Research on the Development Status of Artificial Intelligence and Its Application in the Internet of Things

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Abstract. With the rapid development of science and technology in recent years, artificial intelligence has been gradually applied to all aspects of people's lives, which has greatly promoted the development and application of the internet of things technology. The internet of things has enabled information exchange between people and things, things and things, the artificial intelligence technology has greatly expanded the application scope, application depth and intelligence of the internet of things. Based on this, this article analyzes the development status of artificial intelligence and its application in the internet of things. First, it gives an overview of artificial intelligence, introduces its concept and implementation, and then analyzes the development status of artificial intelligence, including the development difficulties and future development direction. Then introduces the concept, classification and key technologies of the internet of things, and finally explains the application of three aspects in the internet of things in detail. In the context of today's information globalization, it is of practical significance to strengthen the research on the application of artificial intelligence in the construction process of the modern internet of things.

1. Introduction
With the rapid development and popularization of artificial intelligence, big data, blockchain, edge computing and other technologies in recent years, the internet of things industry continues to grow at a high speed, and artificial intelligence has played an irreplaceable role in it, not only improving the degree of the intelligence of the internet of things, also helps to realize the interconnection and resource sharing between different industries and applications. According to relevant predictions, by 2020, nearly 26 billion devices will be connected to the internet of things. A large amount of data maps the physical world to the virtual world like never before. In the network, the infrastructure of families, cities, and the whole society can all be connected to each other through the network. Artificial intelligence and the internet of things will bring huge changes to human social life.
2. Artificial intelligence overview

2.1. Artificial Intelligence Concept
Artificial intelligence is a discipline that studies the use of computers to simulate certain thinking processes and intelligent behaviors of people (such as learning, reasoning, thinking, planning, etc.). It mainly includes the principles of computer-implemented intelligence, the manufacture of computers similar to human brain intelligence, and the use of computers that can achieve higher-level applications [1]. Artificial intelligence involves almost all disciplines of natural sciences and social sciences, and its scope has far exceeded the scope of computer science. The relationship between artificial intelligence and thinking science is practical and theoretical. Artificial intelligence is at the level of technological application of thinking science, and is an application branch of it. From the perspective of thinking, artificial intelligence is not limited to logical thinking. It is necessary to consider image thinking and inspirational thinking to promote the breakthrough development of artificial intelligence. Often considered to be the basic science of many disciplines, mathematics has also entered the field of language and thinking, and artificial intelligence disciplines must also borrow mathematical tools. Mathematics not only plays a role in standard logic, fuzzy mathematics, etc., and mathematics enters the artificial intelligence discipline. They will promote each other to develop faster. Artificial intelligence is embodied in three levels of thinking, perception, and behavior. It mainly simulates eyes and expands human intelligence. Its research content can be divided into three levels as machine thinking and thinking machines, machine behavior and behavior machines, machine perception and perception machines. Although many achievements have been made in the research and application of artificial intelligence, there is still a long way to go to fully promote the application. There are still many problems that require joint research by many disciplines.

With the development of artificial intelligence technology, artificial intelligence technology has an in-depth application and also plays an important role in the establishment of computer simulation systems, system control, and system decision-making. At present, technologies that have been successfully developed and put into use in the field of artificial intelligence including information retrieval, language processing, event logic reasoning, and analysis and other technologies, the core of which is the processing technology of natural language, which can also be regarded as the technology of natural language understanding. Artificial intelligence technology can be widely promoted rely on natural language processing technology as the support. Speech synthesis, speech recognition, machine translation, and semantic understanding are the main contents of natural language processing technologies. Among these technologies, speech recognition and semantic understanding are developing rapidly and modernization. Network technology has been deeply developed and applied. Based on the practical application of semantic understanding, researchers have conducted deeper research and application of intelligent speech recognition technology, which has made people widely recognize the intelligent speech recognition system and laid a good foundation. Newsletter Identifying, applying and processing infrastructure has become one of the core technology development in the Internet age.

2.2. Two Ways to Implement Artificial Intelligence
There are two ways to implement artificial intelligence. The first is called the engineering approach, which uses traditional programming techniques to make the system appear intelligent, regardless of whether the method used is the same as that used by the human or animal body. It has been used in some fields. Achievements such as text recognition, computer chess, etc. The use of this method requires manual detailed specification of the program logic. If the game is simple, it is relatively easy to implement. If the game is complex, the number of characters and the space for activities increase, the corresponding logic will be complicated (according to exponential growth), and manual programming is very tedious and prone to errors [2]. Once an error occurs, the original program must be modified, recompiled and debugged, and finally a new version or a new patch is provided for the user, which is very troublesome. The second is the modeling approach, which not only depends on the
effect, but also requires the implementation method to be the same or similar to the method used by humans or biological organisms. When using this method, the programmer must design an intelligent system (a module) to control, this intelligent system (module) does not understand anything at first, just like a newborn baby, but it can learn and gradually adapt to the environment to deal with complex situations.

3. Artificial intelligence development status

Research on artificial intelligence as a whole has just begun, and it is still far away from our goals, but artificial intelligence has or will have new breakthroughs in some aspects.

(1) Automatic reasoning is the most classic branch of artificial intelligence, and its basic theory is the common basis of other branches of artificial intelligence. Automatic reasoning has always been one of the hottest topics in artificial intelligence research, among which the dynamic evolution characteristics of knowledge systems and the study of feasibility reasoning is the latest hot spot, and it is very likely to make a big breakthrough.

(2) The research on machine learning has made great progress. Many new learning methods have come out and have been successfully applied, such as reinforcement learning algorithms, reinforcement learning, etc. It should also be seen that the existing methods are not enough to deal with online learning. Seeking a new method to solve the online learning problem in the research of mobile robots, autonomous agents, intelligent information access, etc. is a problem of common concern to researchers, and we believe that breakthroughs will soon be made in this area.

(3) Natural language processing is a typical example of the application of AI technology in practical fields. After the hard work of AI researchers, this field has obtained a lot of remarkable theoretical and application results. Many products have entered the public intelligent information. Under the influence of Internet technology, retrieval technology has developed rapidly in recent years and has become an independent research branch of AI. As information acquisition and refinement technology has become an urgently needed research topic in contemporary computer science and technology research, the application of AI technology in this area is an opportunity and a breakthrough for the application of artificial intelligence. Judging from the development of artificial intelligence in recent years, research in this area has made gratifying progress.

3.1. Difficulties in the Development of Artificial Intelligence

3.1.1. Difficulties in computer games. Game is a universal phenomenon in nature. It is manifested in countermeasures or intellectual competition of things in nature. Games not only exist in chess, but also in politics, economy; military and biological wisdom and competition. Although Western Computer programs for checkers and chess have reached a very high level, but computer games still face huge difficulties. This is mainly reflected in the following two aspects:

The first is the combinatorial explosion problem. The state space method is the basic formal method in artificial intelligence. If a game tree is used to represent the state space, the state space is surprisingly large for several common chess types. The second is that current game programs are often aimed at two people. The game is open, and there is a class of chess that is determined to move. It is still difficult to simulate multi-player games, random games and other problems.

3.1.2. Difficulties in machine translation. In the early days of computers, some people proposed the idea of using computers to implement automatic translation. At present, the problem faced by machine translation is still the word and ambiguity of sentences that the linguist Heller said in 1964. It is a major difficulty in natural language understanding (NLU). The same sentence is used on different occasions, and the difference in meaning is commonplace. Therefore, to eliminate ambiguity, we must look for each sentence and its context in the original text to find the cause of the exact meaning of ambiguous words and phrases in the context. However, computers often use sentences as a unit of understanding in isolation. In addition, even if there is a certain understanding of the original text,
there is a problem how to understand the meaning effectively in the computer. The current NLU system can hardly enhance its understanding with the increase of time. Most of the system's understanding is limited to the surface, without deep consideration, no learning, no memory, and no induction. The reason for this result is the problem of structure and research method of computer itself. Now the research method of NLU is very immature, most research bureaus are limited to the separate field of language, and there is no in-depth and effective discussion on how people understand language.

3.1.3. Difficulties in automatic theorem proof and GPS. The representative work of automatic theorem proof is the resolution principle proposed by Robinson in 1965. Although the principle of resolution is simple and easy to use, the method used is deduction, and this form of deduction is completely different from the natural deduction method of human. Deductive reasoning based on the principle of resolution requires the transformation of logical formulas into sets of clauses, thereby losing its inherent semantic meaning of logic. The GPS mentioned earlier is an attempt to achieve a domain-independent solution to artificial intelligence problems. GPS wants to get rid of the dependence on the internal expression of the problem, but the rationality of the internal expression of the problem is closely related to the domain knowledge. Whether it is the resolution principle of the theorem proof using first-order predicate logic, or the generally methods solving artificial intelligence problems, the limitations of expression ability can be analyzed, and this limitation makes them reduce their own application scope.

3.1.4. Difficulties in pattern recognition. Although the use of computers for pattern recognition research and development has achieved a lot of results, and some have become products for practical applications, its theory and methods are completely different from human sensory recognition mechanisms. Human recognition means image thinking ability, which is no computer recognition system can match it. On the other hand, in the real world, life is not a tightly structured task, but it is very difficult for the machine. Although it is difficult to make a big breakthrough in this area, but with further research and development, this limitation may be overcome in the future.

3.2. Development Direction of Artificial Intelligence

3.2.1. Expert system. Expert system is a computer program system that simulates human experts to solve problems in the field. It is a program system containing a large amount of knowledge and experience in a specific field. In the research of "expert system" or "knowledge engineering", there is a tendency to apply artificial intelligence. Because human experts have rich knowledge, they have achieved excellent problem-solving abilities.

3.2.2. Intelligent information retrieval technology. The application of artificial intelligence in information retrieval is mainly manifested in: (1) How to use computer hardware to imitate systems, imitate, extend and expand human intelligence theories, methods and technologies. (2) Because network knowledge information includes regular knowledge and a large number of empirical knowledge, unavoidable ambiguity, randomness, unreliability and other factors of these knowledge. When dealing with these factors, the research results of artificial intelligence are needed.

3.2.3. SOAr. SOAr is a general-purpose intelligent architecture that has been at the forefront of artificial intelligence research and has shown strong problem solving capabilities. It believes that the development of robots is the most important area of artificial intelligence applications.
4. IoT overview

4.1. IoT Concept
The internet of things (IOT) is a huge network that connects various objects and networks through information technology to help people get information about the objects they need. The internet of things uses radio frequency identification (RFID), sensors, infrared sensors, video surveillance, global positioning information acquisition equipment such as systems, laser scanners, etc., connect objects to the internet through wireless sensor networks and wireless communication networks (such as Wi-Fi, WLAN, etc.) to achieve real-time information exchange between objects and objects, people and objects to achieve the purpose of intelligent identification, positioning, tracking, monitoring and management.

4.2. Classification of the Internet of Things
There are many classifications of the internet of things, such as classification according to access methods, application types, etc., and it is similar to the division of computer networks into private network and public networks. We have different users from the internet of things, which can be divided into two types of public internet of things and dedicated internet of things [3]. The public internet of things refers to the internet of things services provided to meet the needs of public life and information, and the dedicated internet of things is a professional service that is targeted to meet the unique application needs of IoT business applications of enterprises, groups, or individuals. Private IoT can use public networks (such as the Internet), private networks (private resources in public networks in the local area network, corporate networks, or mobile communications Internet) to transfer information.

4.3. Key Technologies of the Internet of Things
The key technologies of the internet of things mainly include radio frequency identification technology, sensor technology, network and communication technology and data mining and fusion technology.

4.3.1. Radio frequency identification technology
Radio frequency identification, also known as electronic tag, is a wireless communication technology that uses radio frequency signals and their spatially coupled transmission characteristics to automatically identify static or mobile objects to be identified through radio signals, and read and write related wireless data. Send an RF signal to an item with an electronic tag, activate the electronic tag, and use the energy obtained by the induced current to release the item information stored in the chip to complete the management and control of the item.

4.3.2. Sensing Technology
Another key technology used by the internet of things is sensing technology. As an important means of information acquisition, it is mainly accomplished through sensors, sensing nodes, and electronic tags. Integrated miniaturized sensors can be embedded in any object, and collaborate to monitor it in real time, and then upload the collected information wirelessly to achieve ubiquitous sensing [4]. The sensing nodes have sensing, computing, and communication capabilities, and can perform data collection, processing, and transmission.

4.3.3. Network and communication technology
The secure and reliable transmission of information in the internet of things involves two aspects of remote communication and short-distance communication. The remote communication aspects mainly include IP Internet, 2G / 3G mobile communication, satellite communication, internet networking, gateway and other technologies. The short-distance communication aspects mainly include technologies such as WIFI, bluetooth, ZigBee, RFID and UWB.
4.3.4. Data mining and fusion technology. Distributed computing technologies such as p2p and cloud computing provide new high-efficiency computing models for the internet of things, which can promptly mine hidden and effective information from massive amounts of data, and can also solve various heterogeneous networks or multiple systems. The problem of data fusion between different devices has a relatively reliable data center, which can easily share data and applications between different devices.

5. Application of artificial intelligence in the internet of things

5.1. Application In Medicine
The medical internet of things mainly uses medical sensing equipment to interconnect medical-related people, assets, and items through the network for information transmission and interaction [5]. Common equipment includes: sensing equipment (smart wristbands, etc.) to identify the identity of people and things, and status, including barcodes, QR codes, RF tags, etc.; application servers, including the hospital's own medical information system, EMR (electronic medical records), etc. In the absence of artificial intelligence, sensors can be used to collect and record patient blood pressure, information such as body temperature and medical equipment is transmitted to the HIS system, and its application is relatively simple. With the help of new technologies such as big data, deep learning, and intelligent robots, the medical internet of things is no longer limited to simple data collection and transmission, and is helping hospitals achieve intelligence. It plays an important role in medical management, effectively expanding medical resources, and promoting medical scientific research, such as: remote intelligent care, intelligent diagnosis and treatment, and intelligent drug development.

5.1.1. Remote Intelligent Care. The main technical methods of remote intelligent care are as follows: the patient wears a corresponding acquisition device to collect the patient's blood pressure, heart rate, temperature, pulse, etc. in real time and sends it to the IoT platform in real time through the mobile network; Then the application server processes and analyzes the data and judges the various value range of the indicator. If it exceeds the set value, the system will automatically send a text message alarm to the medical staff. At the same time, the model trained by deep learning is used to analyze the patient's long-term health monitoring data to determine whether the patient has other potential symptoms; and all the data is transmitted to the HIS and EMR systems at the same time for doctors' reference query [6].

5.1.2. Intelligent diagnosis and treatment. Intelligent diagnosis and treatment refers to letting the computer learn the medical knowledge of expert doctors, simulating the doctor's thinking and diagnostic reasoning [7]. Patients can consult the diagnosis and treatment experts through the network in front of the computer at home, and the machine "expert" on the other end of the network (after Artificial intelligence learning training), providing professional reference diagnosis and treatment programs. At the same time, it can also solve the problem of insufficient medical resources in practice and effectively expand limited medical resources.

5.1.3. Intelligent drug development. Intelligent drug research and development refers to the application of deep learning technology in artificial intelligence to drug research. Mainly through rapid and accurate mining and screening of suitable compounds or biological components through technical means such as big data analysis, through computer simulation, drug activity and safety to predict the success rate of new drug development and reduce the cost of new drug development [8]. Artificial intelligence has made new breakthroughs in many fields such as cardiovascular drugs, antitumor drugs and common infectious disease treatment drugs.
5.2. Application in Traffic
With the continuous development of the times, cars have become the most important means of transportation for people's work and life. Especially with the continuous improvement of people's living standards, the number of private cars has become more and more. The impact is also getting bigger and bigger. China chooses to integrate the internet of things technology into car driving, and based on this research and development to obtain autonomous driving technology. This driving technology is actually integrating the laser ranging, radar sensors and video camera and then using these devices to help drivers understand the actual situation of the surrounding vehicles more clearly, and carrying out accurate navigation based on the collected details. Automated driving is basically completed to effectively improve the driving quality of vehicles, which in turn provides more powerful guarantees for people's work safety [9]. Based on the combined application with intelligent map technology, intelligent traffic navigation can be effectively implemented, and based on data centers such as Google, it supports collecting relevant car information, accurately navigating roads, and achieving intelligent autonomous driving. It can be seen that although this technology is still in the initial experimental and research stage, the development process at this stage provides technical support for the further development of intelligent transportation in the future. At present, Google and Baidu's unmanned vehicle technology drives vehicles in autonomous driving in a relatively simple environment and requires manual takeover control when encountering complex road conditions. However, such as vehicle-mounted high-precision sensors, decision-making and control systems, etc. are current research hotspots for technological research, and technological breakthroughs will greatly improve the level of autonomous driving. In the future self-driving cars in smart cities will greatly optimize traffic conditions.

5.3. Application in Film and Television

5.3.1. 3D holographic projection. 3D holographic projection technology is a three-dimensional image construction technology based on the principles of interference and diffraction. In practical applications, users can complete virtual tasks without wearing 3D glasses [10]. In the application of 3D holographic stereo projection, projecting multi-view images can be effectively transmitted to the mp projection film to convey the viewing experience to the viewer. The intelligent features of this technology are closely related to real life and are the embodiment of innovative visual and auditory modes.

5.3.2. Retina screen. For retinal screen technology, this technology is still in its infancy. In essence, it is mainly based on the application compression and display resolution of ultra-high pixel density LCD screens. Generally, screen pixels can achieve 326 pixels / inch, far more than the human eye's ability to discern. It is worth mentioning that this technical method is the key research content of artificial intelligence technology in the application of the internet of things.

Conclusion
The internet of things is a new type of network that combines modern artificial intelligence with the application of computing intelligence technology. Artificial intelligence gives computers similar management capabilities and emotions to humans. During the solution of genetic algorithm problems and the application of technology, many problems at the theoretical and application levels have been exposed. The mutual fusion between genetic algorithm optimization and technology, hybrid genetic algorithm large group search performance and fast convergence optimization methods can produce global optimization effects. The application of artificial intelligence and computing intelligence technology has greatly improved the level of construction and development of the internet of things.

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