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Short Note

Customised application development interfacing geographical information systems

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Application software is a subclass of computer software that employs the capabilities of a computer directly to a task that the user wishes to perform. Requirement and application needs of different organizations/users are different. User-written software tailors systems to meet the user's specific needs. For example, needs and applications for agricultural planning, engineering, medical, infrastructure planning, marketing of products and so on are very much diverse. They cannot be achieved through commercially available computer softwares/GIS packages as those are designed for general purpose functionality to all users and so can address their basic applications. The users either have to satisfy with the functionality given in the software or develop application meeting the particular needs of the organization/users. Customized application development can deliver/fulfill all the specialized and specific needs of the users. There have been applications developed in the past but now applications developed coupled with the advantage of GIS technologies for various data-handling, spatial analyses and visualization under variable inputs and spatial scales, is an innovative approach developed during recent years. This article presents a short note on software application development interfacing geographic information systems.

Geographic information systems (GIS) have emerged as powerful tools in the management and analysis of the large amount of basic data and information (statistical, spatial and temporal) needed to generate in a flexible, versatile and integrated manner, information products in the form of maps as well as tabular and textual reports for land use decisions. Geographic Information System can store, manipulate, display, and produce geographic (spatial) information integrated with statistical and textual data. It is becoming one of the most useful and powerful analytical tools for resource planners and managers. It is a system that uses the power of computers to answer questions for all the things that exist and events that happen around us. GIS is a multidisciplinary undertaking which integrates databases of various kinds and sources, models for data analysis, decision-support tools, computer hard and software and the human resources and institutional framework to operate the system.

With the rapid growth of GIS and related technologies, GIS has become a vital element in maintaining and integrating geo-graphic based information. There are numerous software packages [ArcGIS, ArcView (ESRI, USA), ILWIS (ITC, Holland), and IDRSI (Clark University) and some free open source like GRASS and GRAM++ etc] available in the market and they have general functionalities suiting general uses of the users. But when users become more experienced with Geographic Information System, they require need based applications for tackling and presenting more complex problems. The fundamental software provides the functionality common to all user disciplines but the application software can address the specific requirements of the specific user. Application level depends upon the users' needs, it can be very simple as a set of preferences or a very complex query that selects a group of layers, identifies features of interest, based on attribute ranges, creates variable width buffers, performs a series of overlays and produces required results.[1] Rapid development in information technology in the last decade has created a unique opportunity for the development of such a tool which can be used to generate quickly and efficiently various kinds of information according to the requirements of different users. The development of these and other related applications involve the analysis and interpretation of large quantities of biophysical and socio-economic data, statistical, spatial and temporal, in order to produce the diverse kinds of information products required in the form of images, maps and both tabular and textual reports for decision making at the various application scales of interest. Up-to-date computing tools of spatial analysis allowing easy access to data and information and their manipulation are necessary

to produce these. Such an application contains computerized databases, models, decision-support tools and a user interface to facilitate its function. Conventional software development methodologies often fail to address the GIS application development needs due the complex and dynamic nature of GIS projects. Rapid application development process committed to quickly deliver quality GIS software products to customers in a tight schedule and offering continuous improvement as the customers gradually adapt to the new GIS system and become ready to take advantage of more advanced GIS and information technologies may be adopted[2]. Developing applications is often one of the most time-consuming and expensive elements of implementing a GIS. It is also one of the keys to a successful GIS. The integration of models with GIS has a number of advantages such as short running time and quick production of results.

Further, interfacing GIS with application developments is attractive because it permits the simultaneous examination of spatial and temporal phenomena[3]. The core of the system to develop application software is the database, models and defining the complex relationships relating the different datasets. Large quantities of data are stored in databases. Databases can either be constructed using commercially-available software, or dedicated pre-programmed packages can be used. The MS Access™ metadata software tool can be utilised for the management and maintenance of the GIS database.

Models represent a simplification of a more complex reality and the level of detail of the model should be consistent with the objectives of the study, the availability of data, and the knowledge base from which inferences can be drawn. Once the essential data are stored in the databases, models are used to derive quantitative outputs.

Application development is not rewriting the GIS software, but instead custom applications to meet specific needs. Rapid technology advancements and evolving new scenarios call for newer customized solutions[4]. Applications are developed with extensive programmer-user interaction with numerous sign-off points from conceptual design and prototyping through coding, delivery, documentation, and training[5]. Most applications in a new GIS will be of the simpler, more basic type (display, query, map overlay). More complex applications, either database or spatial analysis, will require development using the GIS macro programming language.

Various options to generate customizable Geo-informatics Applications are available in the software market. The most prominent is the ESRI's MapObjects. The developers can use MapObjects to create applications that include dynamic live maps and GIS capabilities. Mapping components can be added to enhance existing applications, build lightweight data viewing applications, create customized mapping and GIS programs that fulfill specific tasks and requirements. These can be used with any standard Windows 32-bit application development environment like Visual Basic[6] etc and can be used to develop spatial data applications. In Microsoft Windows Operating System, the technologies of ActiveX is employed for creating such customized applications. These allow the software to interact. It is possible to create re-usable software components, link components together to build applications, and take advantage of Windows services. Such applications which provide user specific capabilities and perform analysis more efficiently shall remain newest field in demand in future.

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