Research on Artificial Intelligence Breakthroughs and Electrical Automation Control in AI Technology

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Abstract

In the last ten years, the research of artificial intelligence theory has made important breakthroughs: 1) the common core mechanism of intelligent generation is found to be "information knowledge intelligent conversion" under given conditions, and the mechanism simulation method of artificial intelligence is established, and 2) the ecological structure of knowledge is found under the support of instinct knowledge. It has opened up the vision of artificial intelligence research. 3) combining the common core mechanism of the intelligent generation with the ecological structure of knowledge, we found that the artificial intelligence "structural simulation, function simulation, behavior simulation method, which was originally developed independently, were the mechanisms of the mechanism simulation respectively." The harmonious special case under different knowledge conditions "forms the unified method and theory of artificial intelligence research, which has opened up a new prospect for the development of artificial intelligence. The electrical automation control based on artificial intelligence technology has been applied to actual production and life, and has obtained good application effect. This paper analyses this paper.

Keywords

Artificial intelligence, automation control, knowledge ecology, mechanism simulation, scientific methodology.

1. Introduction

Automation of electrical engineering plays an important role in the development of China's industry and economy. With the development of artificial intelligence technology, its application fields are expanding. Compared with traditional electrical engineering automation, intelligent technology has many advantages, which can significantly improve the automation performance of equipment and optimize product quality. This paper analyzes the application status of electrical engineering automation control, expounds the intelligent technology and its application advantages in the automation control of electrical engineering, and summarizes the specific applications of the intelligent technology in the automation control of electrical engineering, such as electrical equipment, electrical control, fault diagnosis and repair of equipment, and the current intelligence. The application of energy conversion technology in automation control of electrical engineering is of great significance.

2. Divide and Rule Methodology and Decentralization of AI Research

Intelligence is a typical complex research object. It is not only the most advanced product that information resources can be processed, but also the most advanced ability that all organisms may have. It is precisely because of the high complexity of intelligent problems that the research of intelligent science and technology needs the guidance of scientific methodology. In the middle of the twentieth Century, scientific technology Under the background of the operation, artificial intelligence scientists and technicians follow the scientific research methodology of "divide and conquer", and carry out simulation research on natural intelligence (especially human intelligence) from different

angles, and expect to copy the magical ability of human intelligence to machine as far as possible and make intelligent machines. When it comes to it, people find that the problem of intelligence is really too complex and it is difficult to study it as a whole. It can only be broken down into several sides according to the "divide and conquer" methodology. So, people automatically decompose the intelligent simulation research into "structural simulation", "functional simulation" and "function simulation". "Behavior simulation" three different ways, and first from the "structural simulation", and then in the "functional simulation" and "behavior simulation". Half a century of artificial intelligence research history, do follow the guidance of the above methodology, the results have produced the following three different research routes. (1) based on the knot Artificial neural network research on construction simulation [2 -6] . The brain neuroscience research found that human thinking function mainly locates in the brain neocortex, the latter is a complex network consisting of 1011 neurons, each of which is a nonlinear processing unit, and each neuron forms a dynamic connection with 103~4 other neurons. The working frequency is 100 Hz, so neocortex neural network can have 1016·17 connected to /s. It is based on such a rich connection that the human brain neocortex can fully describe the changes in the external world, and produce corresponding strategies to show great intelligence. According to the methodology of "structural simulation", the researchers of artificial intelligence try to build artificial neural networks to simulate human beings. Thinking ability. In 1943, McCulloch and Pitts put forward the mathematical logic model of neurons, which became the basic unit of artificial neural network after the improvement of posterity. In the mid 1950s, Rosenblatt was used to construct a perceptron (Perceptron) using an artificial neuron circuit, which could be used to identify the English letters of the printed body and initially display the intelligence of the artificial neural network. At the same time, Widrow and other Adaline and Madaline systems with self-adaptive ability have been successfully used in the study and design of artificial neurons. People have even used a few simple neural networks to design artificial neural networks that can simulate the reflex ability of higher animals, and show the pre seduction of artificial neural networks. However, the research of artificial neural networks is also facing severe challenges. On the one hand, in order to effectively simulate the intelligence of human thinking, it is necessary to make artificial neural networks which are close to the neocortex of the human brain. However, it is very difficult in manufacturing technology. On the other hand, if the complexity of the artificial neural network is reduced to the level that the industrial manufacturing technology can allow, the intelligence of this relatively simple artificial neural network will greatly deteriorate.

It is a dilemma of "not going forward and backward". The greater difficulty is even with science and technology. However, because people know little and even mystery about the "learning mechanism" of the brain neocortex neural networks, the highly complex artificial neural networks are not known to follow. What "learning mechanism" works is still impossible to produce as wonderful as human intelligence. As people continue to explore the artificial neural network tirelessly, people are beginning to consider a new way to simulate human intelligence. This is the way of "functional simulation" in 1956. Of course, the artificial neural network researchers have not given up the method of structural simulation. On the contrary, the revival and prosperity of artificial neural networks in 1980s, new network models and new learning algorithms are in pattern recognition, associative memory, and combination problems. The applications of optimization, fault diagnosis and other fields have been well applied. (2) research on physical symbol system based on function simulation [7 -11] In the summer of 1956, a group of young scholars, such as McCarthy, Shannon and Minsky, held a two month Summer Seminar in the American Dartmouth to avoid the "complex structure" of the artificial neural network. It explored the use of powerful computing computers as a hardware platform by compiling "smart software".

3. Artificial Intelligence

To simulate the function of human logical thinking, and formally named this research field as artificial intelligence. (Artificial Intelligence) , A brief note to AI. As the theoretical basis of AI, Newell and Simon put forward the famous "physical sign system hypothesis", which think that

although the material components of the computer system and the human brain system are different and the forms of energy are different, they are both physical systems to deal with symbols. A physical symbol system only satisfies: 1) with input symbols, 2) with output symbols, 3) can store symbols, 4) can copy symbols, 5) can establish symbol structure, 6) have the ability of conditional migration, which is an intelligent system. They claim that both the computer and the human brain satisfy these 6 hypotheses, so they are mutually equivalent physical symbols. In other words, it is not only reasonable but feasible to use computers to simulate the mental functions of the human brain. One of the most notable is the first expert system, MYCIN, a diagnostic expert system for blood infection through the Turing test, and the Deeper Blue expert system, which has conquered Kasparov, the world chess champion. However, the research route of the physical symbol system based on functional simulation has also encountered serious difficulties. This had to retreat from the early ambitious goal of universal problem solving to the specialist system for specialized areas. But even as an expert system, its design still faces the shackles of "knowledge bottleneck": the expert system needs to have the knowledge of expert level, but the automatic acquisition of this knowledge is very difficult. It can only be interviewed by the system designer directly to the relevant domain experts. However, the system designers are not necessarily able to make a list. An accurate interview outline, a domain expert can not definitely express all the knowledge he needs to solve the problem. Not only so, even if the necessary knowledge is obtained, but the current logic theory is not enough to support the representation of knowledge and the reasoning of knowledge. Therefore, the core links of knowledge acquisition, representation and reasoning are the key links of knowledge. They all face great difficulties. By 1980s, these difficulties have evolved into a huge obstacle to the progress of the simulation of artificial intelligence. And some people began to think about the search for third possible routes of artificial intelligence.

4. Research on Behavioral Simulation Based Perception Action System

In 1990, the research team led by the Brooks announced the development of a new type of robot that could simulate the behavior of hexagonal worms to walk freely on the uneven ground and not turn over. This is based on the "behavior model" artificial intelligence research route. Representative results [12]. The basic philosophy of the perception action system based on behavior simulation: people do not have to care about the structure of the prototype intelligent system or the knowledge needed by the prototype intelligent system, as long as the stimulus form accepted by the prototype intelligent system (hexagonal worm) from the environment and its response to this stimulus to simulate is to simulate the intelligence of the prototype system. Therefore, Brooks claims that intelligence does not need knowledge and intelligence does not need knowledge; what it needs is only the first accurate perception of the pattern of environmental stimuli and then the corresponding action aimed at the stimulus, so this system is called the "perception action system". It is not difficult to see that the "perception" based on behavior simulation is "perception". The action system is followed by a long existing "black box simulation" method. This method successfully avoids the "structural complexity" difficulty of the structural simulation method and the "knowledge bottleneck" obstacle of the functional simulation method, and creates third intelligent simulation methods for the research of artificial intelligence. However, it is also found that the behavior simulation method faces a new difficulty while avoiding the difficulties of "structure" and "knowledge". This is that it can only simulate some shallow layers (some action expressed) intelligence, and it is difficult to simulate those that are not expressed through external movements but through internal thinking. Deductive intelligence. (4) the traditional "divide and conquer" methodology of structural simulation functional simulation behavior simulation provides three research methods for artificial intelligence research, such as structural simulation, function simulation and behavior simulation, which have obtained many important achievements and made the development of artificial intelligence research.

However, as the "divide and conquer" methodology fails to reveal the internal relations between the three methods of structural simulation, functional simulation and behavioral simulation that it

decomposes, the three methods are independently seeking development each other and forming the three methods of artificial intelligence research "to stand up to each other".

Scattered patterns. For complex systems with information phenomena as the leading elements, the information between these subsystems is exactly the living soul of this complex system. There is no way to restore the face of the original complex system through the synthesis of each subsystem. In other words, the traditional method is used to "divide and conquer" to the complex system, but cannot "synthesize the reduction". The properties of the system (rather than not just some local properties of the information process); because it is a complex information system, it is necessary to pay special attention to the mechanism features. We can sum up a new scientific methodology for the study of complex information systems.

"Information system mechanism" theory With the new progress of artificial intelligence, with the guidance of the scientific methodology of complex information system, which is mainly marked by the concept of information, system and mechanism, we can put the three major methods of structural simulation, functional simulation and behavior simulation on a temporary basis and focus on the concept of information and system. The generation mechanism of artificial intelligence is discussed under the constraint. The results of this study achieve an important breakthrough in artificial intelligence research.［13］. (1) We find that "the common core mechanism of intelligent generation" and "artificial intelligence mechanism simulation methods" have realized that although the definition of human intelligence is quite complex, it can still be expressed as follows. Human intelligence is such a ability: to achieve the long-term goal of human "to improve the conditions of survival and development." It is this long-term purpose, an inexhaustible motive force for the development of human and human society. In the face of specific circumstances, we can find and define the problems that should be solved according to the existing knowledge and the presupposition goals for solving the problem; then, obtain the necessary information for the problems and targets, and extract new knowledge from it. In order to achieve the goal of solving the problem by using the information and knowledge acquired under the guidance of the target, the strategy is implemented to solve the problem to achieve the goal. Here, we find and define the problem and the preset goal according to the long-term purpose, the existing knowledge and the specific environment.

"The ability is called" implicit intelligence ", and the ability to" obtain information, extract new knowledge, generate intelligent strategies under the premise of determining the problem, knowledge and Presupposition "is called" explicit intelligence ". [14]Therefore, human intelligence includes two complementary aspects of recessive and explicit intelligence. Furthermore, implicit intelligence is far more complex than explicit intelligence, because discovery and preset goals are the primary embodiment of innovation ability, far more difficult than solving problems, and so far there are no systematic research results. Artificial intelligence simulates, in fact, only "explicit intelligence" of human intelligence. It can be seen that all the starting points of the artificial intelligence are given a given problem, a priori knowledge and a predetermined target, and their core tasks are "intelligent strategies for solving the problem";[15] The common solution is "obtaining information, refining knowledge and generating strategies". Because "strategy" is the main embodiment of intelligence, this common solution can also be expressed as "obtaining information, refining knowledge, generating intelligence". It is the process of "obtaining information, extracting knowledge and generating intelligence" under the constraints of given problem, prior knowledge and preset target, and can also be more concise as "information knowledge intelligent conversion" under given conditions[16].

This is a common core mechanism that conforms to the "scientific methodology of complex information systems based on the concept of information, system and mechanism, which is the main symbol". This is also the common core mechanism of human dominant intelligent generation. Therefore, people can realize the common core mechanism generated by this intelligent system.

Only because of the limitation of space, it can only mention its conclusion and inconvenient to give detailed explanation. It can be seen that the structure simulation, function simulation and behavior

simulation which have been in their own independent state of development are the special examples of the mechanism simulation method under different knowledge conditions. Moreover, because of the successive links in the chain of harmonious growth, the structural simulation, the function simulation and the behavior simulation should also be the successive links in the ecological chain. It is also an important force to promote the prospect of modern civilization. Electrical automation control based on artificial intelligence technology has improved the control efficiency of electrical automation on the one hand; on the other hand, it has reduced the result. This input is in line with the needs of the development of industrial enterprises. Therefore, for the electrical automation control, the application of artificial intelligence technology is undoubtedly of important practical significance[17]. (1) the application value of artificial intelligence technology in electrical automation control is not often obvious, mainly in artificial intelligence technology. The collection, feedback and processing of information have been realized to replace the complex work of human beings to a great extent. Therefore, in the field of electrical automation control, the application of artificial intelligence technology is bound to be a leap forward.

First of all, the electronic automation control based on artificial intelligence technology has realized the production process of better production and circulation, and realized the real automation in a great degree. Moreover, the design of electrical equipment is complex and systematic, which emphasizes the effectiveness of the design work. The application of artificial intelligence technique to electrical automation control is applied. After that, the function of artificial intelligence control has become a reality, and it is embodied in the following aspects: (1) artificial intelligence control realizes the data acquisition and processing functions. The realization of this function is realized first of the data acquisition of electrical equipment, and in actual production, the related data can be processed and guaranteed. This will greatly improve the control efficiency of electrical automation. (2) the artificial intelligence control realizes the alarm function of the system running monitor. For the main equipment in the electrical system, this function can monitor the value of the analog data in real time. At the same time, the intelligent monitoring is realized for the switch quantity of the electrical equipment, and the control of the electrical equipment is realized. Telephone alarm and recording are made for the change of the operation state of the electrical equipment, so as to facilitate the prior processing of the accident.

One of the major features of electrical automation control is to control the electrical system by using the mouse or keyboard. Therefore, for the operator of the electrical control system, the control program can realize the synchronous load or volume operation of the grid with the control program. This way, The efficiency of the control is greatly improved and it is suitable for the current industrial development demand. (4) the artificial intelligence control realizes the fault recording function. The realization of this function is mainly through the simulation of the fault recording, the sequence recording, the capture of the waveform and so on, so as to realize the intelligent capture of the fault recording. To a great extent, the efficiency and safety of electrical equipment are improved..3.

The application of gas automation equipment, electrical control process and accident diagnosis strengthen the application of artificial intelligence technology in electrical automation control. (1) the application of artificial intelligence technology in electrical automation equipment: in essence, electrical automation system is very complex, involving many fields and disciplines. On the one hand, electricity The operation of gas automation equipment requires the operators to have good comprehensive quality and complete professional knowledge[18]. On the other hand, the complexity of electrical automation, emphasizing the effectiveness of the operation, can reduce the accident or shutdown due to the misoperation or improper operation. In the solution of these practical problems, the artificial intelligence technology undoubtedly plays an important role in the sinking. First, the intelligent technology of human work is based on the computer theory. The scientific nature of the operation of the equipment and the actual environment of the operation of the equipment have been optimized. (2) the application of artificial intelligence in the electrical control process: in the process of electrical automation, the electrical control process is the most important part. The effective

application of artificial intelligence in the electrical control process is undoubtedly an important basis for improving the electrical automation control.

The fuzzy control is an automatic control system, which takes the reasoning rules of fuzzy logic as the theoretical basis, and uses a computer control system to form a digital control system with a closed-loop structure with feedback channels[19]. (b) expert control. The expert control is based on the theory of expert system, and the control theory is combined organically.

In direct current transmission, the main transmission control is Ma In mdani and Sugeno., the Mamdani is the speed control, and the Sugeno is all different. In addition, the effective realization of the artificial intelligence in the AC drive is based on the fuzzy controller. (c) The application of artificial intelligence in ordinary operation with the continuous development of modern industry, the relationship between our life and the electrical industry is increasingly close. The safe and stable operation of electric power is of great significance to our production and life. The electric operation emphasizes the strict norm of the operation process, in the traditional electric field, due to the operation. Complexity, in the process of operation not only to spend a lot of time, but also improper operation or operation error, it may bring serious consequences[20]. Therefore, with the development of the electrical industry, the application of artificial skill technology, to a great extent, simplifies the operation process in the electrical field. On the one hand, the tradition is traditional. The complicated operation steps are further simplified and the efficiency of electrical operation is improved; on the other hand, the realization of automation reduces or eliminates the problems caused by manual operation error, and improves the safety and stability of the electrical system to a great extent. (d) Artificial intelligence technology in fault diagnosis application of artificial intelligence technology with fuzzy theory, expert technology, and neural network control as the core, in the field of fault diagnosis also has very important application value. In the operation of the electrical system, the transformer, engine and other failures, not only affect the efficiency of the electrical system and the operation of the electrical system[21].

5. Concluding Remarks

This paper puts forward the theory of complex information system, which is mainly marked by the concept of information, system and mechanism. Under its enlightenment, the common core mechanism of intelligent generation is found, the mechanism simulation method of artificial intelligence is established, and the ecological structure of knowledge is found. On this basis, it can be derived from "artificial intelligence". The three main mainstream methods of structural simulation, function simulation and behavior simulation can achieve a harmonious and unified artificial intelligence mechanism simulation method, which has formed a unified method and theory of artificial intelligence. The integration of artificial intelligence research methods due to the innovation of scientific methodology will open up the development of artificial intelligence in the future. The new prospect of rapid development of science and technology has changed our life. The emergence of artificial intelligence technology has promoted the development of modern civilization. As a new high-tech, its application value is infinite in reality. First, the electric automation control system based on artificial intelligence technology has changed the traditional electric control model. In the second place, artificial intelligence technology has improved the efficiency of electrical automation control. Both in manpower and material power, the cost is greatly reduced and the practical value is of good value.

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