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Research on Software Design of Network Resource Intelligent Management Platform Based on Internet of Things Technology

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Abstract

The technology in the research on the software design of the network resource intelligent management platform based on the Internet of Things technology effectively solves the proprietary efficiency problem. The software design can integrate the product line with the business. Solutions such as the original management platform did not address the proprietary efficiency measured by algorithms in an effective way. The successful development of the software design and research of the network resource intelligent management platform based on the Internet of Things technology has combined the management of network resources and business processes and various common technologies to form a network resource intelligent management platform of the Internet of Things technology, which brings convenience to life and work .

Keywords: *GIS technology, Cable TV network resources, Management;*

1. Introduction

Compared with the traditional network intelligent management, it is more transparent, efficient and low-cost, which saves a lot of space while improving the flexibility and scalability of operation[1-2]. There is still interconnection behind the advanced Internet of Things, which extends the circulation of goods on the basis of the Internet, converges the network and extends the network[3-4]. How to use the Internet of Things technology to achieve intelligent management of network resources? This came into being, the reorganization of resources is inevitable, and the emergence of comprehensive management platforms, many Internet companies optimize the structural design of the management platform based on the actual situation, and achieve the visibility of information[5-6].

2. Current situation of domestic cable TV network resource management

With the development of my country's cable TV network, the cable TV networks in many cities have been integrated and changed from decentralized operations to centralized management. The number of users has increased dramatically, and the scale of integrated business networks and the number of various types of equipment have increased day by day. The cable TV integrated service network basically adopts overhead and direct buried methods in most areas. The network is crisscrossed, intricately complex, and has a large amount of information. Its planning, construction, maintenance and management are extremely complex, and it only relies on traditional database systems and drawings The management of cable TV network resources is becoming more and more difficult, far from meeting the needs of current applications and future development, let alone scientific analysis, research, and decision-making of network resources. Management bottlenecks are mainly manifested in five aspects: (1) The design standards of network design are not uniform, and design results cannot be shared. (2) In terms of drawing management, it is difficult to update drawings, and the relevance and real-time of drawings are poor, which is easy to cause errors in construction, renovation and overall

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planning. (3) Network resource management As the scale of the cable TV network is expanding, the distribution area of network resources is becoming wider and wider, so it is more and more difficult to effectively use the network resources, which fails to achieve the goal of developing more users at the lowest cost (4) In terms of network operation, accurate data analysis for specific areas cannot be performed, such as network coverage, number of users, arrears rate, network access rate, etc., which affects the accuracy of decision-making and is not conducive to network planning and development. (5) In terms of customer service management, because the user location is not detailed, it is unable to accurately and timely handle the user's installation, migration, shutdown and maintenance services, resulting in poor customer service quality, low efficiency, and difficulty in charging.

3. Development and application status of GIS Internet of things technology at home and abroad

As a powerful computer management method, GIS has developed from the 1960s to today. With the rapid development of computer technology, the rapid development of space technology and the improvement of computer graphics theory, geographic information system technology is also becoming more mature and gradually Known and accepted by people, it has gradually matured. Especially since the 1990s, the application of GIS has become the technological foundation and daily office method for urban management modernization in developed countries. The US government will develop vigorously in the "Digital Earth Project" proposed in early 1998. One of the main technologies of GIS is GIS. In recent years, GIS technology has been successfully applied to nine major industries including resource management, automatic mapping, facility management, urban and regional planning, population and business management, transportation, oil and gas, education, and military. More than one hundred areas of the category, but also penetrated into the cable TV industry.

In the United States and developed countries, GIS technology has been applied in many fields such as environmental protection, resource protection, disaster prediction, investment evaluation, urban planning and construction, government management, etc. In recent years, with the rapid development of China's economic construction, geographic information systems have been accelerated In the process of application, GIS has played an important role in urban planning management, transportation, surveying and mapping, environmental protection, agriculture and other fields, and has achieved good economic and social benefits. There is no doubt that GIS technology will be deeply applied to human beings in this century. In all economic and production activities.

GIS has the ability to place all kinds of information of the cable TV network in its objective spatial distribution, and to manage and comprehensively analyze it. This is very consistent with the characteristics of multi-scale and large-space management of cable TV network information, and it is based on statistical analysis. Compared with traditional management information system (MIS), it has greater advantages. GIS is a means and method to implement effective and scientific management of cable TV network resources by using advanced computer, information engineering and other technologies. It is also a powerful assistant to help leaders conduct macro-decision analysis. GIS uses a powerful and effective spatial database to display complex geographic data in the form of graphics, and uses its secondary development components to develop a comprehensive and practical geographic information system software that is more relevant and functional. Intuitive and visual management of cable TV network resources.

As a low-cost and high-efficiency management method, the superiority of GIS in the cable TV network resource management system is prominently expressed in: (1) Compared with the traditional MIS system, the management method is

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more intuitive, spatial analysis and auxiliary decision-making And other advantages; (2) It can realize the whole process management from network planning and design to network operation and maintenance; (3) Network resource management adopts a spatial method to organize complex network information resources effectively, so that they can be configured in a targeted manner The resources of different regions improve the utilization of network resources. At the same time, various types of analysis can be performed directly on the electronic map, such as connectivity analysis, coverage analysis, etc.; (4) Auxiliary planning and engineering drawing management can realize network planning and design, and can automatically calculate various parameters. Generate various routing diagrams, schematic diagrams, etc., convenient maintenance of graphic data, provide powerful query and analysis functions, etc.; (5) In terms of network operation, through the interface between the monitoring system and the user voice complaint system, on the electronic map Directly locate the fault point, shorten the time from fault report to fault repair, improve network stability, and reduce service costs; (6) In terms of information sharing, information sharing between different departments can be achieved in order to make quick and effective Business decisions, promote the overall development of the enterprise.

At present, the rapid development of Internet technology provides a new and effective geographic information transmission carrier for GIS, making it possible to use spatial information processing technology in the Internet environment. Coupled with the development of component geographic information systems, GIS technology has unique advantages such as functional modularization and distributed establishment of systems. It has spatial information management characteristics that traditional computer management does not have. Therefore, the combination of GIS and cable TV network resource management Out of the ascendant trend.

4. Service method

The intelligent network resource collection and management system adopts the model of distributed data collection and centralized service. The central system is responsible for the centralized publishing and management of data, receiving IoT perception data, and harvesting metadata from various user units through OAI; the local system is used to collect and catalog metadata for ordinary users' intelligent network resources, and provide data harvesting and direction in OAI mode. The central system submits data and has the function of directly transmitting data with the central system. The system service mode is shown in Figure 1.

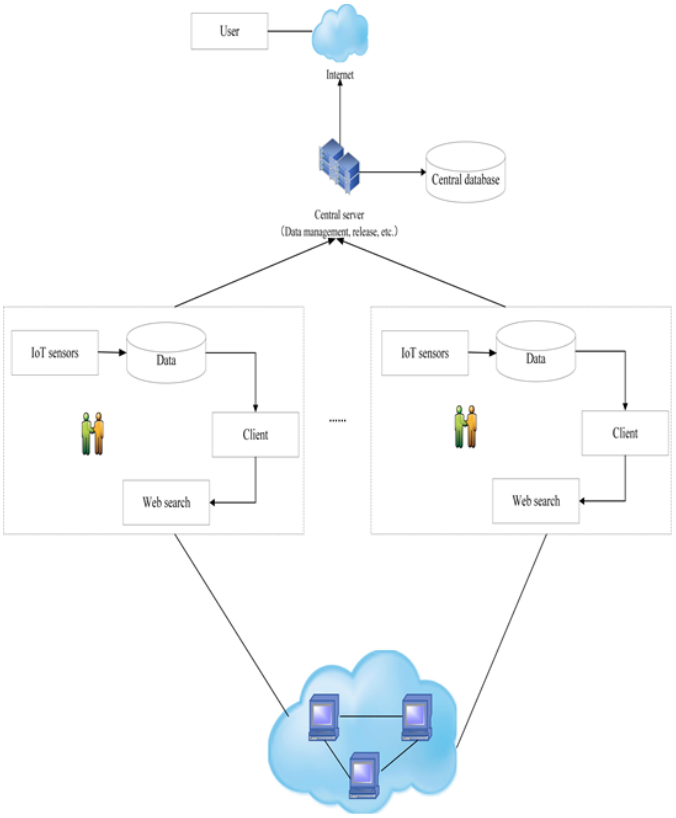

Figure 1. Diagram of the system service mode that relies on IoT perception technology.

5. System technical points

Compared with the current similar systems, this system adopts standardized protocols, fast full-text search technology and certain data mining technology to realize network resources from collecting, cataloging, removing duplicates, providing harvesting or data transmission, central harvesting, and data quality verification. The whole

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set of systems are organically combined to complete the process of project data processing, making this set of intelligent network resource collection and management system possess better intelligence and advancement.

5.1. Standardized Agreement

The entire system contains several sub-projects, which must be unified using a unified technical specification. In the implementation of this system, the OAI protocol is adopted as the protocol between the navigation library center and the local data harvesting. In the communication with CALIS center, we strictly follow CALIS's relevant specifications. In addition, in order to build the navigation library project into an open-architecture computer system, we also follow other mature and widely adopted industry specifications.

5.2. Fast full-text search

Whether it can provide users with fast retrieval services is an important factor in measuring the success of the navigation library center system. In the implementation of this system, a combination of field search and full text search is adopted. Full text search can ensure that users can easily search for information in the navigation database, while field search can enable advanced users to quickly and accurately search for data within a certain range on the premise that certain conditions are met.

If the posterior distribution function $p\left(x_t|z_{0:t}\right)$ of the variable x_t before quick retrieval, then the mathematical expectation of any function is shown in equation (1):

$$E\left(g_t\left(x_t\right)\right)=\int g_t\left(x_t\right)p\left(x_t|z_{0:t}\right)dx_t \quad (1)$$

Among them, the discrete sample $\left\{x_t^i, i=0,\cdots,N\right\}$ is a sample sequence generated by sampling from the posterior distribution function $f\left(x|z\right)$. When N is large enough, $\overline{E}\left(g_t\left(x_t\right)\right)$ definitely converges to $E\left(g_t\left(x_t\right)\right)$, then how to get the posterior distribution function becomes the key to the problem.

5.3. Local system with data mining capabilities

The local system serves as OAI DP (OAI Data-Provider) to provide data to the database center, which comes from the Internet. Therefore, how to ensure the collection of high-quality content from the Internet has become the key to the local system. As a data mining system, the local system of the navigation library has the following core functions: a. Web page download module, in addition to html and htm formats, it also supports PDF, DOC, RTF, PPT formats. b. Web page filtering module, the resource collected from the Internet, the filtering module can filter out those junk information. c. Web page automatic classification module. Through manual intervention, the rough division of secondary subjects can be realized and the workload of staff can be reduced. d. Automatic cataloging module. Automatically extract webpage files, or automatically extract metadata from articles or extract part of metadata through custom templates.

5.4. Central System

The central system is composed of five parts: website basic service subsystem, metadata management subsystem, metadata publishing and retrieval subsystem, system management subsystem and interface system.

(1) The basic service subsystem of the website. The main functions are navigation, resources, personalized services, community (resource comments, feedback), site help (FAQ, site map and related Web site links), tools (online survey), etc.

(2) Metadata management subsystem. It is used to add, modify, edit, check duplicate, quality control, audit, dump, import and export, backup and other processing of metadata in the temporary database and the official database.

(3) Metadata publishing and retrieval subsystem. The main functions are: metadata release, the administrator can release the pre-released record data of different disciplines in the official library according to a certain release strategy, and the release result is a catalog theme gateway of a discipline; browse, for the released metadata , The

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central system provides readers with Web browsing functions that include sorting methods such as first-level discipline, second-level discipline, title name, first-level discipline, second-level discipline, time, etc., or other sorting browsing functions; search and match navigation Field search is performed for each item in the metadata record of the library metadata specification, and full-text search is supported.

(4) System management. Mainly include user management, log and statistics management, monitoring and alarm, OAI harvest management, proxy server and system parameter settings and other main functions.

(5) Interface system. The protocol interface between the navigation library and other CALIS sub-projects, such as ODL-MAP (CALIS Open Digital Library-Metadata Access Protocol), is mainly used to support the retrieval and browsing of metadata of the navigation library by the CALIS digital TV portal. CVRS interface, through which consultation requests can be sent to the local consultation desk or the CVRS central virtual reference desk, as well as the unified authentication interface.

5.4. Local system

The local system consists of four parts: web search subsystem, cataloging subsystem, system management and system interface. The data of the local system is divided into three parts: webpage database, metadata temporary database, and official metadata database. The web searcher uses the web search subsystem to put the searched web page information into the web database. The cataloger selects the web page information needed for cataloging from the web database, and catalogs these web resources with metadata in the cataloging subsystem. The catalog data is stored in the metadata temporary database. After approval, the metadata is transferred to the official metadata database. The metadata in the formal database can be harvested by the central system in OAI mode. The cataloging module is well integrated with the web search subsystem.

(1) Web search subsystem. It has the functions of manual assistance, computer automatic execution, and automatic search for Web resources of a certain subject. The search robot can automatically obtain network academic resources of a certain subject through manual restriction methods. The main functions of the subsystem include: a. Limit the search range. It mainly collects web documents with certain academic value in various disciplines on the Internet. b. Supports multiple search strategies. Start collecting from the recommended URL link collection (such as robot.txt), and analyze the internal links of the searched documents and search accordingly; you can perform internal link analysis and search from the URLs that have been cataloged by the librarian; Perform domain name limited search (such as limited .edu or .net or deeper domain names); search by keyword or keyword combination, etc. In addition, by performing the same text analysis, the search subsystem has the ability to semi-automatically or fully automatically discover and identify some high-quality Internet resources, so that the searched resources are as far as possible the academic resources on the Web of a certain subject rather than junk resources . c. Integration with general search engines. The popular search engines google, baidu, tianwang (and so on) can be seamlessly integrated into the local system, and all the search results of the engines are analyzed and summarized for catalogers to choose to catalog. d. Automatic classification or clustering function. Automatically from each document Extract some key phrases (keywords), use these subject terms to compare with the library that the librarian has classified, if they meet certain criteria, they will be judged into the same subject category, so that automatic clustering by subject can be realized. e. Configurable Characteristic. Search time setting, different search limits, search strategy, incremental search or re search, etc.

(2) Cataloging subsystem. It is used by catalogers to perform metadata description and cataloging of

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the searched network resources. Cataloging metadata is stored in the local temporary database, and can only be transferred to the local official database after being approved. a. Manual cataloging. Each user performs systematic indexing of the searched resources in accordance with the prescribed metadata standards and description rules to provide them to the central server for harvesting. Each field of the metadata record can be used for retrieval and navigation purposes. The description of resources should follow metadata standards and network resource type settings. b. Automatic cataloging. Metadata or part of metadata can be automatically extracted from webpage files to reduce the workload of cataloging personnel.

6. Benefit analysis

6.1. Economic benefits

Through the application of GIS in cable TV network resource management, economic benefits can be significantly improved, which is embodied in the following aspects: (1) Realize the informationization of network resource management and data sharing, and avoid losses caused by inconsistent data (2) Reduce labor and office costs, improve work efficiency, and effectively protect the labor results and intellectual property rights of the enterprise, and avoid information loss caused by the change of thousands of personnel; (3) Through the spatial management of various resources, master The distribution and operating conditions of the entire network resources are updated and maintained in time for network changes to achieve the purpose of effective resource allocation and avoid unnecessary waste; (4) Through the computer-aided design of the network, the unified management of engineering drawings is realized , Correct the errors in the drawings in time, reduce the loss caused by the unclear location or inconsistent drawings in the actual network planning or construction, and realize the scientific and effective management of the project; (5) Through the historical records of the installation and maintenance of resources, it is convenient Thousands of maintenance departments keep abreast of the equipment resource performance and operation and maintenance of the entire network, improve equipment utilization, and save investment; (6) Help shorten maintenance personnel's troubleshooting time, improve work efficiency, reduce misoperations, and reduce maintenance costs (7) Help thousands of enterprise leaders to fully understand the operating conditions of network resources, and improve the scientificity and reliability of decision-making.

6.2. Social benefits

Strengthen the network's security monitoring and fault response capabilities to ensure the smooth flow of network transmission;

Improving the efficiency of network management and the ability of social information services, such as shortening the response time of installation and repairs, etc. can improve the corporate image and increase user satisfaction.

7. Conclusions

This article analyzes and studies the advantages and disadvantages of network resource management. The intelligent management of network resources of the Internet of Things technology is inevitable when entering the Internet era; combined with the management advantages and disadvantages of the TV industry, analyzes the strengths of intelligent management of the Internet of Things technology, and then conducts financial analysis , The network resource intelligent management platform will bring huge benefits, and the existing problems of the TV industry network can be further discovered through the intelligent management system, so as to reduce costs and achieve results that are satisfactory to the public.

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