

The application of bigdata for Intelligent building

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Abstract. Intelligent buildings have become an important development trend in the current construction industry. Compared with traditional buildings, intelligent buildings have shown obvious advantages in many aspects, especially in the embodiment of humanized value, which has attracted great attention. In the information age, any industry is inseparable from the technology of the Internet. With the continuous development and maturity of Internet technology, the construction industry will also combine Internet-related technologies to realize intelligent buildings. This paper summarizes the application of big data in smart buildings, mainly including the application of big data in smart home, smart energy, etc., and summarizes the problems existing in the application of big data in smart buildings, and proposes the future The development suggestions for the application of big data in intelligent buildings.

Keywords: Intelligent building; Bigdata.

1. Introduction

The rapid development of the Internet era and the maturity and application of various information technologies have produced a large amount of Internet data. Morgan's Law of the computer shows that the amount of data in the world can double every two years. Data is not literally massive data, it has its own characteristics: diversity, high speed, low density and high price. With the gradual development and maturity of big data technology, the fields of application are gradually expanding. Big data has had a huge impact in the entire construction field, especially in intelligent buildings, from construction equipment, to building network systems, and then to building software. In terms of control and other aspects, under the background of big data, the development of intelligent buildings has shown a vigorous trend.

In the social development, the progress of science and technology has played an important role. In the field of intelligent building research, with the comprehensive application of various technologies, the application scope of intelligent buildings has also been expanded, and it has begun to move towards intelligent applications. It has developed in various aspects, and formed different application systems, providing various services for people's production and life, and also making the building operation process more green and environmentally friendly, fully meeting the needs of sustainable development. Big data is a new development model of information data, which realizes the acquisition of huge data from multiple and different channels. It is an information asset with a large amount, high speed and value. With the development and application of cloud technology, big data has a broader development space and is applied in different fields. At present, from the planning and design of intelligent buildings at the beginning of construction, to construction in the middle, and operation in the later stage, a large amount of data on cost, materials, construction, technology, will be generated. The collection of the various data makes the construction industry itself a huge data carrier, so that the building has a large amount of data, which has a high value. In the construction of intelligent buildings, the thinking of big data is often used, and the collection, storage, analysis and other skills related to big data are used to provide a real and reliable data basis for intelligent building decision-making.

The original proposal of intelligent building is to meet people's more functional needs, make people more convenient and comfortable in the process of living, and give full play to the basic advantages of the building to realize the efficient operation of the building. Intelligent buildings enable different structural parts to function as a sub-system in the system, so that the building becomes

a whole, which facilitates more scientific management of the building and relieves the difficulties of management work. Smart application in intelligent buildings refers to the combination of traditional technologies and equipment through various modern new technologies including big data, cloud technology, Internet of Things, smart interconnection, modern communication technology, artificial intelligence and other technologies. Innovative applications play an important role in the application of these technologies and equipment to intelligent buildings, but it does not mean that the intelligent building itself has wisdom, but the use of these technologies to achieve transitional development, so that intelligent buildings become smarter.

2. The Application of big data in smart security of intelligent building

With the advancement of a new round of information technology revolution, cloud technology, big data, Internet of Things, mobile Internet, artificial intelligence, GIS and other technologies have all developed rapidly, and have been applied and expanded in different industries. In the construction industry, smart home service is a development direction that people pay more attention to at present.

The application of new technologies in intelligent buildings have promoted the construction of smart security service systems. One of the important contents is to realize the transition from traditional safety to smart security. The more common systems in this field include anti-theft alarm systems that can realize security defense around buildings, construction areas, open areas of certain units and enterprise buildings, and placement of physical equipment and equipment; Real-time monitoring can realize the video monitoring and alarm system for the main public places and important parts of the building; the access control and alarm system for the management and monitoring of the entrance and exit of the building. During the construction of the system, big data technology has played an important role, which can realize a large amount of storage of various data, and improve the recognition rate and alarm effect through intelligent analysis.

In the construction of the smart home and smart housing service system, another important content is the smart home service. The function of this aspect is mainly based on the smart community and home intelligence. In the realization of home intelligence, it is mainly realized by home intelligent management system, which includes home security, home equipment automation, home communication and other aspects. In the specific operation control of the system, it is composed of information platform and multimedia platform. It can adjust various performance intelligently according to the needs of users, which is very user-friendly. With the continuous development of technology, the current home intelligence has been greatly expanded in system construction, and has achieved good results in home wiring systems, security systems, remote metering systems, home appliance automation and other systems, as well as home information services.

3. The Application of big data in smart energy services of intelligent building

In the intelligent buildings, with the continuous expansion of building functions, electrical equipment with different functions is gradually increasing, and the demand for electricity is also increasing, which makes innovative research on electricity supply more and more important. The current advanced metering systems and smart meters based on big data computing provide convenience for the management of power systems. Various clean energy based on smart grid big data such as solar energy, wind energy, nuclear energy, biomass energy, geothermal energy, water energy and other power generation forms have begun to be used comprehensively, realizing the effect of energy saving and emission reduction, and reducing the use of non-renewable energy. In the combination of electric energy, light energy and interconnected communication technology, people can realize that when the LED lights are turned on, High-speed Internet access can be achieved. The chips in this LED light also have functions such as wireless routers, communication base stations and GPS. It has the advantages of fast internet access, green and no radiation, and energy-saving lamps, enabling people to surf the internet in a healthy way. The use of water meters saves electricity and

Internet access costs; smart water meters based on big data, microelectronics, sensing, smart IC and other technologies can not only facilitate people to read the water meter, but also realize the storage function of water consumption data, and automatically complete the ladder. It can calculate the water price of the water price, and can realize the intelligent control of the water consumption according to the agreement, and realize the saving of water resources.

With the application of big data, intelligent buildings make traditional buildings more intelligent through technologies such as various sensors, and making intelligent buildings more human-like. The buildings in the future will be more in line with people's aesthetics, and will also use more energy-saving and environmentally friendly materials. Environmentally friendly ecological environment makes healthy life and smart life a reality.

4. Problems and suggestions of big data application in the intelligent buildings

Big data technology is a new information processing mode, which can realize the comprehensive integration, processing and management of data, and can process and manage massive data for classification. Although it has great technical advantages, it can be used for wisdom. In terms of application, it provides data support and improves the application function, but this technology also needs to meet sufficient conditions in order to realize its specific role. At present, in the construction industry, there are still many limiting factors, which affect the specific application of big data technology. The main problems in satisfying the conditions are, first of all, the database construction with various datasets, and the validity of the search engine for data acquisition from the database. The effective connection with the database is not complete; the second is the government's policy support and the improvement of relevant laws and regulations and constraints, which need to be managed in a more standardized manner, and the industry should be given certain development authority to make it more open; in addition, competition and cooperation between different enterprises also have a great impact on the sharing and coordinated application of data. So, different enterprises usually develop different large database platforms and have different search engines. The selection of appropriate software among various complex software types will affect the specific role and operation efficiency of the platform. In the construction of the big database platform, the financial support of the enterprise, talent support with professional technical level, reliable network system and intelligent gateway guarantee, these are all crucial. In addition, the full integration of big data technology and cloud technology is also very important, lack of cloud technology support, the application and role of big data technology will be more difficult to play.

Faced with the problems and development challenges of big data technology in the smart application of intelligent buildings, enterprises should conduct comprehensive thinking, and formulate strategic goals to address various problems and avoid detours in the future development. The attention can be increased from the following aspects. Firstly, through the introduction of talents, innovative research and development of new product and technology development concepts should have its uniqueness and quality assurance.

The second is to make the smart application of smart buildings more scientific. Enterprises should pay more attention to the theoretical research on the realization of smart buildings from smart buildings, and through in-depth research and excavation, understand how to apply big data technology more scientifically and realize an effective method of combining multiple technologies, making the application of the technology more in-depth.

In addition, enterprises should grasp the development trends of the construction industry, relevant national policies and market demand changes, as well as new development trends in the research field of related technologies, so that enterprises can keep pace with the times in their development, and use This is the basis for appropriate innovation and adjustment of technological applications. At present, in the development of intelligent buildings, the commonly used BIM technology is mainly to realize the design and management work in building construction. In the future development, enterprises should make more use of the various advantages of BIM technology and integrate BIM technology

with the big database of intelligent buildings. It can be combined to provide support services for its more effective realization of smart applications. For example, the construction of various systems in smart applications can be more scientific and reasonable by using BIM models.

5. Conclusion

With the advent of the information age and the innovation and development of various new technologies, it has brought great development opportunities for the development of various industries. In this regard, the construction industry can better promote transformation and achieve breakthroughs. It is also necessary to keep up with the pace of current developments, improve the development level of intelligent buildings, and improve the overall functionality of the building through the application of new technologies, so as to achieve better application and expansion of new technologies, so that people can experience in production and life. Smarter application plays an important role in the ultimate realization of the construction goal of smart city.

References

- [1] Wong J K W, Li H, Wang S W. Intelligent building research: a review[J]. Automation in construction, 2005, 14(1): 143-159.
- [2] So A T, Chan W L. Intelligent building systems[M]. Springer Science & Business Media, 1999.
- [3] Finley M R, Karakura A, Nbogni R. Survey of intelligent building concepts[J]. IEEE Communications Magazine, 1991, 29(4): 18-23.
- [4] Doukas H, Patlitzianas K D, Iatropoulos K, et al. Intelligent building energy management system using rule sets[J]. Building and environment, 2007, 42(10): 3562-3569.
- [5] Wong J, Li H, Lai J. Evaluating the system intelligence of the intelligent building systems: Part 1: Development of key intelligent indicators and conceptual analytical framework[J]. Automation in construction, 2008, 17(3): 284-302.
- [6] Yang J, Peng H. Decision support to the application of intelligent building technologies[J]. Renewable energy, 2001, 22(1-3): 67-77.
- [7] Rathore M M, Paul A, Ahmad A, et al. Hadoop-based intelligent care system (HICS) analytical approach for big data in IoT[J]. ACM Transactions on Internet Technology (TOIT), 2017, 18(1): 1-24.
- [8] Plageras A P, Psannis K E, Stergiou C, et al. Efficient IoT-based sensor BIG Data collection–processing and analysis in smart buildings[J]. Future Generation Computer Systems, 2018, 82: 349-357.
- [9] Yuan L. Niagara Framework Technology for Cloud Edge Collaborative Intelligent Building Management System[C]//International conference on Big Data Analytics for Cyber-Physical-Systems. Springer, Singapore, 2021: 1277-1283.
- [10] Zhu H, Xu Z, Huang Y. Research on the security technology of big data information[C]//International Conference on Information Technology and Management Innovation. 2015: 1041-1044.
- [11] Marinakis V, Doukas H, Tsapelas J, et al. From big data to smart energy services: An application for intelligent energy management[J]. Future Generation Computer Systems, 2020, 110: 572-586.
- [12] Moreno M V, Dufour L, Skarmeta A F, et al. Big data: the key to energy efficiency in smart buildings[J]. Soft Computing, 2016, 20(5): 1749-1762.
- [13] Qolomany B, Al-Fuqaha A, Gupta A, et al. Leveraging machine learning and big data for smart buildings: A comprehensive survey[J]. IEEE Access, 2019, 7: 90316-90356.
- [14] Bilal M, Oyedele L O, Qadir J, et al. Big Data in the construction industry: A review of present status, opportunities, and future trends[J]. Advanced engineering informatics, 2016, 30(3): 500-521.
- [15] Benhlila L. Big data management for healthcare systems: architecture, requirements, and implementation[J]. Advances in bioinformatics, 2018, 2018.