Research on Collaborative Innovation Platform of Internet of Things Industry Based on Data Mining Technology

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Abstract. The Internet era has entered a new historical development stage, and the technology and application of Internet of Things have become the new core of the future development of information society. Information technology has been integrated into every corner of production and life, and various information industries are constantly undergoing transformation, facing new opportunities and challenges. To enhance the technological innovation capability of China's Internet of Things industry from the perspective of collaborative innovation, the key is to face the characteristics and needs of the Internet of Things industry and explore the interactive mode of process synergy and behavior synergy in technological collaborative innovation. There are more and more data generated in the process of human interaction with sensors, and more intelligent applications can be developed through deep data mining and analysis. This paper focuses on collaborative innovation of Internet of Things and smart service industry, and studies the combination mode of collaborative innovation of Internet of Things and smart service industry in China based on data mining technology, in order to provide valuable theoretical basis for the development of smart service industry and the improvement of collaborative innovation of Internet of Things in China.

Keywords: Internet of Things, Collaborative innovation, Wisdom service

1. Introduction

Nowadays, the Internet of Things (IOT) is deepening into people's normal production and life from the initial research, and many applications based on IoT are presented to people. The development of the Internet of Things industry needs to be based on information and communication technology, so that traditional industries will change under the influence of intelligent services [1]. Therefore, in order to adapt to the development of the information age, the Internet of Things should become an important development direction of coordinated innovation of various industries in society. Collaborative innovation is an interactive and linkage innovation model from a theoretical perspective [2]. An Internet, which only takes increasing bandwidth and increasing speed as technical indicators and takes interpersonal information interaction and transmission as its target function, has been difficult to meet the new social development needs, and information technology and information industry are facing...
new transformation challenges and development opportunities [3]. The pace of globalization has been accelerated, and the speed of information technology has become an important factor to measure comprehensive national strength. The prominent position of Internet of Things has been highly valued by all countries, and industrial services should be characterized by informationization and intelligence, thus the speed of regional economic development will become a brand-new situation [4]. In order to meet the development needs of the information society, the Internet of Things should become an important development direction of the collaborative innovation system of various industries in society. So as to speed up the development of social informationization, and constantly promote the intelligentization of social services such as medical and health care, public transportation, education and culture, and lay a solid foundation for the promotion of national competitiveness and social transformation and development [5].

For the Internet of Things, its data is massive and heterogeneous. Although this feature will make data mining based on the Internet of Things very difficult, data mining is still a problem that must be solved in the development of the Internet of Things [6]. Fusion is the integration and processing of commonness among multi-domain things, and collaboration is the integration and processing of individuality among multi-domain things. Therefore, the integration and collaboration strategy of the Internet of Things is to fully integrate and utilize multi-domain resources on the basis of the Internet to meet the needs of various information services and their intelligence in the process of social development [7]. In collaborative innovation, the Internet of Things integrates the essential elements of innovation such as modern technology, modern theory, modern information, and modern capital, and carries out collaborative construction among subjects around the mainstream innovation subjects in the current society, such as government and enterprises, so as to realize the creation of new physical mechanisms and behaviors [8]. The development of Internet of Things industry is mainly based on information and communication technology, which makes the traditional industry change under the influence of intelligent service [9]. This paper focuses on collaborative innovation of Internet of Things and smart service industry, and studies the combination mode of collaborative innovation of Internet of Things and smart service industry in China based on data mining technology, in order to provide valuable theoretical basis for the development of smart service industry and the improvement of collaborative innovation of Internet of Things in China.

2. Internet of Things Collaborative Innovation System and Intelligent Service Industry

2.1 Application of Internet of Things Collaborative Innovation System in Smart Service Industry

Industrial chain is an inevitable industry under the development of market economy, which caters to market demand and can be said to be a product driven by demand. Under the industrial chain of Internet of Things in smart service industry, it can help service providers and service demanders form effective information docking and communication. The Internet of Things is not an abstract concept, it will provide people with a steady stream of intelligent services, and many people's needs will be met efficiently. The Internet of Things is not a specific network or technology, but should be expressed as a concept or technical idea to provide intelligent services by using the connectivity of the network. This technical idea of the Internet of Things can be defined as "using the ubiquitous network technology of integration and collaboration to realize ubiquitous intelligent services" [10]. The technical system of Internet of Things covers a wide range, which can effectively integrate all kinds of information, and the specific system structure will adapt to the development trend of the future society. The pace of innovation of the Internet of Things is gradually accelerating, but the innovation process will be accompanied by decentralization, and the specific innovation efficiency cannot be effectively guaranteed. Although it covers a wide range, it is easy for various technical levels to support each other, and information security problems will occur frequently. Smart city public platforms can share fragmented information resources into a resource pool, and effectively improve the level of urban management and service through comprehensive perception, integration and sharing of urban information.
People can enjoy the services provided by various stores to a high degree, which indicates that the service mode of resource sharing has been positively recognized by the people, and the Internet of Things will integrate various information efficiently, and the information service will show the characteristics of intelligence. By making full use of the connectivity of the network, the Internet of Things can meet the needs of the whole society for intelligent services. On this premise, the architecture of the Internet of Things is researched according to the market application, industrial structure and service demand of the Internet of Things in the future, and a sharing platform of "smart service shop" is established, so as to better provide intelligent services for users. The Internet of Things will bring about great changes in the structure of information industry, and the supporting media in network operation will be changed. Equipment manufacturing is also a good supplement, and all kinds of information industries will be reorganized efficiently. Under the support of the information exchange technology of the Internet of Things, with the increasingly perfect and developed science and technology chain, the innovation chain system can be effectively derived, and under the guarantee of innovation chain, the industrial chain can be promoted to develop in a more perfect and scientific direction, thus realizing the steady development of the whole industry and supporting the construction of intelligent services.

2.2 Construction of Intelligent Service Information Platform

The network information performance of the Internet of Things can form a certain information channel, but the construction and guarantee needs of this channel can be guaranteed by building a good Internet of Things architecture. It is also necessary to build an information platform according to the market development plan, industrial development structure and service demand prospect of the Internet of Things to ensure that intelligent services can be better provided to the service demand side. The guiding ideology of China's development of Internet of Things is to create a development environment, innovate service mode, strengthen standards and norms, rationally plan layout, strengthen resource sharing, deepen integration of defense and civilian technologies and build an internationally competitive Internet of Things industrial system around the actual needs of economic and social development. Internet of Things technology development and industrial application have broad prospects and rare opportunities, but there are also some problems, such as key core technologies to be broken through, weak industrial foundation, potential hidden dangers in network information security, blind construction in some places, etc., which need to be strengthened and solved urgently [11].

The Internet of Things has the characteristics of strong permeability, great driving effect and good comprehensive benefits. It emphasizes not only the connection of things and the transmission and interaction of information in the form of network, but also the social application and service value of connected things and their transmitted information. The overall architecture of the Internet of Things connection management platform is shown in Figure 1.

Figure 1 The overall architecture of the Internet of Things connection management platform construction
The industrial chain of Internet of Things is driven by market demand, which mainly includes manufacturers of all equipment and service providers of Internet of Things. Usually, it is led by enterprises with strong strength in related industries and forms a strategic alliance with other enterprises. As a complex system engineering, the development of the Internet of Things needs the cooperation of multiple disciplines, technologies and industries. It is necessary to determine the target system of scientific and technological innovation according to the main problems existing in the technology, standards, security and industrial layout of the Internet of Things, and cooperate with multidisciplinary talents and other resources to achieve technological bottleneck breakthrough [12]. On the basis of discipline chain, in order to achieve common goals, professionals from different fields are organized to cooperate and form a technology chain. The emergence of technology chain can effectively improve the efficiency of scientific research and development, and also play a supporting role in the steady development of the Internet of Things industry. If the information industry structure in the Internet era is led by the network industry, supported by the network equipment manufacturing industry and supplemented by the service industry, the Internet of Things will lead to important structural changes in the information industry in the post-Internet era. In the construction of information platform, it is necessary to pay attention to the construction environment and pertinence of the platform, not only to provide intelligent services to service demanders, but also to meet the individual needs of different customers.

3. Collaborative Innovation Of Internet of Things Technology and Intelligent Service Industry Based on Technical Data Mining

3.1 Promoting the Deep Integration of Information Technology and Traditional Industries

Modern economic growth has developed from natural resources era and capital era to innovation era, and innovation has become the core power of economic growth. Data mining in the Internet of Things has changed from the traditional statistical analysis of data and the discovery and mining of potential patterns to the indispensable tools and links in the Internet of Things. Collaborative innovation refers to the process and activities of creating new things by cooperating and coordinating with each other based on common goals, internal motivation and effective communication, by building a platform and mechanism for sharing resources and capabilities that give full play to their respective advantages. Industrial chain represents a form of spatial organization, in which companies with strong competitive strength will have a dominant advantage and form alliance relations with other enterprises. The Internet of Things industry chain provides a good path for manufacturers and service providers, which can efficiently connect various information and provide efficient services to the public.

In order to judge the real-time environment quickly and accurately, the data terminal corresponding to each distributed storage node of the Internet of Things needs to have powerful real-time data processing and analysis capabilities. The application layer obtains accurate and reliable environmental information by fusing, processing and sharing all kinds of acquired data, and provides guidance for precise control of intelligent services. The specific processing process is shown in Figure 2.

![Figure 2 Data information processing process](image)

The formation of the industrial chain of the Internet of Things will be the result of the continuous promotion of the market, various industries will be vigorously integrated and constructed, new production organization forms will emerge as the times require, and people's demand for products and services will be fully guaranteed. In the development of the Internet of Things, collaborative innovation is emphasized, and the industrial structure is deeply changed. With the help of the intelligent service platform system, the isolated information service mode will be optimized, various
disciplines will be efficiently connected, and different industries will be continuously cross-integrated. In-depth exploration of collaborative innovation mode and mechanism of Internet of Things industry, construction of collaborative innovation platform of Internet of Things industry, and promotion of strategic integration of knowledge innovation, technological innovation and regional innovation of Internet of Things industry are of great strategic significance for taking the initiative in this new international competition field and seizing the commanding heights of information technology.

3.2 Realize Collaborative Innovation of Key Technologies and Common Technologies of Internet of Things

In the process of referring to the Internet of Things technology, smart service industry will emerge as the times require, which will provide comprehensive services to people and greatly optimize management efficiency. Urban construction is the main theme of China's current new era construction. With the promotion of urban-rural integration, new rural construction and smart city construction, China's urban construction has achieved certain results. Especially, with the introduction of collaborative innovation of the Internet of Things, the urban information system has been further improved. Around the Internet of Things technology and information technology, the collaborative construction of urban construction and urban services has been realized in all stages and links of urban construction [13]. The construction of smart service industry will be a long-term process, and it needs constant collaboration with traditional industries, so that information services will present many characteristics such as informationization, and the processing and manufacturing procedures will be more reasonable. Deepening the institutional reform of the future smart service industry and fully releasing the vitality of these innovative elements is the core and urgent need to accelerate the innovation of the Internet of Things technology system and the development of the smart service industry.

The Internet of Things smart service industry is facing unprecedented opportunities for development. The technical system and industrial chain of the Internet of Things have taken initial shape, but it also faces challenges from technology, standards, scale and many other aspects. Concentrate on the resources of all parties involved in collaborative innovation, jointly carry out major technological research and application integration innovation, break through core and common key technologies as soon as possible, and form a sound Internet of Things technology system, reaching the international advanced and domestic leading level. In the urban transportation and logistics industry, intelligent transportation systems are developing continuously, among which intelligent public transportation management systems and intelligent route guidance information systems are widely used. In order to speed up the development of intelligent transportation, we should improve the modern comprehensive transportation information system based on the Internet of Things technology. Only by strengthening collaborative innovation, scientifically integrating innovation forces and high-quality resources in all aspects, and forming an organic and unified whole, can we effectively improve the overall innovation strength and core competitiveness, thus ensuring that the technology and application of the Internet of Things can accelerate development and achieve substantial breakthroughs and landmark achievements as soon as possible.

4. Conclusions

The development of Internet of Things smart service industry is facing unprecedented opportunities. The technical system and industrial chain of Internet of Things have taken initial shape, but it also facing challenges from technology, standards, scale and many other aspects. If the Internet of Things doesn't add intelligent information processing and data mining, it can't embody intelligence, it's just a sensor network. The data mining cloud service is an advanced, practical, sustainable and scalable data mining method in the Internet of Things. The development of the Internet of Things is a complex systematic project. Although its technical system and industrial chain have been initially formed, there are still serious problems in the exchanges and cooperation between various departments. Faced with this situation, various departments need to scientifically integrate resources and strengthen
collaborative innovation, so as to form a unified whole. At present, the technical system and industrial chain of the Internet of Things have been initially formed, but there are still serious problems in the exchanges and cooperation between various departments, which require scientific integration of resources and further coordination and innovation among various departments. Only by strengthening collaborative innovation, scientifically integrating innovation forces and high-quality resources in all aspects, and forming an organic and unified whole, can we effectively improve the overall innovation strength and core competitiveness, ensure that the technology and application of the Internet of Things can accelerate development, and achieve substantive breakthroughs and landmark achievements as soon as possible.

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