Discussion on the Integration and Development Trend of 5G Communication Technology and Artificial Intelligence in Smart City

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Abstract: The construction of smart cities is based on information systems and provides more convenient conditions for urban management through the application of collection and transmission technologies. With the promotion and application of 5G networks, this technology has greatly promoted the development of artificial intelligence by virtue of its advantages of high bandwidth and low latency, which provides a good environment for the rational operation of artificial intelligence technology. In this context, the construction planning of a new smart city can also be implemented. Therefore, this article conducts research on the integration and development trend of smart city 5G communication technology and artificial intelligence, hoping to provide assistance and reference for subsequent smart city construction and contribute to society.

1. Introduction

5G technology has gained rapid development and promotion in recent years, which has established a good foundation for the development of artificial intelligence. Combining 5G technology with artificial intelligence closely promotes the inevitable trend of smart city development. 5G technology can not only promote the rapid development of information technology, but also be applied to people's lives, thereby improving their living standards and quality of life. In the context of modern 5G communication, artificial intelligence can perform detailed and in-depth analysis of large amounts of data with low latency and high bandwidth, thereby improving the intelligent level of smart cities. It can be seen that strengthening the integrated development of 5G technology and artificial intelligence has a very positive effect on China's modernization development, can effectively improve the overall economic level of our country, promote the good development of all industries, and ensure the security and transmission quality of network information.

2. Overview of 5G Communication Technology and Artificial Intelligence

2.1. 5G Communication Technology

The core of 5G communication technology relies on cellular mobile communication, but it does not belong to the category of new wireless access technology. It has two basic characteristics: low network latency, as low as less than 1 ms, and high network speed, with peaks up to Mb/s. In addition to these two basic features, 5G communication technology has greater data capacity and faster data processing speed, and has lower usage costs, allowing for wide coverage and connectivity. The gradual application of 5G communication technology has greatly realized network convergence, enabling efficient and free communication between people and things. China's 5G network communication research entered its initial experimental phase in January 2016, lasting eight months. The formal experiment was completed in September 2016, and the second experimental phase was entered. In September 2017, the second experimental phase was also basically completed. In November of the same year, the Ministry of Industry and Information Technology of China announced the start of the third experimental phase. Finally, at the end of January 2019, the Ministry of Industry and Information Technology of China officially announced

that the experiment had been successfully completed and the network speed had been further improved.

2.2. Artificial Intelligence

Artificial intelligence technology itself is based on a large database and is a technology developed for information computation, retrieval, and reasoning. A large amount of information is stored in the database, which can greatly improve the retrieval speed and filter out relevant information when reading information through artificial intelligence technology. Artificial intelligence technology has a certain degree of self-learning ability, which can complete logical reasoning and sound image recognition through self-learning, helping people complete more complex tasks.

3. The Convergence Path of 5G Communication Technology and Artificial Intelligence in Smart City

3.1. 5G+Smart Devices

5G technology is a representative technology of current communication technology. As a new technology with significantly improved spectrum utilization, radio technology has been derived. With the support of this technology, it is possible to well perceive changes in the surrounding environment, thereby allowing intelligent devices to adjust system parameters to ensure that they are compatible with the spectrum rules. Fully integrating 5G communication technology with artificial intelligence can effectively solve the problem of resource constraints on intelligent devices. Artificial intelligence technology applies power transmission at disturbed temperatures and limits the number of spectra to achieve better control of power. In the context of the integration and development of 5G communication technology and artificial intelligence technology, it is possible to transform the server cloud of intelligent devices into a fragmented mobile device cloud, which can provide solid device resource support for intelligent construction and development in various fields.

3.2. 5G+Smart Factory

In the process of social development, factory development is also an important driving force. Improving factory production efficiency and reducing labor costs have been the unremitting pursuit of industrial development. With the support of 5G communication technology and artificial intelligence technology, it has gradually approached the above development goals and continuously improved the intelligent development level of the factory. Applying 5G communication technology to the intelligent construction of factories can improve the smooth connection of the network between factory automation equipment, and can realize the actual operation of the factory through the connection with intelligent equipment. Currently, there has been the emergence of a representative intelligent chemical plant, Saimo Electric. The intelligent chemical plant has clearly stated that it will build an intelligent chemical plant scenario with 5G communication companies, and is committed to building an industrial internet platform with Huawei. This initiative has provided a strong development force for promoting the in-depth application of 5G communication technology. With the support of artificial intelligence technology, the construction level of intelligent chemical plants will once again achieve leapfrog development, and will further realize the functions of mobile office, intelligent data collection, and video communication in factory intelligent office, which can significantly improve the operational efficiency of enterprises.

3.3. 5G+Intelligent Logistics

In the process of development, the logistics industry has gradually incorporated the connotation of intelligent development. With the integration of 5G communication technology and artificial intelligence technology, the logistics industry has achieved intelligent management in warehouse management, logistics distribution, packaging and inspection. In some regions, intelligent logistics and distribution robots have emerged in the logistics and distribution industry, which can locate

distribution areas and meet the needs of customers to transport goods. Currently, JD has also nearly built the first 5G intelligent logistics demonstration park, reflecting the in-depth application of 5G communication technology, autonomous driving technology, and intelligent operation technology in the logistics industry. It can also further achieve civil air defense linkage management within the intelligent logistics park, thereby effectively ensuring the safety of the park.

3.4. 5G+Intelligent Parking

Artificial intelligence has currently been applied to various fields of society, and intelligent parking platforms are a major manifestation. With the support of 5G technology, the intelligent parking platform will further develop into an intelligent parking cloud platform with a higher degree of intelligence and linkage, which can achieve the transmission and sharing of specific parking information across time and space. The application of "5G+artificial intelligence" in the parking field is specifically the AI high-level video technology mode. This mode can fully apply the advantages of 5G networks such as high speed and large bandwidth, enabling more efficient data interaction and cloud computing, and effectively expanding the capacity of parking management equipment. Moreover, supported by the low latency feature of 5G networks, it can significantly improve the precision recognition level of intelligent parking devices (as shown in Figure 1). When constructing an intelligent parking cloud platform, it is necessary to widely apply artificial intelligence technology. Simulation and virtual testing of the construction of the intelligent parking cloud platform should be carried out using artificial intelligence technology to ensure that the intelligent parking cloud platform put into use can operate safely and efficiently. In the "5G+artificial intelligence" mode, wireless communication technology, mobile terminal communication technology, and global real-time positioning technology will also be comprehensively applied, which can enrich the functions of the intelligent parking cloud platform, further collect, manage, find, and reserve urban parking spaces, and also provide navigation services, which can help solve "parking difficulties", "race for parking spaces", and other issues.

Figure 1 Intelligent parking in a 5G environment

3.5. 5G+Intelligent Shopping

In the consumer field, 5G communication technology and artificial intelligence technology are also gradually being applied. Currently, there has been an intelligent shopping project called "5G+fitting glasses". This project fully utilizes the advantages of high-speed and low latency of 5G communication networks, enabling customers to achieve remote fitting in intelligent simulation scenarios. In this fitting mode, camera recognition, database matching, and real scene simulation are required. Therefore, it is an intelligent service project that requires a high level of integration of 5G communication technology and artificial intelligence technology. Further in-depth research and practice are required to ensure that the project achieves high application benefits.

Figure 2 5G fitting magic mirror

3.6. 5G+Intelligent Tourism

In the context of the continuous improvement of living standards, people are paying more and more attention to spiritual consumption, resulting in the rise of the tourism industry. With the continuous increase in people's various tourism experiences, the quality requirements for tourism services are also increasingly high. Based on this, the tourism industry has also begun to actively explore new development models. The emergence of 5G technology and artificial intelligence technology has provided a new development opportunity for the tourism industry. Specifically, VR and 5G technology can be applied, and scene simulation can be conducted through artificial intelligence technology to provide a new tourism project, namely, immersive virtual tourism project. The emergence of this project can help people solve problems such as difficulty in traveling and lack of time to travel, and can provide users with an immersive tourism experience.

3.7. 5G+Intelligent Medical

In recent years, with the continuous development of modern society in China, the medical environment in China has also become extremely tense. With a large population, China is facing a lack of medical resources. The obvious problem is that different regions can provide different medical services. China's high-quality medical resources cannot be distributed to remote mountainous areas, which leads to the problem of difficulty in seeking medical treatment in some regions. Not only can high-quality doctors in large cities communicate with patients in mountainous areas in real time, but also based on artificial intelligence technology and 5G network low latency technology, it can even conduct telemedicine surgery and remote diagnosis and treatment, providing the highest quality medical services for different regions, which cannot be ignored in the construction of smart cities in China. However, due to the need for strict review of the development of medical technology, in the development of smart cities in recent years, this concept and technology still require time and relevant research to develop and optimize. Only in this way can China's medical industry be guaranteed guidance from 5G network technology and intelligent medical devices, and promote the comprehensive development of China's medical industry.

4. The Development Trend of the Integration of 5G Communication Technology and Artificial Intelligence in Smart Cities

Based on the changes in mobile networks, the smart city project needs to actively apply network media in its development process. Through the efficient application of Internet technology, it can accelerate the spread and efficiency of the Internet of Things, and also achieve efficient sharing of resource information. With the support of network platform technology, the Internet of Things can rely on various types of platform communication channels for resource integration, such as modern mobile payment and GPS positioning services. Alibaba Enterprise is an important representative of the Internet of Things industry, and various mobile services that promote applications are highly recognized by modern people. In the context of today's social development, the layout of the mobile Internet of Things has become more extensive. Through various mobile network platforms, it can promote the further promotion of intelligent life and the complexity of smart cities.

5. Conclusion

The intelligent application of 5G mobile communication technology in smart cities, such as smart transportation, smart healthcare, and smart home, is an important milestone in the development of 5G to promote smart cities. Of course, in this step-by-step development process, there have also been problems, such as the current personal information security that everyone is most concerned about, as well as the Internet of Things, and whether the crazy access of many mobile terminals will affect the user experience. These are all issues that we need to continuously optimize and solve. With the support of the general trend of intelligence, national policies, and people's living needs, the integration of 5G technology and artificial intelligence in promoting the construction of smart cities will surely successfully solve problems, promote social and economic

development, and provide people with a better lifestyle.

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