

Application of Geographic Information System Technology in Urban and Rural Planning

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Abstract: With the rapid development of China, the urban and rural space resources have been further explored and utilized. In order to improve the basic conditions of urban and rural areas and promote the development of urban and rural areas to meet the needs of people's lives, leaders and planners are considering how to use modern information technology to improve the planning and management of urban and rural areas, so that urban and rural space resources can be better used and constructed. GIS technology is widely used in the field of urban and rural development planning, which can bring great convenience to the information processing, decision-making and implementation of urban and rural construction and spatial planning. This paper briefly discusses the significance and function of GIS technology in urban and rural planning and management, and then analyzes the application of GIS technology in urban and rural planning and management. It is expected that the research of this paper can help to improve the efficiency of urban and rural planning and management.

Keywords: GIS Technology; Urban Planning; Application

1. Introduction

With the continuous development of society and economy, the speed of urbanization is constantly increasing. In the process of urbanization, the relevant departments of the central government have increased the planning and construction of cities and towns. Because there are many factors involved in urban planning and design, if it cannot be comprehensively managed, it is easy to cause omissions and produce various contradictions. Therefore, relevant departments of central government should combine geographic information engineering with urban planning, and establish a scientific and perfect data system with the help of GIS technology. Only in this way can we provide guarantee for the development and construction of modern cities.

2. Overview of Geographic Information System technology

Geographic information engineering refers to the science and technology of geospatial information storage, processing, management and application, which can use advanced and efficient means to improve the quality and efficiency of work, and also provide a good decision-making environment for technical personnel with the help of systematic and comprehensive data information. In this case, the development of social economy and the construction of modern cities can be promoted continuously and stably. After investigation, it is found that the main contents of GIS are: first, the principle and application of GIS technology, mainly: GIS automatic acquisition, engineering data structure and model, spatial database system and so on. Secondly, 3D-GIS and Virtual Relationship. To combine the principles of 3D-GIS with GIS technology, it is necessary to systematically explore the principles of 3D-GIS and GIS. GIS technology is a database used to store all kinds of geographic information. In order to ensure the stable and orderly operation of GIS, it cannot be separated from the support of computer technology and software. Through the collection, display, analysis and processing of geospatial data, this system can complete the analysis and application of urban geographic model. Through GIS technology, users and researchers can obtain more comprehensive and reliable geographic information data. Under normal circumstances, the functions of GIS can be divided into the following two types: Two-way query graph function and data retrieval function^[1].

3. Crucial technology of urban and rural planning management informatization

3.1 Basic concepts of GIS

In urban and rural planning and land management, GIS is an indispensable and important technology. GIS can process and summarize the data in geographical space, thus presenting the detailed situation of current land use and laying a good foundation for related management work. In the real world, all things have their own geographical characteristics, and the expression of this characteristic can be called “space” and “property”. GIS technology is the combination of spatial information and attribute information, from the two perspectives of space and itself, the corresponding research samples are queried, statistics, analysis, and presented in three-dimensional maps.

Therefore, the relevant personnel in the analysis and expression of real life, it requires more and more image of technical support. GIS technology is one of the effective means to solve this problem. GIS is a technical system, which is based on the geographic spatial database and uses the geographic model analysis method to provide a variety of spatial and dynamic geographic information in time for geographic research and geographic decision making. Under the support of computer software system, information collection, information processing, information management and other related work can be completed in the same system, but also can provide users with detailed information. At the same time, GIS also has important application value in space simulation and scientific prediction. At present, geographic information system (GIS) technology has been a good research method and means in China.

3.2 Application fields of GIS

3.2.1 Urban and rural planning

Urban and rural planning is to determine the nature, scale and development direction of urban construction, conduct detailed investigation and analysis of the use of urban land, and scientifically analyze the relationship between urban land and urban construction land on the basis of these. In urban and rural planning, resources, environment, population, transportation, economy, education, culture, finance and other geographical elements and a large number of data are involved. GIS database management is conducive to integrating these elements into a unified system. Through the analysis of the current situation of urban development, urban development planning is formulated, and comprehensive assessment and planning of urban development is carried out to realize the dynamic monitoring of urban development, urban development and urban development in the process of urban development. The application of GIS technology to urban and rural planning, management and analysis is helpful to improve the level of urban planning decision-making, management and service.

3.2.2 Cartography

GIS technology is derived from computer-aided cartography, and GIS technology, remote sensing technology and global positioning system technology have been widely used in cartography. The advantage of these three methods is that they revolutionize the way maps and data are presented, greatly reducing mapping time, and presenting the map to the user in a clearer way. This system has a good application prospect in vehicle navigation and travel^[2].

3.2.3 Resource management

Resource management is the most basic function of GIS technology. It collects all kinds of data in urban construction, conducts systematic analysis through GIS technology, and summarizes the resources in urban construction overall according to conditions such as boundary and subdivision. For example, taking the demand for land use as an example, we can divide the land for various purposes, clearly define the area and type of land used in the region, divide the types of land use according to the elevation, divide the actual situation of land use according to the size of the slope, and divide the types of land according to the change of use time. All these can establish a good basis for the use of resources, so as to promote the stable operation of urban planning in our country.

4. The application of geographic information system technology in urban planning

4.1 Visual planning

In the process of urban planning, the most common method is to use image analysis software, such as AUTOCAD image analysis software, which can analyze the city's terrain and landform, but because of its slow calculation speed, it is only suitable for a small range of image analysis. However, the students majoring in color and color equipment management have high professional quality and poor painting skills, so their application in practice is limited. GIS has a strong comprehensive processing ability, which can well supplement the shortcomings of other systems, and can graphically and three-dimensional processing of various elements in urban planning, so as to provide visual data for urban planners. For example, the mapping function of GIS is used to draw red line map and planning map, and the image data is processed to finally form three-dimensional image analysis, which provides a powerful tool for the intuitive spatial planning of the planning, thus ensuring the scientific and rational planning.

4.2 Information query and management

GIS technology is a very meaningful method to introduce GIS technology into urban planning. GIS technology is mainly composed of spatial information and attribute information in GIS. For the characteristic data related to population and economic aggregate, the interaction between them can be obtained by using correlation analysis method. At the same time, the terrain data and planning results data involved in the planning can also be retrieved and counted through the spatial query function of GIS, which can be improved to the maximum extent both in the quality of data management and in the degree of standardization, which can also improve the management level of urban planning.

4.3 Decision analysis and management

GIS technology can help urban planners to simulate and select schemes, and can also process data through a large amount of data to provide reference for urban planners to make decisions. In the process of urban planning, GIS technology should be used to obtain all kinds of data, whether it is land expropriation, demolition, reconstruction, or the development of public facilities. Only in this way can these data be immediately reflected, so that planners can make correct decisions and ensure the scientific nature of urban planning^[3].

5. Conclusion

To sum up, in urban planning work, the use of GIS technology can not only carry out two-way query of charts, but also carry out data retrieval, which can promote the development of urban planning data management to a large extent, but also optimize and improve the planning and design scheme, so as to make urban planning more perfect and reasonable. In addition, the function of GIS technology can also provide effective and reliable decision-making reference for urban planning and management. Therefore, the country should pay enough attention to GIS technology, make full use of its advantages of engineering, and lay a solid foundation for the planning and management of various cities.

References

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