2022 International Conference on Industrial IoT, Big Data and Supply Chain (IIoTBDSC) | 978-1-6654-5455-1/22/$31.00 ©2022 IEEE | DOI: 10.1109/IIoTBDSC57192.2022.00029

Research on Artificial Intelligence-Related Technologies for Internet of Things Applications

Zebo Huang
Guangdong University of Science & Technology,
Guangdong, 523083, China
e-mail: huangzebo@gdust.edu.cn

***Abstract*—With the rapid development of science and technology, artificial intelligence technology has been pushed to a new height of technical research.It not only greatly promoted the reform of productive forces, but also effectively drove the development of market economy.Today's era is the era of artificial intelligence, and the Internet of Things technology undoubtedly plays a crucial role in the integration of artificial intelligence into daily production and life.Through the Internet of things technology, artificial intelligence and communication technology are combined to form a huge intelligent system between things, so as to realize the intelligent management of production and life with the network.This article will explore the application and development prospects under the Internet of Things.Intelligent technology has great value in the production and development of various industries.The application of artificial intelligence technology has effectively promoted the development of the Internet of Things technology. This paper will make a simple analysis of the artificial intelligence related technologies applied in the Internet of Things for discussion by industry insiders.**

Keywords-Internet of Things; Artificial intelligence; Technical research; Prospects for development

I. INTRODUCTION

Artificial intelligence technology is referred to as Ai, which is used in many fields, such as (Fig. 1), which is also a part of computer science and technology.Language understanding technology is the core of artificial intelligence technology.Internet of Things technology is the recognition and control management of object information based on intelligent technology, so as to achieve the relative control of network automation of logistics information. Intelligent management of logistics data and information is the core of artificial intelligence technology[1].At present, the development of science and technology is gradually increased in all parts of the country. Advanced science and technology can effectively drive the progress and development of the industry.Relevant enterprises should be aware of the importance of the development of Internet of Things technology in their development, constantly increase the development of artificial intelligence technology, comprehensively improve the operation efficiency of the Internet of Things, and improve the speed of the Internet of Things[2].

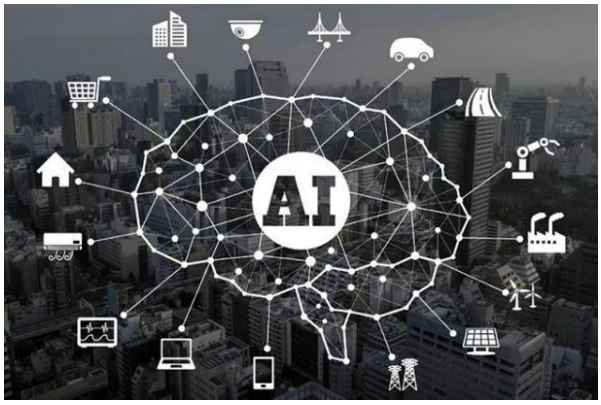

Figure 1. Artificial intelligence covers fields.

II. AN OVERVIEW OF INTERNET OF THINGS TECHNOLOGY AND ARTIFICIAL INTELLIGENCE TECHNOLOGY

A. Internet of Things Technology

The Internet of Things is an extension of the Internet and an important part of the new generation of information technology.The Internet of Things realizes the interconnection between objects and objects and between objects and people. It has the characteristics of comprehensive perception, reliable transmission and intelligent processing. It enables people to manage production and life in a more refined and dynamic way, thus improving the informatization ability of the whole society.When you understand the Internet of Things technology, it is mainly analyzed from the meaning and function of the Internet of Things technology.It can effectively connect things together with people to achieve intelligent conversion during the connection.In this process, the Internet of Things can effectively transfer relevant information and data. As a complete information carrier, it can form a network system and network system during operation, and operate and develop on the basis of the network system[3].We should not ignore the nature of the Internet of Things technology, which has strong variability and extensibility in the process of use. Therefore, the Internet of Things technology is very consistent with the characteristics of the development of the current era.With the development of The Times, the Internet of Things technology is no longer limited to a certain Internet of Things technology or the Internet of Things technology of a

978-1-6654-5455-1/22/$31.00 ©2022 IEEE
DOI 10.1109/IIoTBDSC57192.2022.00029

certain system, but really from the whole, can form a complete solution to the problem or form a complete ecosystem.In the construction and use of sensor equipment, the Internet of Things technology is the medium for the operation of the device system[4]. In this process, the sensor equipment is connected according to relevant rules, which can effectively ensure the information interaction between the sensor equipment.Increase Internet interaction levels and interaction techniques, allowing two individual objects to be connected together through the network.After the series of operations, the remote control can be truly realized, and realistic tracking and monitoring can be realized.Let the relevant personnel can master the dynamic operation of the equipment in the first time, which can effectively improve the quality of life and truly promote the progress and development of society.

B. Artificial Intelligence Technology

Artificial intelligence is a general term for the science of using computers to simulate human intelligence and behavior. It covers the scope of training computers so that they can complete autonomous learning, judgment, decision-making and other human behaviors.Artificial intelligence technology and Internet of Things technology have certain differences in some aspects. First, there are differences in modes[5].In the process of operation, artificial intelligence technology simulates the intelligence of human brain. It simulates the learning of human brain and studies relevant data in a specific field. After subsequent training, self-cognition of a certain field can be formed.These self-cognition can be expressed in external ways, for example, it can be expressed in words and images or voice and behavior.Artificial intelligence is a technology that can learn and change itself.Common artificial intelligence technology products are robots. Robots are intelligent and automatic[6].They can constantly simulate and transform related behaviors according to people's actual operation needs and actual product needs.In the development process, the research products of artificial intelligence technology can replace the basic manual operation, it can complete the work tasks of relevant staff, it can effectively reduce the workload of workers, improve the overall work efficiency.Artificial intelligence technology is the most disruptive and revolutionary technology after the Internet, it will open a series of new business changes.Artificial intelligence is at a stage of development where the Internet was in the mid-1990s.At present, Internet giants such as Google, Facebook, Amazon, Alibaba and Baidu are actively arranging AI research and development by acquiring AI startups or establishing their own R&D LABS. Leading enterprises in various industries are also making active investment, acquisition and R&D in various AI application scenarios. For companies across a wide range of industries, the time to deploy AI applications is now. Overall idea of enterprise development of artificial intelligence.

III. THE MAIN APPLICATION OF ARTIFICIAL INTELLIGENCE-RELATED TECHNOLOGIES FOR INTERNET OF THINGS APPLICATIONS

In recent years, Internet of Things (hereinafter referred to as IoT) has accelerated its integration with the industry and gradually landed, including the participation and support of a large number of artificial intelligence technologies. The term "AI+IoT" (AIoT) came into being.At present, with the occurrence of AI and IoT at the same time, we believe that AIoT, as a channel for the intelligent upgrading of various traditional industries, it has become an inevitable trend of the development of the Internet of Things.When studying the related issues of the Internet of Things and artificial intelligence technology, we should really explore the connotation and practical application of the Internet of Things technology.In the context of the development of the current era, relevant personnel should cater to the development trend of the current information technology and give full play to the role of the Internet of Things technology[7].It is an indispensable part of the information development mode, and the development of it also marks the arrival of the information age and the Internet era.The Internet of Things is a modern operation mode. In the process of using the Internet of Things, equipment and facilities can be flexibly converted and applied through specific technologies and operating systems.Judging from the current development of China, the overall application scope of the Internet of Things is very wide.In addition to being applied to the smart community, it also applies its wide application in the fields of transportation system management and other fields, and the use of Internet technology will be effective in developing society.With the continuous progress and development of social and network technology, the development of Internet of Things technology has been further improved and developed.The current related enterprises gradually realize the importance of Internet of Things technology in the development process, and start to increase the research and development and use of it.From the current trend of development, the application of Internet of Things technology will be more and more wide in the next period.We believe that IoT has achieved significant results in China's new industrialization, urbanization, information technology, agricultural modernization, transformation and upgrading of traditional industries, and construction of smart cities.According to IDC, the scale of IoT spending in China has exceeded $150 billion in 2020 and is expected to reach $306.98 billion in 2025. In addition, IDC expects manufacturing to account for the largest share of iot spending in 2024, at 29%, followed by government spending and consumer spending at about 13% and 13%, respectively. With the maturity of artificial intelligence technology, IoT is expected to enter a broader market application with the support of AI.

The convergence of AI (artificial intelligence) and IoT (Internet of Things) has unleashed huge potential for global enterprises.To illustrate this potential, we've rounded up five emerging AI iot applications.

A. Autopilot

Autonomous driving has always captured people's imagination, but this is a great example of how artificial intelligence and the Internet of Things can work together.Self-driving cars are equipped with sensors that constantly collect vast amounts of data about their surroundings.This data is processed into intelligent insights using artificial intelligence models that enable vehicle navigation systems to coordinate their surroundings and perform complex path planning in real time.

B. Optical Inspection

Quality inspection supported by computer vision is one of the biggest applications of artificial intelligence. Automated optical inspections scan industrial machinery for quality defects, and once a defect is identified, a semi-supervised machine learning algorithm model classifies the image into fault categories or predicts scheduled maintenance.AI-based iot solutions provide businesses with predictive maintenance applications to anticipate equipment failures in advance.

C. Network Security

According to Gartner, there will be 20 billion iot devices connected by 2020. Statista predicts that by 2030, about 50 billion iot devices will be installed worldwide. That ubiquity will make them attractive targets for attackers.

As a response, AI-powered cybersecurity systems can detect network vulnerabilities, protect valuable data and block cyber attacks. AI systems can learn the usual patterns of activity and determine when unusual activity is occurring, which can reduce the frequency of false alarms and can reveal ongoing cyber attacks.

D. Active Health Care

With the outbreak of COVID-19, the integration of the Internet of Things and artificial intelligence has attracted great attention to meet the need for smart health surveillance and pandemic management.Wearable iot sensors can track a patient's vital signs and provide real-time updates to doctors and caregivers to alert them to any major health events. Artificial intelligence with machine learning algorithms can analyze vast amounts of data to provide important insights into people's overall health. This eliminates the need for any human intervention to maintain records and frees up medical staff for more important work.With the outbreak of COVID-19, the integration of the Internet of Things and artificial intelligence has received a lot of attention to meet the need for smart health surveillance and pandemic management.

E. The Energy Management

The Internet of Things and artificial intelligence can play a role in reducing energy consumptionHvac systems account for a large part of the total energy consumption of buildings and a large proportion in any industry. Machine learning programs that learn from past efficiencies have been shown to reduce energy consumption by 20 percent.Smart street lights equipped with iot sensors collect data about traffic and pedestrians, allowing the system to save up to 80 percent on energy bills.Artificial intelligence capabilities, along with machine learning and deep learning algorithms, parse the data generated from iot sensors to track energy consumption in real time.In short, demand for smart iot will continue to grow across industries, from Fortune 500 companies to emerging companiesUsing AI to enhance the Internet of Things could open up opportunities to create new products. Machine learning, natural language processing (NLP) and other disruptive technologies encourage accelerated interactions between businesses. AI iot continues to drive the growth of data processing and intelligence businesses and will continue to do so in the coming years.

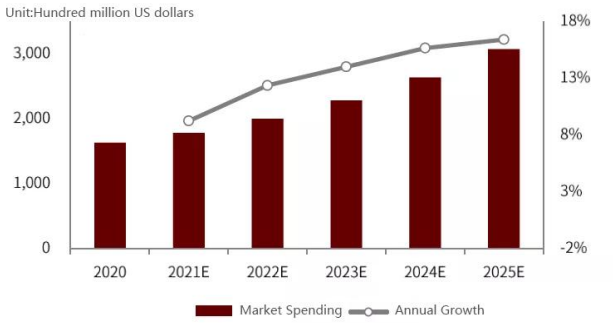

Figure 2. Analysis of data

IV. CONTENT ANALYSIS OF ARTIFICIAL INTELLIGENCE TECHNOLOGY

A. Key Technology

Internet of Things artificial intelligence technology is actually a very large system and concept, which contains many elements and internal structures.The same iot technology contains multiple technical content, and it should be analyzed for the key technologies.After mastering the key technologies of it, we can better operate the Internet of things.Analyze the key technologies of the Internet of Things,we are also familiar with sensor technology and artificial intelligence technology[8].There is also a relatively special type of technology called RFID.This is a new intelligent technology, this technology in the application process need to contact radio signals, it can give full play to the role of wireless communication, the use of radio information to identify specific targets, identify targets after the relevant data and information processing.This kind of data and technology can be identified according to a specific system without direct contact in the process of actual use, and certain optical knowledge can be formed.In this process, the application of sensor technology should be increased, and the measurement work should be carried out in accordance with the requirements of sensor technology in time[9]. After the completion of the measurement work, the specific provisions should be converted, the original measurement work should be converted into information transmission, and the reasonable selection of information transmission equipment and devices.For information transmission operations, it is also an important pillar of information

transmission devices and computer technology and communication technologies for information acquisition.Computing technology also involves dynamic information data related to the Internet of Things, forming virtualized resources for virtualized management, and giving full play to the storage function of computers[10].

B. Artificial Intelligence Technology

In the current social development, the development of science and technology is getting faster and faster, so the development of artificial intelligence technology should be strengthened.Continuously improve and optimize related artificial intelligence technology, and widely used in various industries, such as (Fig. 3).3D holographic projection techniques are more combined with organic matter and Internet of Things technology to give full play to the role of artificial intelligence technology to achieve 3D display mode.The basic principles mainly used in this process are diffraction and interference, which use information technology to display objects through the pattern of three-dimensional graphics.In addition, 3D holographic communication technology can be used for projection and analysis from multiple angles. The data object model can be placed on a specific projection screen.People can really feel the three-dimensional effect of 3D when they watch movies. In traditional 3D viewing, special 3D glasses are required to see this effect[11]. Therefore, 3D holographic communication technology improves the disadvantages of traditional technology.In fact, many entertainment venues and enterprises are already using this technology.Such as bars and fashion release conferences and other places, and from the current application situation, the overall application effect is very good, they have a good application value.After the application of this technology, not only can bring a new visual experience to the audience, but also an innovation of intelligent technology.

Figure 3. Integrated development of Internet of Things and multiple Industries.

V. APPLICATION PROSPECT OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN INTERNET OF THINGS

As network communication delays decrease and artificial intelligence processes information faster.The Internet of Things technology will enter the next stage under the impetus of artificial intelligence, and the application field of intelligent network will cover a wider range[12]. With the pace of The Times, technology is making continuous progress, and large-scale intelligence and full automation are stepping into people's life at a faster speed.Human intelligence will be transferred to other objects via the Internet of Things, making mechanical life more intelligent.

VI. CONCLUSION

The development of technology integration is the trend of the development of global technology industry. As the intelligent brain of Internet of things technology, artificial intelligence will support the emergence of more new application technologies of it.In the process of development, we continue to explore the combination of the two, break through technical barriers, so that artificial intelligence technology can more effectively promote the improvement of the construction level of the Internet of things, and improve the development level of itself.Only by continuously increasing the technical input can we ensure the continuous improvement of the application level of artificial intelligence and further research on the basis of artificial intelligence algorithm.Strengthen the machine learning and the Internet of things will fit specific business scenarios, the comprehensive development of artificial intelligence application scenarios, a more comprehensive collection of various equipment operation data, more in-depth understanding of artificial intelligence and iot refold advantage, make artificial intelligence technology become

the backbone of the Internet of things development, build more perfect network information interaction.

REFERENCES

[1] Electronic Technique and Software Engineering,2020(23):11-12. Li Lina. Research on Artificial Intelligence Related Technology for Internet of Things Application [J]. Electronic Technique and Software Engineering,2020(23):11-12.

[2] Huang Jian. Research on artificial Intelligence related Technology for Internet of Things Application [J]. Computer Products and Circulation,2020(10):48.

[3] Lu Zhimin, Su Hao, Cao Zhiwen. Artificial Intelligence Technology for Internet Applications [J]. Paper Equipment and Materials, 2020,49 (01): 95.

[4] Liu Qiang. Analysis of artificial intelligence related technical characteristics for Internet applications [J]. Electronic Technology and Software Engineering, 2021 (17): 23-24.

[5] Dong Mingxing. Application of artificial intelligence technology in the Internet of Things [J]. Modern Industrial Economics and Information Technology, 2021, 11 (06): 117-119.

[6] Li Zongjun, Ma Chang. Overview of the key technologies of the Internet and artificial intelligence [J]. Scientific and Informatization, 2018, (3): 45, 48.

[7] Tian Chen. Research on Artificial Intelligence Related Technology for Internet of Things Application [J]. Architectural Engineering Technology and Design, 2017, (26) : 2205-2205.

[8] Alowaidi Majed.Energy ReportsVolume 8, 2022. PP 2462-2471.

[9] Sam Goundar;Archana Purwar;Ajmer Singh Applications of Artificial Intelligence, Big Data and Internet of Things in Sustainable Development [B] ,2022.

[10] Sam Goundar; Akashdeep Bhardwaj; Shalmendra Chand Task offloading concept using cloud simulations in mobile computing[J] International Journal of Systems, Control and Communications,Volume 12, Issue 3. 2021. PP 243-263.

[11] Milić L.;Jelenković L.;Magdalenić I.;A metaprotocol-based Internet of Things architecture AutomatikaVolume 63, Issue 4, 2022, PP 676-694

[12] Kayode Saheed Yakub;Idris Abiodun Aremu;Misra Sanjay;Kristiansen Holone Monica;Colomo-Palacios Ricardo;A machine learning-based intrusion detection for detecting internet of things network attacks.Alexandria Engineering JournalVolume 61, Issue 12, 2022, PP 9395-9409.