed maps, and to enlighten/twinkle or to change colors for easy reading and analyzing.

3.7 Thematic Data Statistics: to print out or process a statistical analysis or display various thematic data. The statistics contains various calculations such as average value of the whole country, variation of maximum and minimum value, percentage, standard deviation and histogram creating, etc..

3.8 Selective Figure-Character Information output: to thematically select, display or print out figure or character information.

The reading function of the above electronic maps will be performed through the user interface which should be easy to operate and the system will provide necessary help for user's consultation.