Artificial Intelligence research report

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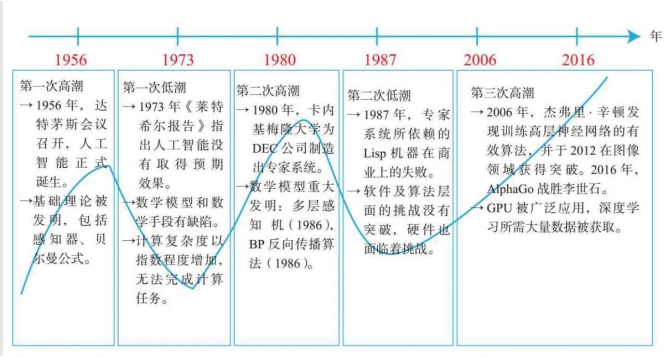
***Abstract*—Artificial Intelligence (AI) is a discipline that studies to explain and simulate human intelligence, intelligent behavior and its laws. Its main task is to establish the theory of intelligent information processing, and then design computing systems that can display some approximate human intelligent behavior. As an important branch of computer science and a broad new field of computer application, AI, together with atomic energy technology and space technology, is known as the three leading technologies of the 20th century.**

I. The history of artificial intelligence

From the birth of artificial intelligence to the present, it has experienced many ups and downs, and finally become a hot field of contemporary research with strong vitality. We will make a specific introduction below.



1. Birth of Artificial intelligence: In 1950, Marvin Minsky, along with his classmate Dunn Edmond, built the world's first neural network computer. Also in 1950, Alan Turing, known as the "father of the computer," came up with an idea that caught the world's attention: the Turing Test. According to Alan Turing, a machine would be intelligent if it could carry on a conversation with a human being without being identified as a machine. In the same year Alan made a bold prediction about the possibility of truly intelligent machines. In 1956, computer expert John McCarthy coined the term "artificial intelligence" at a conference held by Dartmouth College. The Mouth Conference officially established the term AI and began to conduct serious and specialized research on AI from an academic perspective. Soon after that, the earliest AI scholars and technologies began to emerge. The Dartmouth conference is widely considered to mark the birth of artificial intelligence, which has since embarked on a path of rapid development.

2. The first big rise: After the 1956 conference, artificial intelligence developed rapidly. For more than a decade, computers have been widely used in mathematics and natural language to solve problems in algebra, geometry and English. This makes many researchers see the machine to artificial intelligence development confidence. Even at the time, many scholars thought, "In twenty years, machines will be able to do everything that humans can do.

3. The first big fall: At that time, artificial intelligence was faced with three technical bottlenecks. First, many programs could not be applied in the field of artificial intelligence due to insufficient computer performance; Second, the complexity of the problem. Early artificial intelligence programs mainly solve specific problems, because specific problems have few objects and low complexity, but once the problem rises to a higher dimension, the program will be overwhelmed immediately. Third, there was a serious lack of data. At that time, it was impossible to find a large enough database to support the deep learning of the program, which easily led to the failure of the machine to read enough data for intelligence. As a result, the AI project has stalled.

4. The next big thing: In 1980, Carnegie Mellon University designed an "expert system" called XCON. XCON is a set of computer intelligence system with complete professional knowledge and experience. The commercial success of this system has led to the rapid development of artificial intelligence.

5. The Second big fall: After just seven years, the once-blockbuster artificial intelligence system is over. By 1987, both Apple and IBM were producing desktops that outperformed general-purpose computers like Symbolics. Since then, the expert system has lost its glory, and the development of artificial intelligence has once again fallen into a trough.

6. The third big rise: Since the mid-1990s, with the gradual development of AI technology, especially neural network technology, and people's objective and rational cognition of AI, artificial intelligence technology has entered a period of steady development. On May 11, 1997, IBM's computer system "Deep Blue" defeated the world chess champion Garry Kasparov. In 2006, Hinton made a breakthrough in the field of deep learning of neural networks. Humans once again saw the hope that machines could overtake humans.

7. At present: Google, Microsoft, Baidu and other Internet

giants, as well as many start-up technology companies, have joined the battlefield of artificial intelligence products, setting off another round of intelligent frenzy, and with the increasing maturity of technology and widespread acceptance of the public, this frenzy may build a bridge between modern civilization and future civilization.

II. Research Content of Artificial Intelligence

Artificial Intelligence (AI) is a discipline that studies to explain and simulate human intelligence, intelligent behavior and its laws. Its main task is to establish the theory of intelligent information processing, and then design computing systems that can display some approximate human intelligent behavior. As an important branch of computer science and a broad new field of computer application, AI, together with atomic energy technology and space technology, is known as the three leading technologies of the 20th century.

The main research contents of artificial intelligence include: knowledge representation, automatic reasoning and search methods, machine learning and knowledge acquisition, knowledge processing system, natural language understanding, computer vision, intelligent robots, automatic programming and so on. So here's what it boils down to.

1. Machine sense: To make a machine similar to human perception.
2. Knowledge representation: formalization or modeling of human knowledge.
3. Machine thinking: Through the perception of the external information and the internal work of the machine information for the purpose of processing.
4. Machine learning: The study of how to give a computer the ability to learn like a human, so that it can automatically acquire knowledge through learning.
5. Machine behavior: The expressive power of computers, "speaking, writing, drawing," etc.

III. Hot Technology

In the research field of artificial intelligence, there are five core technologies that are the hot topics of current research, which are computer vision, machine learning, natural language processing, robotics and speech recognition.

1. Computer vision: Computer vision refers to the ability of computers to identify objects, scenes and activities from images. Computer vision uses a sequence of image processing operations and other techniques to break down an image analysis task into manageable chunks. For example, some techniques can detect edges and textures from images, and classification techniques can be used to determine whether the features identified represent a class of objects known to the system.

2. Machine learning: Machine learning refers to the ability of a computer system to rely on data to improve its performance without following explicit program instructions. At its core, machine learning automatically finds patterns in data that, once found, can be used to make predictions. Machine learning has a wide range of applications, with the potential to improve almost any performance for activities that generate large amounts of data. Machine learning also plays an important role in other areas of cognitive technology, such as computer vision, which can improve the ability to recognize objects by constantly training and improving visual models in massive images.

3. Natural Language Processing: Natural language processing refers to the human-like text processing capabilities of computers. For example, extracting meaning from texts, or even interpreting meaning from texts that are readable, naturally styled, and grammatically correct. A natural language processing system doesn't understand how humans process text, but it can process text in a very sophisticated and sophisticated way.

4. Robots: The integration of cognitive technologies such as machine vision and automatic planning into tiny but high-performance sensors, brakes and cleverly designed hardware has given birth to a new generation of robots, which are capable of working with humans and can flexibly handle different tasks in a variety of unknown environments.

5. Speech recognition: Speech recognition is mainly concerned with the automatic and accurate transcription of human speech technology. The technology must face some of the same problems as natural language processing, dealing with different accents, background noise, distinguishing homophones/homonyms, and the need to work fast .

IV. Guidelines for Graphics Preparation and Submission

Applications of artificial intelligence mainly include: retail, medical, transportation, education, home furnishing, logistics and other fields.

1. Retail

Artficial intelligence is widely applied in the retail industry. The unmanned warehouse independently developed by Jingdong adopts a large number of intelligent logistics robots for coordination and cooperation. Through artificial intelligence, deep learning, image intelligent recognition, big data application and other technologies, industrial robots can make independent judgment and behavior, complete various complex tasks, and realize automation in commodity sorting, transportation, warehouse and other links.

2. Medical Care

At present, in the field of vertical image algorithm and natural language processing technology, it can basically meet the needs of the medical industry. Intelligent medical treatment plays an important role in assisted diagnosis and treatment, disease prediction, medical image assisted diagnosis, drug development and other aspects.

3. Transportation

At present, the application of intelligent development of traffic network system in our country is mainly through the collection and analysis of the traffic flow and traffic speed problems, can study and implement the process of monitoring and scheduling of traffic modes, effectively improve traffic capacity, simplify traffic resources management, reduce social environment caused by pollution and so on.

4. Education

Through image recognition, the paper can be corrected and answered by the machine, and pronunciation can be improved by speech recognition. Human-computer interaction can be answered online. The combination of artificial intelligence and education can, to some extent, improve the unbalanced distribution and high cost of teachers in the education sector and provide more effective learning methods for teachers and students at the tool level.

5. Home Furnishings

Based on the Internet of Things technology, smart home consists of intelligent hardware, software and cloud computing platform to form a complete home ecosystem. Users can remotely control the equipment, the equipment can be connected, self-learning, optimize the safety of the home environment, energy saving, convenience, etc.

6. Logistics

By using intelligent search, reasoning planning, computer vision and intelligent robot technology, the logistics industry has realized automation in the process of transportation, storage, distribution and loading and unloading, and basically can realize unmanned operation.

7. Scientific research

DeepMind, in collaboration with the European Institute for Bioinformatics, recently announced a major leap forward in biology. They used AlphaFold, an artificial intelligence (AI) system, to predict 214 million protein structures in more than 1 million species, covering almost all known proteins on Earth. The breakthrough will accelerate the development of new drugs and revolutionize basic science. The study was published in the journal Nature. AlphaFold is known to predict the shape of proteins with atomic, size and minute accuracy. Many AlphaFold predicted structures are good enough to replace experimental structures in some applications. Alternatively, researchers can use AlphaFold predictions to verify and make sense of experimental data. In the field of scientific research, artificial intelligence can help scientists complete tasks such as analyzing data and predicting results, which can greatly help scientific research.

V.Future Development Direction

After nearly 10 years of rapid development, artificial intelligence technology has made great breakthroughs. With the increasing maturity of artificial intelligence theory and technology, the integration ability of artificial intelligence scene is constantly improving. Therefore, commercial application has become the focus of the layout of artificial intelligence technology enterprises in recent years. Various products based on artificial intelligence technology have replaced human beings in various fields to engage in simple and repetitive physical or mental labor, greatly improving

production efficiency and quality of life, and also promoting the development and reform of various industries.

In the future, the three drivers of data, algorithms and computing power will evolve significantly. In terms of data, the rapid development of the Internet makes high-quality and large-scale big data possible, and the massive data provides sufficient raw materials for the development of artificial intelligence technology, including computer vision. In terms of algorithms, the machine learning algorithm has made a major breakthrough. The algorithm based on the multi-layer neural network model has improved the accuracy of the machine learning algorithm in the field of face recognition by leaps and leaps, laying an important technical foundation for commercial application. In terms of computing power, the improvement of computing power breaks through the bottleneck. The new generation of computing chips represented by GPU provides more powerful computing power, which makes the calculation faster. Meanwhile, the distributed computing realized on the cluster helps the algorithm model to run on a larger data set.