Value Added Products From Geo-Spatial Data

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ABSTRACT

The digitisation processes of maps enable geospatial information to be captured in a computer database. The computer enables the data stored in layers to be manipulated in an intelligent way to yield variety of value added products relevant to different themes. The user customer should not be compelled to pay for all layers of the dataset of a topo sheet in which he may not be interested. The specific features which he requires or components which will be relevant to the theme desired by the indentor, should be provided to him. This will also largely eliminate the problem arising from inclusion of data of non permissible (by MOD) content in the indents for digital data.

The paper has discussed about some popular thematic products like Tourist Maps, City/Town Guide Maps, Relief products etc. Geographic Information Service is a main beneficiary of geospatial data thus stored in the computer. A special variant of GIS, suited for land parcel based information service is what is called Land Information System (LIS). This needs creation of database compatible to maps on 1:500 to 1:1,000 scales for urban areas and 1:2,000 to 1:5,000 scales for rural areas. Geo-spatial data is the link which connects features and phenomena to location of places and cartography provides the means to visualize these relationships.

INTRODUCTION

For Cartographers worldwide, a new age has arrived which can be called as Digital Age. Digital Maps and digital spatial data displayed in various forms on the computer screen and other display devices are quickly replacing the conventional hard copy map. In this new medium a fresh perspective is required to design geo-information products which are more relevant, economical and acceptable to the user. Earlier the user had no option but to accept the hard copy map alongwith all the information on it even though he could be interested only in a fraction of it, but in a digital version of the map only the relevant portion of the data can be selected and enhanced in value (visually and semantically) and presented to the user.

SELECTION OF DATA

An user will seldom need the whole digital data set pertaining to a sheet for his use. He should not be compelled to pay for the layers in which he is not interested, say; a forester may not be interested in telecommunication or a banker may not be interested in vegetation. Therefore, digital data for a sheet should be stored and supplied layer-wise and a user should be charged accordingly. The user should not be compelled to have full dataset of a sheet. This will also largely eliminate the problem arising from inclusion of data of non permissible (by MoD) content in the indents for digital data. While constituting the layers, features of same group should be included, i.e., vegetation should include trees, shrubs, grass, scrub and mangrove etc and their remarks/description as necessary. Relief should include elevation layers, few spot heights, hill shade, boulders, rocky outcrop etc. Some users may insist on buying two or three layers which may have a bearing on each other. For example, roads, railways and rivers. A sheet can be organised in the following layers for the purpose of digital data:

1. Geographical/Arbitrary Frame
2. Streams
3. Rivers and other water channels/bodies
4. Tracks (Roads and Railways)
5. Vegetation with remarks
6. General Features (other Red and Black details on a topo map)
7. Services network e.g. Power and telephone lines etc.
8. Localities (with names)
9. Relief with heights
10. Adm Boundaries (down upto village)
11. Forest boundaries
12. Off-shore features
13. Grid (Arbitrary or otherwise)
14. Blue Tint (Water bodies)
15. Green Tint (Wooded areas)

THEMATIC DATA PRODUCTS

Common users require data for GIS and similar applications

on specific themes. These data have to be specially composed by combining several layers as cited above. For example, Route Maps are popular by demand and these can be made by combining the following layers in the selected corridor of the route:

1. Geographical/Arbitrary frame/with reference Square/Grid
2. Locational Data (selected features)
3. Rivers
4. Localities with names
5. State Boundaries
6. Relief (as permissible and appropriate)
7. Tracks (Roads, Railways)
8. Water Bodies (Blue tint)
9. Green Tint
10. Additional features like objects of tourist interest, petrol pump, hotels, cinema, banks, taxi/bus stands, schools, hospitals etc.

The cartography for thematic maps has to be suitably adapted to be more meaningful to the theme. For example, for Route Map multi-lane highways should be adequately depicted, prominent highway intersections, level crossings, bridges (single and multi level) etc should be represented with appropriate symbology. All highway amenities like motels, service centres, drive-in restaurants etc should be shown.

TOURIST MAPS

There is great scope of innovation in preparing the data content of tourist maps to make them more attractive and informative. Maps for tourists may be varied depending on the nature of the tourist place i.e., hill stations, places of pilgrimage in plains or on river banks, wild life sanctuaries or metro cities and places selected for special events like melas, sports or game events etc.

CITY/TOWN GUIDE MAPS

City/Town guide maps of good quality and reliability are very much in short supply. With increasing map awareness among people and especially among the student community in metro cities (thanks to the Map Quiz programmes conducted by INCA and other initiatives launched by SOI in the important cities of India) a market for products under this category is growing. The existing hard copy editions have become outdated and it is worthwhile to go for fresh surveys say on 1:10,000 scale based on Satellite Imageries for the future. For the congested townships maps on larger scale say between 1:2,000 to 1:5,000 prepared with the help of IKONOS satellite imagery will be more appropriate as this provides 1 m resolution and most features will be identifiable on the imagery. In special cases ALTM (Airborne Laser Terrain Mapping) which employs laser scanner mounted on aircraft, giving a dense array of points of precision .1 to .5 m vertical and .3 to 1 m horizontal can be used in very quick time for urban mapping.

For lesser developed areas IRS Panchromatic Satellite Imageries should prove to be useful. However, with imageries alone such maps cannot be prepared. Ground truth verification and collection of additional information is a must to make reliable maps. Aerial Photography is an useful option for most accurate and reliable survey of detail or updation of map, if photographs of the area on appropriate scale can be arranged in reasonably short time, though this may not be always possible. Digital Photogrammetry or Softcopy Photogrammetry is the best way to compile information in the most efficient way from aerial photographs with stereo coverage. A Digital Photogrammetric Workstation with appropriate software and a high resolution scanner (10 μ) are required to be set up for such facility. Differential GPS which is being used by many agencies for quick verification of major details and updation in a very short time, appears to be most convenient. It is quite likely that GPS updation will become a standard method for updation of existing city/town maps due to its speed and reliability at affordable cost.

PRODUCTS SHOWING RELIEF

Many users require digital products from elevation. Since Survey of India topo maps contain contours, Bench Mark heights and other spot heights, these information can be processed through software to generate Digital terrain Model in the computer. With such a model various other display applications like oblique views, hill shade maps, elevation profiles, slope and aspect maps etc can be derived which help in appreciating the relief of the terrain and can be used for various purposes. Many engineering applications like route alignment, determination of submergence limit, checking of intervisibility etc can be carried out. Computation of surface area and volume can also be done. Another interesting application is terrain simulation in 3D and generation of fly through visuals and animation useful for reconnaissance of the area and strategic planning for tactical operations as required by military.

GEOGRAPHICAL INFORMATION SYSTEM

Geospatial data, once appropriately structured and stored in the computer can be variously manipulated to yield geographical information. A geographical information system possesses the tools to carry out spatial analysis, logical operations and selective retrieval of point, line and area features stored in coverages (as in Arc Info) to highlight features and

generate maps to convey information through graphical display. Such information can also be presented through tables, and statistical parameters of a set of data can be presented either numerically or graphically. Answer to logical queries can also be obtained from GIS. Thus such services are really a boon for scientists, planners, administrators etc who deal in study of earth resources and their management. They also help common citizens in securing reliable information about land property, revenue, utilities and services like municipal and other essential services, tour and travel, recreation, education, shopping etc. Even departments like Police, Banks, Fire Services, Telecommunication Operators, etc can make their services much more efficient by using such systems.

CADASTRAL MAPS/LIS

A special variant of GIS, suited for land parcel based information service is suited for cadastral purposes. The basic infrastructure for a modern digital cadastre in almost any of the states in India is lacking for various technical and administrative reasons. Experts feel that, now is the appropriate time to launch an initiative to prepare/update cadastral survey records of the states with the help of modern electronic survey equipments like Total Station, DGPS, PalmTops etc. This could be done by the State-level Geospatial Data Centres of Survey of India in close collaboration with the Revenue Departments of the State Governments to prepare maps on 1:500 - 1:1000 scale for urban areas and 1:2,000 - 1:5,000 scale for rural areas and the database should be continuously updated. The Guide Maps for cities and towns whenever required will be extracted and compiled from the cadastral database. In addition, the topographical foundation database on 1:25,000 scale will also be compiled from the cadastral database. It is essential to have such vertical integration in the interest of development of resources and their efficient management and exploitation with an optimum effort.

CONCLUSION

The society is gradually transforming from its traditional character towards a knowledge society where knowledge driven by IT is the force which energises all human activities. Geoinformation is the link which connects information, features and phenomena to locations of places and cartography is the means of visualisation of these relationships. This insight will motivate the cartographers to design many maps and geospatial displays by adding value to extracted basic data from the database.