Research on the Application of PPGIS in Urban and Rural Schematization Based on Network Information Technology

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Abstract. The promotion of the level of social urbanization puts forward higher requirements for the functionality of the city, and it is the most important auxiliary for the city function to play and reflect. The utilization of PPGIS in urban-rural schematization incalculably accelerates the improvement and development of urban-rural schematization level. Based on this, this paper first analyses the connotation, typical features and functions of PPGIS, then studies the utilization of PPGIS in urban-rural schematization, and finally gives the utilization strategies of PPGIS and network info tech in urban-rural schematization.

Keywords: Urban-rural Schematization, Network, PPGIS

1. Introduction

With the iterative progress and maturity of computer info tech, it has been widely and deeply studied and popularized in many fields, especially the utilization of computer network info tech and GIS tech in urban-rural schematization, which incalculably accelerates the improvement and development of urban-rural schematization level [1]. On the other hand, the continuous growth of social economy in recent years has significantly improved the level of urbanization. In this context, the promotion of the level of social urbanization puts forward higher requirements for the functionality of the city, and the urban-rural schematization level and ability has gradually become the focus of social attention and research.

With the maturity of network info tech, the function and performance of GIS in the utilization of urban-rural schematization are becoming more and more prominent, and gradually become an important part and an important auxiliary tool of urban-rural schematization and management. Through the integration of GIS tech and new computer network tech, diversified info can be
organically integrated, so that urban schematization can be intuitively displayed draw support from of 3D space [2]. At present, the utilization of GIS in urban-rural schematization has achieved three-dimensional development, not only applied to the surface space, but also further expanded to the underground space.

In addition, in the context of urban-rural integration development, urban-rural schematization and construction covers different stages of schematization analysis, schematization scheme formation and schematization scheme evaluation [3]. Through the analysis of urban-rural schematization scheme, the objective analysis and evaluation of various development indicators are realized. In this process, the urban-rural schematization scheme is more scientific and reasonable draw support from of computer info tech and means. Computer info tech and intelligent tech provide important assistance and support for the storage and management of a large number of data and info generated in the process of urban-rural schematization. At present, the use of GIS tech to carry out urban-rural schematization includes the transformation of topographic map, the construction of schematization info system and the construction of urban-rural transportation system. The use of network info tech can further improve the process of urban-rural schematization and realize automatic data sharing and work management.

In short, urban-rural schematization work has several typical characteristics as shown in Figure 1 below. Traditional schematization methods and tools are more and more difficult to effectively support the needs of future urban-rural integration development. The integration of GIS and network info tech can realize the efficient collection, storage and analysis of spatial info of schematization area [4]. The visualization function of GIS in urban-rural schematization, especially in urban-rural traffic management, can effectively predict the feasibility of schematization scheme and the scalability of future development. Therefore, the research on the utilization of participatory GIS based on network info tech in urban-rural schematization has important engineering practice value.

![Figure 1. Typical characteristics of urban-rural schematization](image)

2. The connotation and typical features and functions of PPGIS

2.1. The concept and connotation of PPGIS

PPGIS can be applied to all aspects of urban-rural schematization, including urban-rural schematization design and management, the collection and collation of schematization data, and the mapping of schematization results. Whether it is a small-scale detailed schematization or a large-scale urban-rural regional schematization, or a comprehensive master schematization, it provides a strong
support and foundation for the utilization of PPGIS. In addition, PPGIS has different utilization emphasis in different stages of urban-rural schematization. By using the function of PPGIS spatial database, it can realize the display and query of schematization data. By adding schematization analysis module into PPGIS spatial database, the function of PPGIS spatial analysis is realized.

2.2. Typical characteristics and utilization framework of PPGIS

The introduction of PPGIS into the process of urban-rural schematization can significantly improve the efficiency of schematization, improve the accuracy and rationality of schematization results, monitor the development of urban-rural areas, optimize and adjust the development strategy of urban-rural areas in time [5]. PPGIS is composed of hardware, software, data, utilization environment and other elements. The composition of PPGIS also includes the acquisition and input of info, data storage and management, data query and analysis, and the expression and output of results. The utilization framework of PPGIS is shown in Figure 2 below.

![Figure 2. The utilization framework of PPGIS](image)

2.3. Utilization function of PPGIS in urban-rural schematization

The utilization functions of PPGIS in urban-rural schematization mainly include data collection, input, editing and storage, spatial analysis, thematic mapping and data visualization. In spatial analysis, it includes query analysis, location analysis, trend research, pattern research, simulation analysis and other functions [6]. Among them, the query and analysis function is to find the target info that can meet the user's requirements from the urban-rural schematization geographic info, so as to establish the spatial and attribute characteristics of the target info. Secondly, at the level of location analysis, it mainly analyzes the location, environment and relationship of urban-rural schematization area, and excavates the typical characteristics of urban-rural schematization location.

In addition, in the aspect of trend analysis of urban-rural schematization, it mainly analyzes the evolution trend of geographical things in urban-rural areas. At the level of pattern research, it mainly analyzes the spatial analysis, aggregation characteristics and the relationship between things. At the level of simulation analysis, by simulating the geographical line of urban-rural schematization area, it could simulate the change trend of the research object under the assumed conditions.

3. Utilization of PPGIS in urban-rural schematization

3.1. The utilization of PPGIS in the investigation of urban-rural schematization
First of all, in the current situation investigation stage of urban-rural schematization area, GIS is used to manage the current situation data, including the land use status, road status, municipal facilities data, etc. in the urban-rural schematization area, and auxiliary field survey data, integrating GPS, RS and PDA, so that urban-rural planners can have a more direct understanding of the surrounding environment of the schematization area, so as to more effectively understand the status of urban-rural schematization area. Secondly, in the urban-rural schematization regional status analysis stage, using GIS overlay analysis function, statistical plot ratio, evaluation of land suitability, and production of various status drawings [7]. Draw support from of spatial statistics function of PPGIS, the spatial distribution law of geographical things is mined, and the spatial structure and traffic network structure of urban-rural areas are analyzed. In addition, draw support from of urban-rural spatial interaction model, the attraction and influence circle of cities and towns are analyzed, the adjustment of urban-rural administrative divisions is carried out, the three-dimensional topography of urban-rural schematization area is simulated, and the ecological sensitivity evaluation and landscape perspective analysis are carried out.

3.2. Utilization of PPGIS in urban-rural schematization design, implementation and supervision

Firstly, in the urban-rural schematization and design stage, PPGIS combined with urban-rural evolution model is used to predict urban evolution [8]. Through multi criteria decision analysis, the change of urban-rural land use under different policy conditions is predicted. Draw support from of PPGIS, the optimization of transportation network, layout of municipal and public facilities, landscape simulation, analysis of site filling and excavation, urban-rural schematization and mapping can be further carried out. Secondly, in the implementation stage of urban-rural schematization, PPGIS is used to manage schematization results, basic terrain and related info to provide info for urban-rural schematization business [9]. Draw support from of PPGIS, the schematization management info system is used to carry out all kinds of construction permission business. When carrying out urban-rural schematization decision-making, multi scheme selection and scheme optimization are carried out by simulating the three-dimensional scene of construction, and the rationality of project declaration is checked. In addition, in the evaluation and supervision stage of urban-rural schematization, PPGIS and spatial remote sensing tech are used to monitor the environmental changes of urban-rural schematization area, check the consistency of construction projects and schematization, and evaluate the implementation effect of urban-rural schematization.

4. Utilization strategy of PPGIS and network info tech in urban-rural schematization

4.1. Analysis of urban-rural schematization based on network info tech

The analysis of urban-rural schematization based on network info tech includes the balance analysis of urban-rural land use schematization, the analysis of schematization technical indicators, the analysis of schematization road network, the analysis of schematization green space, the analysis of population size and distribution, the analysis of spatial relationship between supporting facilities and residential population, and the evaluation of urban-rural land rent, as shown in Figure 3 below. Draw support from of spatial measurement and analysis function of PPGIS, urban-rural buffer area is established to realize topology overlay, feature extraction and neighborhood analysis.
4.2. Utilization strategy of PPGIS in urban-rural schematization based on network info tech

Draw support from of remote sensing data and PPGIS powerful management and analysis function of urban-rural geospatial info, accurate calculation of urban-rural population density and building capacity [10]. Through the analysis of various technical and economic indicators of urban-rural master schematization, the calculation of demolition indicators in the process of urban-rural schematization and road widening and reconstruction is completed, so as to determine the nature of various types of land, assist the selection of urban-rural land and the reasonable site selection of construction projects. Secondly, draw support from of the integration of network info tech and PPGIS, the roads in urban-rural areas are planned in detail, including road section, control point coordinates and elevation, so as to reasonably arrange the location and land use of various engineering pipelines and engineering buildings in the urban-rural schematization area.

In addition, the visibility analysis function of PPGIS is used to test the visibility of a point to the surrounding area, and the visibility analysis of points and lines is carried out to carry out 3D virtual reality analysis in urban-rural schematization. With the integration of geographic info system, remote sensing system and GPS, it can provide direct data service, fast track, observe, analyze and simulate the observed dynamic changes.

5. Conclusion

In summary, the integration of computer info, intelligent tech and GIS provides an important support for the storage and management of a large number of data and info generated in the process of urban-rural schematization. Through the analysis of the connotation, typical features and functions of PPGIS, this paper studies the connotation and utilization framework of PPGIS. Through the research on the utilization of PPGIS in urban-rural schematization, this paper analyzes the specific utilization of PPGIS in urban-rural schematization status survey and PPGIS in urban-rural schematization status survey. By analyzing the utilization strategy of PPGIS and network info tech in urban-rural schematization, the urban-rural schematization process based on network info tech is studied.

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