Research on Smart City Planning Management System based on Multi-source Data and Multi Planning Integration

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In order to better promote urban development, This paper puts forward the research of smart city planning management system based on multi-source data and multi planning, and discusses the application of data mining in urban data management from three aspects of information management, information management and data management, so as to realize scientific, efficient and comprehensive urban planning management. To promote and improve the planning and management of smart city, it is necessary to establish a unified standard system, integrate all kinds of planning materials, establish a collaborative mechanism for smart city planning and management based on the principle of multi-source data and multi planning, and build a three-dimensional planning platform for public participation in smart city planning and management, so as to make planning standardized, collaborative and open, and ensure the scientific and reasonable planning and management of smart city.

Keywords: Multi-source data; Multigauge integration; Smart city; Planning system; Collaboration mechanism
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INTRODUCTION

With the disorder development of construction land, excessive population concentration, traffic congestion, ecological environment deterioration and other "urban disease" problems become increasingly serious, the traditional urbanization model is difficult to continue, so the state puts forward a new urbanization strategy. Under the background of new urbanization, China's urban and rural planning is facing the transformation from "blueprint planning" to "process planning", from "incremental planning" to "stock planning", and from "doing things by themselves" to "integrating multiple plans". These changes urgently need to be realized by means of informatization.With the rapid development of cloud computing, big data, Internet and other new generation of information technology, data acquisition, processing, computing, storage and sharing capabilities are greatly improved, which provides a strong technical support for planning informatization construction. Planning Informatization is developing rapidly in China. At present, it mainly focuses on the construction of planning big data, e-government, one map, multi planning platform construction and so on. In the future, "collaborative, online and intelligent" will be the focus of planning informatization construction.

With the rapid development of information technology, the era of big data provides new ideas for smart city planning and management. With the advent of the era of big data, profound changes have taken place in urban spatial structure and residents' spatial activities. Based on the research of urban planning management and implementation methods based on multi-source data and multi planning, a simulation model is constructed to effectively count the dynamic evolution of smart city planning management[1]. In the research process of smart city planning management system based on multi-source data and multi planning integration, it is necessary to adhere to the people-oriented urban planning concept,

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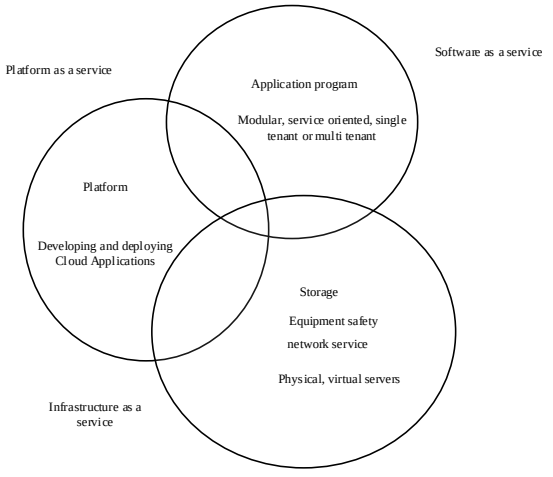
comprehensively implement the urban planning concept of multi-source data and multi planning integration, take the construction of ecological harmonious society as the planning goal and focus, introduce public participation in urban planning decision-making through innovative application of new technologies and methods, and gradually realize the transformation of planning to public policy Change[2]. At present, most of the research on urban planning and management in China is from the perspective of public value or decentralization. Starting from the concept of people-oriented planning, combined with the research results of scholars at home and abroad on the application of big data to urban planning management, this paper proposes a smart urban planning and management system Research Based on multi-source data and multi planning, so as to promote the reform of urban planning management system and innovate urban planning management mode, improve the scientific and refined level of urban planning management, and build intelligent management unit from big data, informatization, intelligent and other aspects. To provide integrated and highly efficient new data services for the whole life cycle of planning, build a service system oriented to information sharing, online analysis and multi-party collaboration, improve the sharing ability of information resources, and realize online collaboration in the whole life cycle of planning, so as to provide technical support for promoting "multi planning integration" and smart city construction.

SMART CITY PLANNING MANAGEMENT SYSTEM

Structure Optimization of Smart City Planning Management System

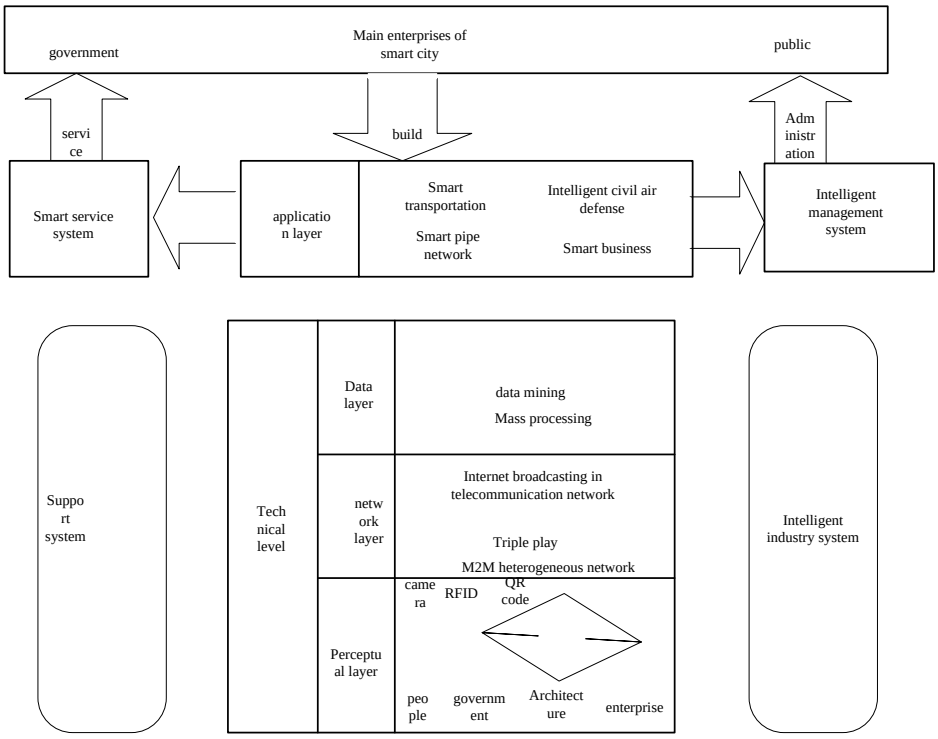
Smart city planning based on multi-source data and multi planning has the advantages of informatization and big data. In order to ensure the rationality of smart city planning management, we should establish a unified smart city planning management standard system, departmental cooperation mechanism, three-dimensional planning platform, public participation and other means, so that urban planning management can run through all aspects of planning preparation, planning approval, planning implementation, etc[3]. To realize the standardization, coordination, three-dimensional and public planning management, to form the intelligent urban planning management, and to promote the "smart" development of the city. Based on multi-source data and multi planning integration of smart city planning management system, big data, as the cornerstone of intelligent planning management, provides a new idea for urban planning management. Smart city planning management breaks through the limitation of traditional system on data and promotes the sharing of massive data[4]. At the same time, big data provides a new technical means for urban planning, which transforms various phenomena in urban society, economy and natural environment into data, and provides a large number of multi-source and dynamic data for urban planning circle[5]. Through the analysis of a large number of multi-source and dynamic data, the knowledge hidden in the data is mined, the relationship between urban environmental factors is reflected, and the scientific and reasonable decision support environment is provided for the relationship between urban residents' behavior and urban space, and the planning is adjusted timely and effectively, and an intelligent urban planning management and timely feedback mechanism is formed[6]. In order to better the effect of smart city planning and management, the related factors of smart city planning and management are analyzed and optimized, as shown in the Figure 1:

Fig. 1
Related factors of smart city planning and management



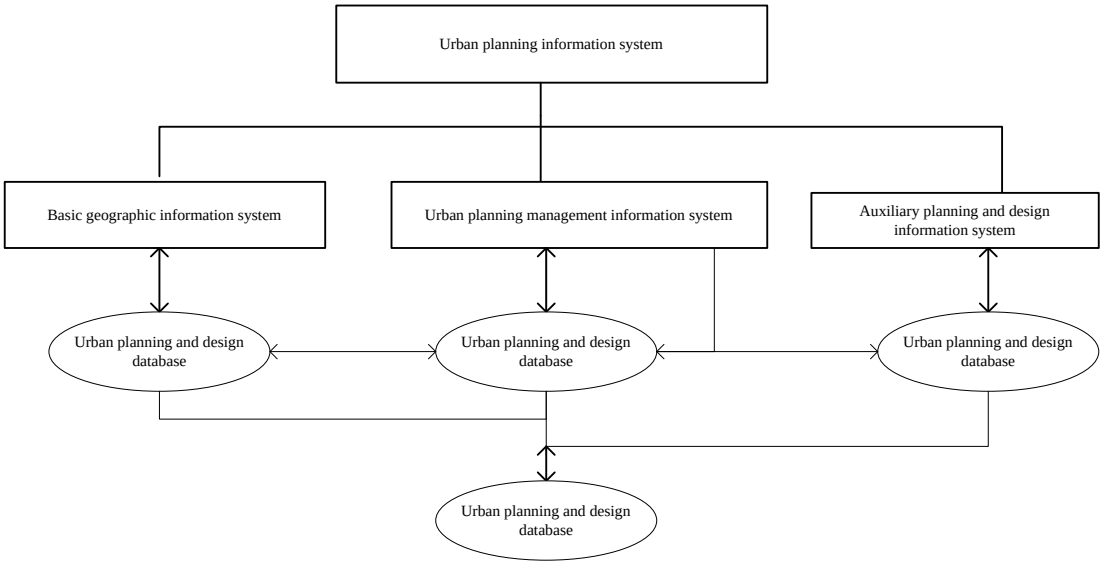
Smart city planning management index is a platform for citizens to participate. By mining and analyzing the related factors of smart city planning management in the above figure, we can better reveal the complex non spatial transaction information hidden in the urban space, stimulate public participation through data analysis and exchange, and realize the management mode transformation from planning preparation to planning implementation, from planning supervision to planning management by using multi-source data and multi planning principle[7]. Based on the Internet of things and other communication networks, smart city builds entity perception platform, processes a large amount of data in the sensing layer quickly through cloud computing, realizes the collaborative operation of various functional modules, and forms a new urban development mode of high-tech integration, high-yield industrial development, high-efficiency service and convenience[8]. To build a smart city, it is necessary to comprehensively and deeply perceive the city, use multi-source data and multi planning method to perceive the current situation of the city, realize resource sharing, use big data technology to mine the relationship between various elements of the city, and feed back the information to the core analysis system, so as to realize the comprehensive intelligent management of the city[9]. Based on this, the framework structure of smart city system is optimized, as shown in the Figure 2:

Fig.2
framework of smart city system



After analysis, the intelligent urban planning management system is mainly composed of technology layer, main body layer, industry layer , support service layer and infrastructure layer. The infrastructure layer provides hardware support for the normal operation of the platform, including various servers (application server, communication server, database server), storage equipment, network equipment, etc. Among them, the technology layer includes perception, network and data layer, which is the foundation of building smart city[10]. It is necessary to carry out urban planning management information, site planning management, construction project planning permit management, and realize the unified processing of forms, graphics, text and other businesses in combination with multi-source data and multi planning integration method[11]. According to the workflow, a series of business and management authority integration such as approval, approval and permission of completed projects are carried out, so as to realize the management of urban planning basic information system. Based on this, the structural relationship of urban planning information system is optimized, as shown in the Figure 3:

Fig. 3
Optimization of urban planning information system structure

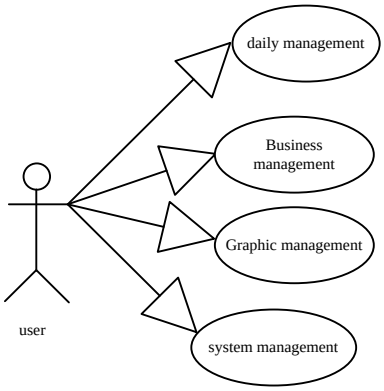


The function modules of urban planning management system are designed and developed by using multi-source data and multi planning integration method. Interface personalization is the basic requirement for the effect[12]. It focuses on personalized operation according to the user's specific requirements, so that the user can have a good user experience after login, the system navigation is clear, the link is reasonable, and the user can operate quickly after login. After the implementation of the specific business function module, the security of the system program and database information can be ensured through the specific access to the system.

Optimization of Smart City Planning and Management Steps

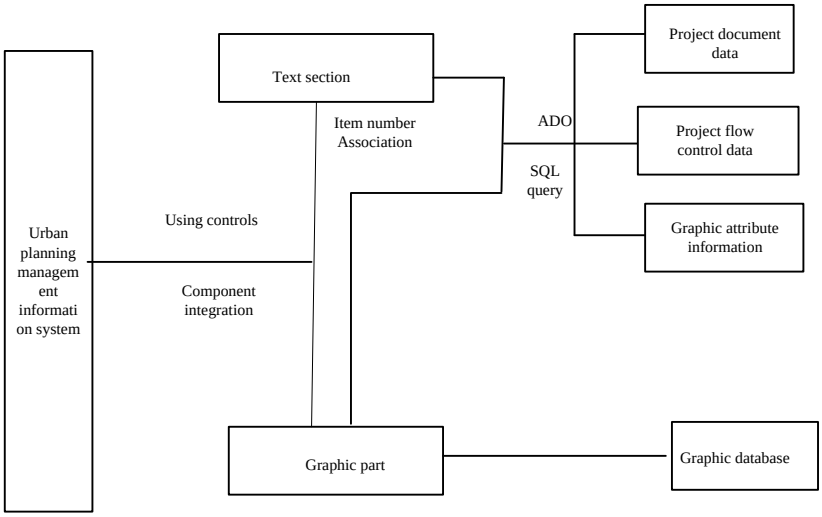
For the urban planning management information system, first of all, the relevant theory is analyzed, and then the demand analysis and overall design are carried out. Demand analysis the content of urban planning management system is to determine the functional requirements and non functional requirements in business development[13]. This paper mainly introduces the overall design of the system, including design ideas and overall design, the main content is the requirement analysis of software information management system. Through planning business data information, policy and regulation data information and other reference induction, measurement, comparison and other comprehensive business processing. According to the specific situation of the daily business of urban planning, the overall use case diagram is prepared and the information management system is established. In order to ensure the operation effect of the system, the use case steps of smart city planning management system are optimized, as shown in the Figure 4.

Fig. 4
use case diagram of smart city planning management system



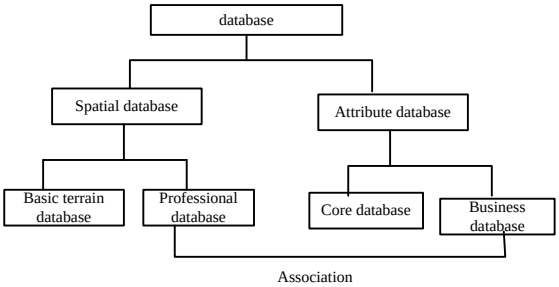
According to the overall use case shown in the above figure, the smart city planning management business is divided into daily management, business management, graphic management and system management. With business management as the main function, mainly responsible for the management of various urban planning business[14]. For the urban planning information management system, due to the diversification of business processing methods, especially the rapid development of the city and the increasing of geospatial information, this paper analyzes the specific functional requirements of the urban planning system, and uses Oracle database to store spatial data planning data, so as to realize multi planning and one processing standard. The system adopts VisualStudio.net C / s network structure, safe and reliable. Based on this, the overall software structure of the system is shown in the Figure 5.

Fig. 5
Overall software structure of the system



It can be seen from the overall software structure of the system that the main content of urban planning management system is the information management of text data and graphic data. The work of database design of urban planning management information system mainly aims at the content determined in the system demand analysis stage and design stage, determines the data information stored in the database, studies the conceptual structure design and physical structure design of the database, and completes the database business design based on the overall architecture design of the system[15-16]. According to the E-R diagram, the entity information in the urban planning management system is determined, and then the relationship between them is determined. Thus, a detailed database table is designed to realize the storage of various data information. Oracle database is used to store urban planning information management data. The Figure 6 shows the specific classification steps of urban planning data logic.

Fig. 6
logical classification steps of urban planning data

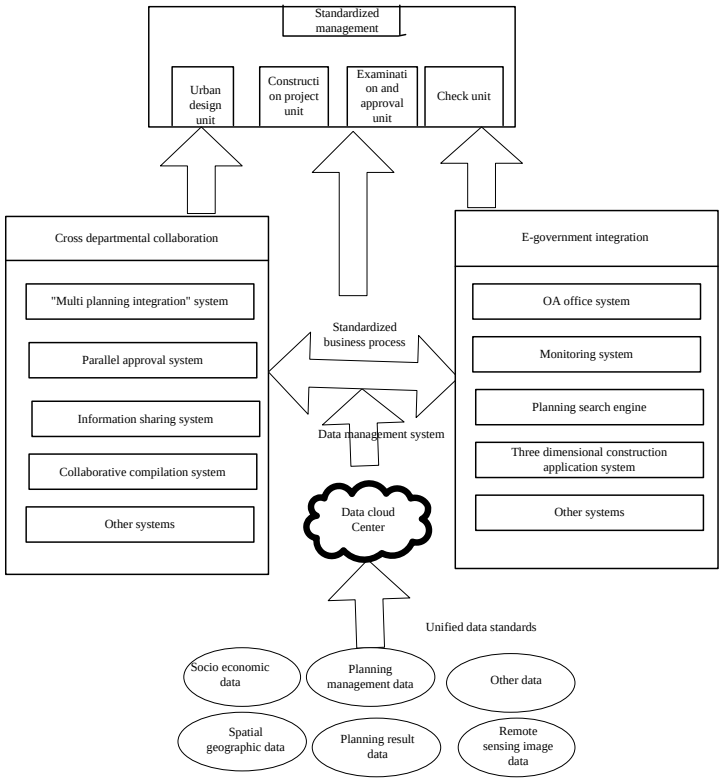


Based on the analysis of graphic database logic, the design data information of urban planning business management system is divided into two main parts: spatial database and attribute database[17]. The functions of the two are different. Spatial database: it is mainly divided into basic terrain database and professional database, which are respectively responsible for storing spatial data resources. Attribute database: mainly business database and core database, respectively responsible for storing the security data and configuration data of urban planning business management system.

Realization of Smart City Planning Management

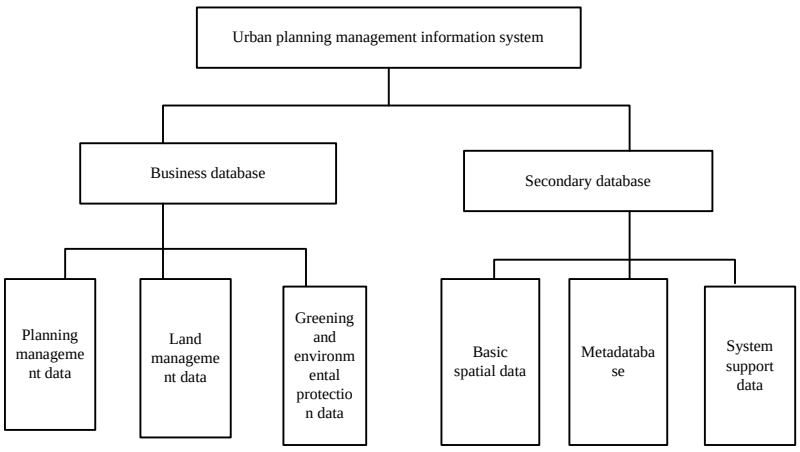
With the advent of the era of big data, it is necessary to establish a unified data management standard system and standardized business process system for planning approval, planning preparation, planning approval, construction project and other planning stages for different types and levels of relevant urban planning units. However, urban planning involves urban design units, construction project units, business process is not clear, work content and responsibility are not clear, it is urgent to establish a standardized management system[18-19]. The database design of urban planning management information system mainly includes two aspects: conceptual structure and entity structure. Conceptual design is the content of the system database entity design, which is to determine the real information of the system database from the user's point of view, analyze the attribute of the database entity combined with the specific business process, and give the name, type, length, space length and other specific information of each database table. At the same time, combined with the current situation and future planning of domestic urban planning and management informatization development The specific management steps are as follows:

Fig. 7
Standardized management of urban planning



Data and spatial database are the two main storage contents of urban planning management information system. Multi source data is mainly used for urban spatial data information and spatial entity related document data information. In the operation of the basic spatial information and urban planning thematic information, the spatial database is mainly used, with the basic spatial information as the main, and the document information related to the spatial entities as the main. This paper studies the logical structure of urban planning information system, determines the logical structure of system data information, and divides the data characteristic levels of urban planning management information system[20-21].

Fig. 8
Data feature hierarchy of urban planning management information system



The database in the figure is divided into business database and auxiliary database. The commercial database mainly includes planning management database, land management database and greening environment database. Auxiliary database is based on multi-source data and multi-compliance data. The system database table is introduced in detail.

The Table 1 shows the physical division of the specific database, urban planning management information planning data, as shown in the table.

Table 1
urban planning management information planning table

Field name	Field type	Can it be empty	constraint condition
Appeal_id	Int	Not null	Primary key constraint
User_id	Int	Null	Foreign key constraint
Appeal_email	Warchar(20)	Not null	information content

After a lot of preliminary research and demand investigation, the functional modules of the system are determined as shown in the figure. The graphic module of information system management can help users complete the relevant approval work, enable users to quickly, accurately and intuitively view the relevant geographic information in the approval documents, realize the reasonable planning of smart city and ensure the effect of urban data management.

ANALYSIS OF EXPERIMENTAL RESULTS

In order to verify the operation effect of the intelligent urban planning system based on multi data and multi planning in the practical application process, the simulation experiment is carried out, and the specific test environment of the urban planning business management system is given, and the test environment is configured, including the server side and the client side. Server: HP server with dl388 is mainly configured, with memory of at least 16g and 1 TB hard disk configuration, which plans to store and backup system data; client: ordinary customer management system will configure customers according to the business plan. For the urban planning management system, this paper introduces the function realization method used in the system test in detail. Specifically, function method includes function method and performance test method. In terms of function test content, the focus is on the specific test cases of each business function module. After the completion of each functional requirement, it is deployed to the urban planning management system for overall test. The specific performance data information is recorded by performance testing tools to determine the performance of urban planning management system. System users must log in to the system first and operate each function module concretely. The system provides the overall login window and information browsing interface of the planning management system. Users can browse the information directly on the system homepage. Users need to enter a specific account number to log in to the background business of the municipal management system, and operate according to the specific business. When testing the business function module, the user management module is used, which is first managed by the system business personnel. System testers write test cases according to the system requirements, and list the test cases of each business module.

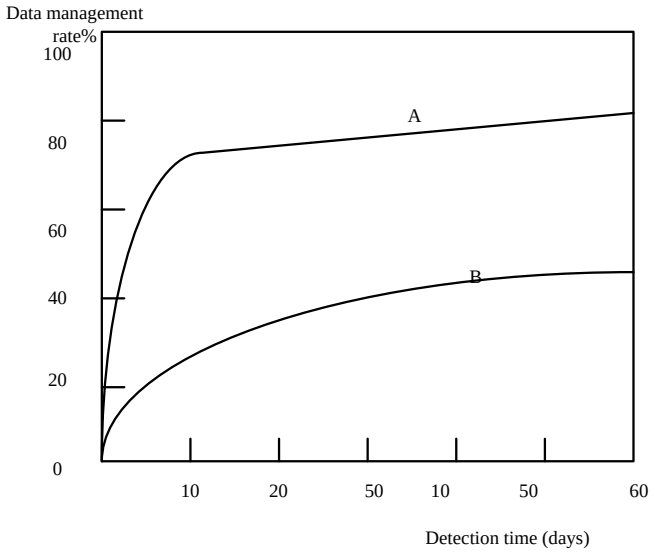
Table 2
test case table of urban planning management system

Test identification	1	System name	Design and implementation of urban planning management system
Tester	XXX	Design documents	User management function test
Test type	functional testing	Implementation date	October 2015
test method	Black box	date of observation	November 2015
Test description	The system administrator input personal information, log in the urban planning information management system, click the system management business function module, input the user's information, and the system carries out audit operation		
Preconditions	Users input information to complete information verification		
Test expectations	The user information added by the administrator completes the operation		
test result	It is consistent with the content determined by the demand analysis of urban planning information system		

According to the above experimental parameters, a comparative test was carried out. In order to observe and record the test results, the traditional test results are recorded as B. In this paper, A is used to record the detection results. The specific detection

methods are as follows:

Fig. 9
comparison test results



Based on the above detection results, under the same environment, the data processing efficiency of the smart city planning management system based on multiple data and multi planning integration proposed in this paper is significantly improved compared with the traditional methods in the actual operation process. The practice proves that the urban planning management system designed in this paper has higher rationality in the actual operation, which ensures the urban planning management Compared with the traditional test curve, its correctness has been significantly improved.

CONCLUSION

In the era of big data, the social, economic and natural environment of cities will become better and better. At the same time, under the new normal, urban planning will pay more attention to the changes of personal behavior, social values, historical and cultural heritage and new technology. The primary task of urban planning management is to meet the future challenges through management innovation and new technology. Smart city construction is the development direction of urban planning and management in the future. It is necessary to establish a standardized planning management system, integrate multi department data, standardize and optimize business processes, integrate, upgrade and reconstruct planning information platform. It analyzes the daily work of urban planning, proposes data requirements, designs system database and architecture, and establishes urban planning information management system.

However, due to the limited time of this study, more functions of smart city planning need to be further studied in future research. For example, online tips. According to the inherent planning constraints of the planning system, the online key points prompt function can automatically find the existing statutory plans and planning standards at all levels, put forward planning requirements (i.e. planning points) for the current planning under preparation, and push them to users in the form of graphics, text and tables. According to the conflict detection rules, the online conflict detection function can automatically identify the consistency and difference of the target planning and comparative planning submitted by users (the system can automatically identify) in the aspects of land layout, construction scale, rail transit, public services, municipal facilities, etc., so as to provide the basis for conflict coordination and planning decision-making. This is also the focus of future research.

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