

Research on Integrated Development Technology of Artificial Intelligence, Big Data and Cloud Computing

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Abstract:

Big data is profoundly changing our society and our way of production, life and thinking. At the same time, the development of big data continues to promote the innovation and breakthrough of artificial intelligence. Artificial intelligence is the focus of current research. All countries also raise artificial intelligence to the national strategic level and seize the commanding height of artificial intelligence. This paper analyzes the strategic characteristics of the development of artificial intelligence in the United States, Britain and Japan from the two dimensions of technology deployment and system guarantee. This paper studies the artificial intelligence technology based on big data and the development strategy of artificial intelligence, so as to provide a strategic idea for the development of artificial intelligence in China. The idea has a certain reference value for the research on the integrated development technology of artificial intelligence, big data and cloud computing.

Keywords: Big Data, Artificial Intelligence, Technology Deployment, Integrated Development.

I. INTRODUCTION

Since the reform and opening up, China has always attached importance to the development of science and technology. In this artificial intelligence revolution, China is also trying to accelerate the realization from "following" to "leading" [1-2]. In 2017, the State Council issued the development plan for a new generation of artificial intelligence, which set a three-step strategic goal by 2030 [3]: synchronization of overall level, innovation of basic theory and world leading level. At present, the large-scale application of artificial intelligence technology in China has become possible [4]. The scene pilot work of automatic intelligent driving system has been gradually carried out, and the artificial intelligence system has also been introduced into some hospitals and railway systems. It stressed hitherto unknown that AI is an important

driving force for the new round of technological revolution and industrial transformation [5]. Accelerating the development of the new generation AI is a strategic issue that concerns China's ability to seize the new round of technological revolution and industrial transformation. Compared with the international scientific and technological frontier and China's industrial reality, it has become a general trend to carry out strategic research on the development of artificial intelligence [6-8]. This paper aims to summarize the current key frontier technologies of artificial intelligence from the technology deployment strategy through the discussion and analysis of the strategic plans of artificial intelligence in various countries, and briefly explain them.

II. ARTIFICIAL INTELLIGENCE TECHNOLOGY BASED ON BIG DATA

There are many definitions of big data, and the understanding of experts in different industries and fields is not exactly the same. Among them, Wikipedia defines big data as a collection of data that cannot be captured, managed and processed by conventional software tools within a certain time. Definition of IDC (International Data Corporation) report: big data technology describes a new generation of technology and architecture for extracting value from various large-scale data in a very economical way and with high-speed capture, discovery and analysis technology.

With the surge of data and the continuous improvement of computer computing power, the research on machine learning algorithms has also developed rapidly. According to the hierarchical structure of the algorithm model, the development of machine learning can be roughly divided into two stages: shallow learning and deep learning. Machine learning is to let the machine simulate the human learning process to obtain new knowledge or skills. The machine completes the specified tasks through self-learning. The goal is to let the machine have the learning ability like human beings. Tom M. Mitchell's definition of machine learning is widely cited: for a certain type of task T and performance measurement P , if a computer program's performance measured by P on t continues to improve with experience E , then we call the computer program learning from experience E .

Shallow learning model is the so-called traditional machine learning, which can be summarized as: "traditional machine learning = data + feature + model". Traditional machine learning methods need to preprocess the data, such as sorting, cleaning and extraction. After completing the operations such as feature engineering, the data can be input into the model for training. In the learning stage, the feature selection and the built model are continuously optimized and improved. Dark blue of IBM is a typical representative of traditional machine learning. The core of the "dark blue" algorithm is to manually input the rules and methods of chess, generate all possible moves based on violent exhaustion, constantly evaluate the situation and find the best move.

Deep learning is a machine learning model with deep structure. Compared with the shallow

model, although it is simulated neural network, deep learning is reflected in its word "depth", which transforms the features many times through multi-layer neural network. The commonly used deep learning model is multilayer neural network. Each layer of neural network will input nonlinear mapping. Through the stacking of multilayer nonlinear mapping, very abstract features can be calculated in the deep neural network to help classification.

Simply put, in deep learning, if enough original data is input, the computer can obtain concepts or knowledge that only human beings can understand, and then apply these knowledge to new data. However, when there is little data, the performance of deep learning algorithm is not ideal, which is precisely because the deep learning algorithm needs to be based on big data. The difference is that the performance of traditional machine learning algorithms will be relatively good when the samples are limited or insufficient.

If speech recognition technology is to make the machine "hear", then natural language processing (NLP) is to make the machine "understand". NLP transforms human language into a form that computer programs can process and computer data into the form of human natural language, so that computers can understand human language. Therefore, the goal of NLP is to enable computers to learn and understand languages and produce adult languages.

TABLE I. NLP development stage

NATURAL LANGUAGE PROCESSING (NLP)	PHASE I	PHASE II
IDEOLOGICAL ORIGIN	Rationalism	empiricism
MAIN POINTS	Analyze the language structure and simplify it into a set of clearly defined grammatical rules, which is essentially pattern matching.	Language data automatically and semi automatically statistics knowledge in the training process, which is essentially deep learning.

The development of NLP has experienced two stages, and its ideological source can be traced back to empiricism and rationalism in philosophy. NLP based on statistics can be classified as empiricism in philosophy, while NLP based on rules belongs to rationalism. In the first stage, rationalism mainly relies on thesaurus and rules to deal with language. In the second stage, the empirical method based on statistics is adopted, and the language data automatically and semi automatically obtain the statistical knowledge of the language in the training process, so as to effectively establish the statistical model of the language.

III. DEVELOPMENT STRATEGY OF ARTIFICIAL INTELLIGENCE BASED ON

BIG DATA IN TYPICAL COUNTRIES

1.American AI development strategy

The United States is the birthplace of artificial intelligence. It has long attached importance to the top-level design, capital investment, technology research and development of artificial intelligence.

(1) Pay attention to big data. The intelligent system is inseparable from the support of data. Obtaining a large amount of data and specific data is the key to successfully training machine learning algorithms. Therefore, the United States attaches great importance to the development of big data and the establishment of public data sets. In order to further promote the open sharing of data, the United States proposes to implement the "artificial intelligence open data" plan to achieve the goal of publishing a large number of government data sets and promote the use and practice of artificial intelligence open data standards in the fields of government, academic institutions and the private sector.

(2) Achieve effective human-computer interaction. Although fully autonomous intelligent systems have a large number of applications in the United States, many scenarios still need the combination and cooperation of human intelligence and artificial intelligence to most effectively solve problems and achieve application goals. Enhance the perception ability of artificial intelligence system. Intelligent systems are often disturbed by other factors in the perception process. The perception mechanism needs to eliminate the input redundant information and interference information and extract the key and useful parts. Develop an efficient language processing system. In human-computer cooperation, effective oral or written communication with machines is the key.

(3) Develop general intelligence and human like artificial intelligence. The United States proposes that investment research should develop from special artificial intelligence to general artificial intelligence, and finally achieve the goal of human like artificial intelligence. Special AI systems generally only have perception ability, but general AI and human like AI need to have the same cognitive ability as human beings.

2.British AI development strategy

At present, the UK ranks first in the development of artificial intelligence in Europe. Therefore, the UK is selected as the research object to explore its artificial intelligence development strategy.

(1) Upgrade data infrastructure. At the data level, many reports on artificial intelligence issued by the British government emphasize the importance of big data, and the infrastructure construction of big data is the focus in infrastructure. In terms of digital and telecommunications infrastructure, the British government proposed to improve data transmission capacity, access "ultra-high speed" broadband in 95% of households, invest more than £ 1 billion to develop 5g mobile network and expand the construction of all fiber

broadband.

(2) Realize understandable artificial intelligence. The "black box" algorithm of deep learning challenges artificial intelligence. Between multi-layer data input and output, developers engaged in intelligent systems are not sure which layer or factor causes the system to make specific decisions. Therefore, as far as the deep neural network is concerned, because it is impossible to realize its interpretability for the time being, the application of this kind of intelligence in specific major fields should be postponed until an alternative solution is found. In specific security critical scenarios, the UK has shown that it can sacrifice the capability and accuracy of the system.

(3) Human computer interaction. At present, the UK is developing various human-computer interaction systems through machine learning, including the design of intelligent agents that can make efficient decisions according to human emotions. In short, let the intelligent system try to interpret a person's emotional state and make corresponding responses according to different states to achieve the best effect and meet their needs.

3. Development strategy of artificial intelligence in Japan

As the world's third largest economy, Japan's science and technology is basically at the world's leading level. The Japanese government and industry also began to pay attention to the layout and development of artificial intelligence.

(1) Overcome the defect of small amount of data. Since the amount and quality of data determine the degree and depth of machine learning, Japan's key work direction is how to ensure the generation and use of high-quality data, so as to establish a higher-level artificial intelligence learning model. The development of artificial intelligence technology in Japan requires a large number of high-quality data resources for machine learning, but the amount of data in Japan is far less than that in Europe and the United States. Therefore, in order to overcome the defect of small amount of data, Japan is promoting the research and development of "new hierarchical reinforcement learning" algorithm by imitating the brain nervous system, simulating the information processing mechanism of the human brain, and processing as many images of nature as possible with few cells.

(2) Brain like research. Learn the information processing mechanism of brain transparency. People get inspiration from the hierarchical structure of human visual cortex and begin to simulate brain multi-layer neural network. Deep learning is based on this multi-layer neural network. Learn the brain's flexible learning methods. Compared with human intelligence in learning methods, human brain learning has higher learning efficiency.

(3) Natural language processing. Natural language processing technology based on Japanese should become a national key research topic. Japan hopes to make effective use of the written materials written in natural language written in Japanese, including social knowledge such as social public documents and academic papers, and is committed to the research that intelligent systems can automatically identify social problems and put forward solutions. At the same time,

by strengthening natural language processing, accelerate the research and development of dialogue robot, so as to prepare for the construction of intelligent society in Japan.

TABLE II. Comparison of artificial intelligence development in different countries

	U.S.A	BRITAIN	JAPAN
RELATIONSHIP MODEL BETWEEN GOVERNMENT AND MARKET	Enterprise autonomy	Bring production by learning	Government guided market-oriented
TYPICAL ENTERPRISE	Google, IBM,IROBOT, Apple,Facebook, Amazon	Vocal IQ, Cytora,Evi, SwiftKey,Darktrace	Fujitsu, Toyota, Honda, sharp, Toshiba, FANUC
ENTERPRISE CHARACTERISTICS	AI development is driven by big data and computing power, and giant enterprise groups cooperate to form an AI ecosystem.	Focusing on basic research and algorithm driven AI innovation, university scientific research projects have developed into star enterprises.	There are few specialized AI companies, and most enterprises are closely integrated with the application field.
TECHNICAL COMMONNESS	Attach importance to big data and establish an open data sharing platform Perceptual intelligence - cognitive intelligence - human-computer interaction: machine learning, deep learning, computer vision, natural language processing system, speech recognition, visualization technology, etc Develop understandable and transparent artificial intelligence system		

In terms of technology deployment, although the United States, Britain and Japan have different research directions, there are three common aspects of Technology Research (see Table 1). The first is the use and openness of data. All three countries proposed to establish a data sharing platform, formulate standards for open and shared data sets, and affirm the importance of data for training artificial intelligence; The second point is to realize effective human-computer interaction by perceiving intelligence and promoting cognitive intelligence. For example, the United States has invested in the research and development of visualization technology and natural language processing technology; Britain tries to develop virtual agents

that can understand human emotions through machine learning, so as to make machines have cognitive ability; Japan hopes that through natural language processing, machines can actively have social problem awareness and solve social problems. The third point is to propose an information processing mechanism to solve the black box algorithm and develop an understandable and transparent artificial intelligence system. The United States, Britain and Japan put forward different solutions. The United States and Japan proposed to simulate the brain transparent information processing mechanism through brain science research, while the United Kingdom wanted to push back the machine processing mechanism through the man-machine dialogue interface, in order to avoid the algorithm discrimination or unsafe impact caused by the "black box" algorithm.

IV. CONCLUSION

Scientific exploration is endless, especially at the forefront of artificial intelligence. It is a subject worthy of in-depth study to study what kind of development model and development strategy artificial intelligence should take. From a longer-term perspective, the research on the development strategy of artificial intelligence can not only promote the technical development of artificial intelligence, but also improve the regional innovation ability and drive the regional economy through the development of artificial intelligence. This paper discusses the development strategy of artificial intelligence technology from three dimensions: big data and artificial intelligence, artificial intelligence technology and national development strategy. The competition situation of exploring and studying artificial intelligence in various countries is becoming more and more intense, and the development of artificial intelligence technology is also changing with each passing day. The research on the development strategy of artificial intelligence should keep pace with the times and follow up the research in time.

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