Realization and Application Research of Automatic Control System Based on Artificial Intelligence

Zhang Xingyuan

Huazhong University of Science and Technology, Wuhan, 430074, China

Keywords: electrical automation control, artificial intelligence, application research

Abstract: With the continuous development of our country, there are significant improvements in various fields, especially in artificial intelligence (AI), which has made significant breakthroughs. AI is a product created by human beings by combining science and technology with themselves. At this stage, it has a wide range of applications in the electrical industry, with ideal effect. AI has been continuously improved through the technology of electronic computer. Compared with traditional technology, AI has obvious advantages. It can effectively combine with electrical automation control, solve daily problems, as well as improve the efficiency and quality of equipment. This paper briefly describes the realization and application of automation control based on AI in electrical field.

1. Introduction

With the continuous development of science and technology, the most successful technology at this stage is AI technology, which is also the representative of the new era. Compared with the previous technology, it has innate advantages. Its technology is more comprehensive and the effect is very ideal. In the current development, AI promotes the comprehensive development of our country to a certain extent. However, because the use of AI technology is only in its infancy, there are still many shortcomings, and it will also be affected by other factors. To this end, the relevant personnel management should improve the AI technology and give full play to its role.

2. Concept of Artificial Intelligence Technology

At present, AI technology has made remarkable progress. In the advanced western countries, great importance has been attached to AI technology and a lot of capital has been invested to study. Now, it has achieved rapid development results. AI technology is widely used in our country. It combines many kinds of knowledge and is the product left by the combination of human and computer, involving relatively more contents, such as automation, information technology, science and technology and so on. AI was first proposed in the early 21st century.. This technology simulates human beings by using the programming technology of C language of computer, then analyses and collects the data, reacts to it to some extent, and solves the corresponding problems with human wisdom. It makes use of mechanized systems to adjust, and can easily surpass human beings. At present, AI is still a new type of technology in the field of scientific development. With the continuous improvement of science and technology, computers have been popularized in our daily life. Their continuous development also promotes the effective development of AI.

3. Basic Characteristics of Artificial Intelligence Controller

For the use of AI in electrical automation control, the principle is non-linear function. The algorithm is divided into exponential function, logarithmic function, polynomial function and so on. Moreover, they have a unique way of computing. Details are shown in Table 1.

  DOI: 10.25236/mmmce.2019.018

Table 1 Computation of Non-linear Function in Artificial Intelligence

Name of Function	Calculation Method
Exponential Function	Y=a*x(a is constant and is less than 0)
Logarithmic Function	Y=logax(a is greater than 0)
Polynomial Function	F(x)=an·X*n+an-1X*(n-1)....a2·x*2+a1*x+a0

4. Application Status of Artificial Intelligence

In electrical automation equipment, there are more complex structures, so it is of great difficulty to improve the equipment. In the process of work, it is necessary to have an effective understanding of the circuit and the whole workspace, and master it skillfully. It is also essential to analyze the problems according to the design concept, predict the existing problems and do the corresponding prevention work well. In the past work, the traditional method is usually adopted to deal with these manually, which also made the staff at that time did not attach importance to this issue and did not formulate an effective plan. At this stage, China has made remarkable progress in science and technology, and computer technology is constantly improving. Automation has been able to shorten the design time of electrical products, which not only has greatly improved the efficiency of work, but also has improved the quality of products. At present, automation technology is still constantly improving and has been widely used in electrical automation through artificial intelligence. In electrical equipment, AI control is mainly embodied in the analysis and processing of data, which can effectively monitor the operation of electrical equipment. Through monitoring, problems caused by equipment can be detected and transmitted to staff through electronic information. In the current stage of work, it is necessary for the relevant personnel to observe the differences in the automation production, and also to make records, so that if such problems occur again in the follow-up work, they can be effectively solved by recording. AI technology can calculate electrical equipment through non-linear function, and analyze and protect relevant parameters, so as to reduce the probability of equipment damage.

5. Role of Artificial Intelligence

With the continuous development of science and technology, China’s electrical engineering has been significantly improved, which also makes the AI technology has been further improved. At present, AI technology has been widely used in various fields in China. The use of this new technology not only improves the technical ability of various industries in China, but also promotes the better development of science and lays a good foundation for the sustainable development of China in the future.

The application of AI technology in electrical equipment is mostly aimed at automation system control. The seemingly simple system, in fact, constructs the overall structure of the power system, while controlling the relevant content of detection and management. In the process of implementing protection in power automation, there are usually two states: separated state and continuous link state. In the process of work, AI makes evaluations mainly through different running states. When the generator causes internal faults due to other reasons, the automatic control can be controlled in a special way to protect electrical equipment. With the progress of science and technology, the equipment in the electrical system should be optimized continuously. When designing the products initially, it should be designed by means of science and technology. This can not only improve the quality of products, but also prolong the service life of products. In recent years, AI technology has been constantly innovating and improving, and today’s electrical equipment has a certain scientific and rational feature. Once problems occurs in the electrical equipment, it is relatively difficult to judge the faults because of the relatively complex internal structure. Therefore, it is difficult to find

the faults in a short time. If AI technology is applied to make analysis, problems can be found easily. Effective dealing by artificial skills technology and electronic computer technology makes us easily judge the problem.

Nowadays, AI has become an indispensable part of electrical engineering. Especially in the field of automation construction, most of the new technologies in the field of electrical engineering are the effective combination of AI technology and automation system. In the electrical system, automation promotes the normal operation of electricity, and is also the basic condition for the operation. AI can improve the level of automation to a certain extent and further promote the development of enterprises. Therefore, it is necessary to strengthen the AI technology in electrical engineering, so as to promote the quality and efficiency of electrical engineering operation and improve the overall development of electrical enterprises in China.

6. Application of Artificial Intelligence Technology to Electrical Automation

6.1 Application and Analysis of Artificial Intelligence Technology to Electrical Automation Equipment

In the process of the operation of electrical automation equipment, the internal structure is very complex, which involves a relatively wide range of disciplines and fields. To adjust and operate the electrical automation equipment, it is necessary to have a strong comprehensive ability. At present, this kind of compound talents is relatively scarce, so it is very difficult to adjust and operate the electrical equipment. In order to ensure the normal use of electrical equipment, AI technology can be used effectively. Computer programming technology can be used to compile its internal and store a large number of related data. Combined with automation, it can realize the adjustment and related operation of electrical equipment, save a lot of human resources, effectively improve work efficiency, and promote better development of enterprises.

6.2 Application and Analysis of Artificial Intelligence Technology to Electrical Control Process

In the process of electrical control, electrical automation operation is particularly important, and is also an important part of electrical control. If the work of electrical control can be carried out automatically, the automatic operation will be realized. It can greatly improve the work efficiency of the entire electrical engineering, and reduce the input of human costs, thereby reducing the investment of enterprises in this fund. Nowadays, AI technology has been widely used in electrical automation control, which can control neural network by means of non-linear function.

If we want to further improve the application level of AI technology to electrical automation control, and carry out distance analysis of its control, we can know that its important role is achieved through DC and AC transmission, in which Sugeno (proposed by Gao Mu, an industrialist) is used as the main model to regulate speed.

6.3 Application and Analysis of Artificial Intelligence Technology to Daily Operation

People’s daily life can not be separated from the support of the electrical industry. If there are deviations in its operation process, on the one hand, it will cause economic losses of related enterprises, on the other hand, it will also affect the lives of residents. During electrical work, there are more stringent requirements in the operation. Because of its complex structure, in the operation process, the higher difficulty will consume a lot of time. Moreover, mistakes occur easily in operation, which greatly reduces work efficiency. For this reason, we can realize automatic operation through AI technology, reduce errors in work and reduce economic losses of enterprises. AI technology is a fixed way of work, and will not produce details of the error, so it can improve the operational efficiency of enterprises.

6.4 Role of Artificial Intelligence Technology in Accident and Fault Diagnosis

In daily work, electrical equipment failure is an ineviTable phenomenon. In AI technology, expert technology of non-linear function and neural network control play an important role in the process of equipment failure. Especially the start-up equipment and transformer equipment play a

very significant role in dealing with faults. In the use of electrical automation, the frequency of faults is relatively high, and the causes of the faults are also various. Often, during the period of equipment failure, it is difficult for staff to formulate timely solutions, thus causing great economic losses. In the process of artificial diagnosis, the method is relatively complex, and the accuracy is not high, making the effect very unsatisfactory. For example, after the transformer fails, it is necessary to collect the gas generated in the transformer first, and then analyze the collected gas. However, in actual operation, gas collection is relatively difficult, and it is easy to incorporate other gases. In analysis, the results will inevitably be affected. This diagnostic method not only wastes time, but also needs more operation methods, and the results obtained are not accurate, which may lead to other effects in the repair process. In the use of AI technology, the fault can be effectively diagnosed and found quickly through the systematic analysis of computer data, which can greatly reduce the repair time and improve work efficiency. For example, constant pressure water supply technology is widely used in industrial water supply. But in some specific cases, there are huge differences in water consumption in time and space. The traditional control method calculates and controls the water supply pressure through Pid algorithm, which can no longer meet the market demand, since there are many stability factors. Experiments show that using AI 808 regulator as the main controller of constant pressure water supply system can effectively improve its stability and realize the automatic control goal of the whole process of constant pressure water supply.

7. Conclusion

With the continuous progress of science and technology, AI technology has been widely used. In people's life and production work, it brings great convenience to people. Through the unique calculation method, complex work can be solved, the work efficiency be greatly improved, and the overall development of the country be promoted.

References

[1] Bai Jinlong. Application of Mechanical Automation Technology to Automotive Control [J]. Farmer's Staff, 2019 (11): 194.

[2] Gao Lixia. Application of Intelligent Technology to Electrical Engineering Automation Control [J]. Southern Agricultural Machinery, 2019,50(10): 200.

[3] He Jinyong. Exploration of the Application of Artificial Intelligence Technology to Electrical Automation Control [J]. Internal Combustion Engine and Accessories, 2019 (09): 208-209.

[4] Liu Yongqi, Qu Mingfei. Construction of Electrical Automation Control System Based on Artificial Intelligence Technology [J]. Computer Fan, 2018 (11): 138.

[5] Peng Liang. Application of Artificial Intelligence Technology in Electrical Automation Control [J]. Engineering Technology Research, 2018 (12): 55-56.

[6] Wang Mingyang, Deng Lanqing. Development and Application Value of Artificial Intelligence to Electrical Engineering Automation [J]. China Equipment Engineering, 2018 (20): 165-166.