Application of Artificial Intelligence in Electrical Automation

Wu Weizhen

Jiangxi University of Engineering, Xinyu City, Jiangxi Province, 338000, China

Keywords: Electrical automation, Artificial intelligence, Application, Innovation

Abstract: In recent years, with the continuous progress and development of information science and technology, a variety of new scientific and technological tools are applied in social production and life, greatly changing the daily life and work style of residents. As one of the remarkable achievements of information science and technology, artificial intelligence technology has been introduced by domestic enterprises to improve the production efficiency and quality of enterprises. The application of artificial intelligence technology in the field of electrical automation can improve the quality of electric control and save the production cost of enterprises. Based on this, the application of artificial intelligence technology in electrical automation is very important for the development of electric control technology in China. In this paper, artificial intelligence technology as a starting point, the application value of artificial intelligence technology is analyzed, and combined with the application of artificial intelligence in electrical automation, some development suggestions are put forward for the application of artificial intelligence technology in electrical automation, in order to promote the application of artificial intelligence technology in the field of electrical automation and improve the development efficiency of electrical automation industry.

1. Introduction

Generally speaking, the application of artificial intelligence technology in the field of electrical automation can be regarded as the intelligent improvement of the traditional production mode. The key of its application lies in the innovation of artificial intelligence technology, which integrates intelligence through multiple reasons. Since the development of electrical automation control technology, a relatively mature technical system has been formed, and the application of artificial intelligence technology further tap the potential of electrical automation control field. The application of artificial intelligence technology in the field of electrical automation can effectively improve its control efficiency and further expand the application range of electrical automation. In addition, the integration of big data technology, cloud computing technology and electrical automation can stimulate the potential value of data information to the greatest extent, so as to solve the problem of information data with the help of cloud computing technology, so as to make accurate and objective data analysis and further improve the efficiency and quality of electrical automation control.

2. Application Value of Artificial Intelligence Technology

In the era of knowledge economy, the application of artificial intelligence technology is the inevitable result of the rapid development of social science and technology, which has greatly changed people's work and life, and thus is widely used in various fields. The application of artificial intelligence technology is based on the premise of computer and big data technology, integrating other professional knowledge, which is a great innovation of human science and technology. A simple understanding of artificial intelligence technology is an extension of human intelligence, finding equipment that can replace human beings, freeing the labor force from some simple and repetitive fields, so as to invest in higher production fields. As an important branch of computer science and technology, artificial intelligence technology can produce a new intelligent machine mode similar to human thinking, such as natural language recognition processing, image recognition, etc. through in-depth understanding and analysis of the essence of intelligent

technology, which has a high technical application value. Artificial intelligence technology is applied in the field of electrical automation. Compared with traditional artificial control technology, artificial intelligence technology can realize the automation of equipment operation based on computer technology, thus further improving the accuracy of equipment control, and to a large extent saving resources and human costs.

3. Application Analysis of Artificial Intelligence in Electrical Automation

3.1 Application in Electrical Equipment

Artificial intelligence technology is applied in electrical automation control. As far as the design of electrical equipment is concerned, the design process is very complicated, and the requirements for technicians are very strict. Technical personnel are not only required to be familiar with the professional knowledge of circuit, electromagnetic field, motor, electrical appliance and other aspects, but also have rich design experience. When facing some problems, they should have more accurate judgment ability, so as to be able to face the unexpected situation in time. According to the traditional electrical equipment design process, the design of its program usually depends on manual preparation, which is too active, resulting in the electrical automation design far from reaching the expected standard. However, the application of artificial intelligence technology can solve this problem in time, and further improve the quality and efficiency of electrical equipment program design.

3.2 Application in Normal Operation

With the continuous progress of society, people's living standards have been greatly improved. No matter in life, work or study, there is no lack of electrical equipment. For people's life and work security, the stability of electrical equipment operation is very important. When we use electrical equipment, we need to operate and use it according to the design rules and operation rules. In addition to the complexity of traditional operation methods, strict operation procedures also mean that errors in one link will lead to serious operation errors and have serious consequences. The emergence of artificial intelligence can solve these problems, simplify the operation procedure of the equipment and improve the operation efficiency, put forward the intelligent recognition of wrong operation, further correct the error, and even reduce the error rate to zero. It can be seen that the application of artificial intelligence technology greatly improves the safety and stability of electrical equipment, and plays a crucial role in promoting the operation of electrical equipment and improving the practicability of equipment.

3.3 Application to Accident and Fault Diagnosis

During the operation of electrical equipment, accident and fault diagnosis is to confirm the information about mechanical equipment and determine its operation status. If any abnormality is found, the fault location can be quickly and accurately located, the type of fault can be analyzed, and the solution strategy can be quickly found. Generally speaking, the operation of electrical equipment will be affected by various obstacles, especially prone to various failures and accidents. If effective measures are not taken in time to deal with it, a very small failure may lead to the occurrence of major failures, leading to safety accidents, seriously damaging the interests of employees, electrical system and the company, and even extremely serious social consequences Adverse effects. It can be seen that the application of artificial intelligence technology is very important for the accurate and timely determination of electrical equipment faults.

3.4 Application in Electrical Control Work

In the electrical automation control system, the normal operation of the control equipment can be said to be very important, which directly affects the operation effect of the automation system. At present, the application of artificial intelligence technology in electrical automation equipment has become the main trend. Artificial intelligence technology can not only greatly improve the working efficiency of system operation, but also reduce the production and operation costs to a certain extent.

The emergence of fuzzy control technology, Shenjing network control and expert system in artificial intelligence technology can realize the intelligent control of electrical automation. For example, the fuzzy control technology mainly regulates the operation speed of the equipment through Sugeno, Mamdani and Mamdani technology, which is an effective communication control technology and greatly improves the work quality and efficiency of the electrical equipment.

3.5 Application of Artificial Intelligence Technology in Product Design

In the design of traditional electrical automation device, it is mainly accomplished by experienced designers. To some extent, this design method lacks technology and has strong subjectivity. However, with the improvement of national economic level and science and technology, the relevant departments began to focus on the development of this field, thus increasing the investment of funds and resources, in order to focus on improving the design of electrical device related products. With the deepening of the research in this field in China, more and more research results have been achieved. Artificial intelligence technology has been applied to the production and application of this field, which has greatly changed the direction of product design. With the application of artificial intelligence technology in electrical automation system, the automation efficiency of product production has been greatly improved, and artificial intelligence elements have been integrated into product design to ensure product quality to the greatest extent.

4. Application Strategy of Artificial Intelligence in Electrical Automation

4.1 Design of Electrical Automation Equipment

It can be seen from practice that the electric automation system is very complex, and includes many professional and disciplinary knowledge, such as the operation of electric automation equipment requires highly professional and skilled personnel, so as to minimize the improper operation and errors of personnel, resulting in various possible stoppages and accidents, so as to avoid resource loss as much as possible. Therefore, when faced with this practical problem, artificial intelligence technology will play a very important role. Through the computer theory to create the relevant electrical automation equipment program design, the computer intelligent control can be realized. The intelligent operation of electrical equipment can replace the subjective problem of personnel operation, which not only improves the work efficiency, but also reduces the operation and design costs. The electrical automation control system of artificial intelligence technology is shown in Figure 1. In addition, artificial intelligence technology can improve the scientific operation of electrical automation equipment and optimize the real environment of equipment operation.
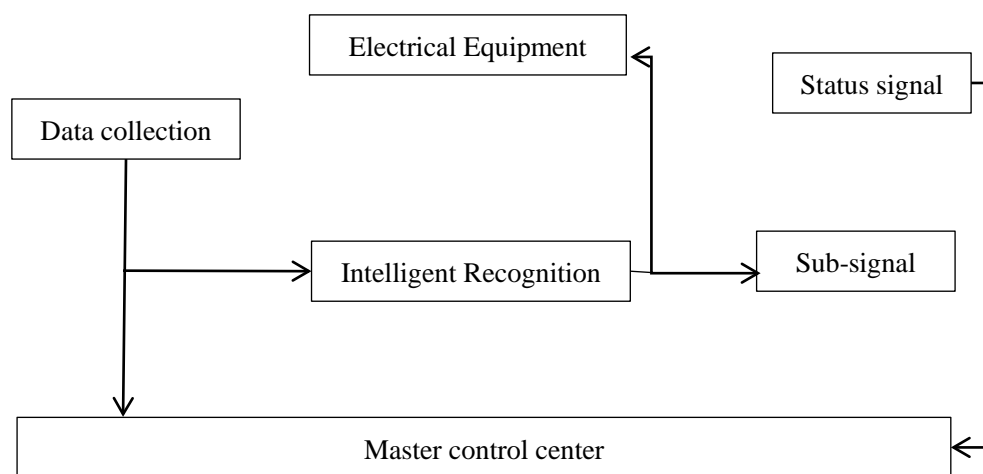
Fig.1 Electrical Automation Control System of Artificial Intelligence Technology

4.2 Design of Electrical Control Process

In the electrical automation control system, its electrical control link is a very important part, and artificial intelligence technology can improve the electrical control ability, also can improve the efficiency of electrical automation system operation, at the same time can realize scientific production through automation, and reduce the operation cost. In the design of electronic control process, the main technologies applied are expert system, neural network and fuzzy control. Among them, the fuzzy control system mainly takes the fuzzy language as a variable, based on reasoning, fully refers to expert experience, and analyzes the basic idea to control the electrical control system, as shown in Figure 2. Fuzzy control system belongs to a kind of self-control system. Based on fuzzy logic inference rules, a closed-loop digital control system with feedback channel structure is created by using computer control system.
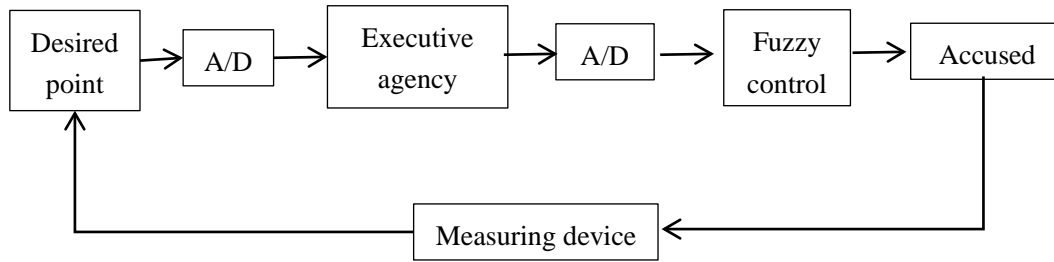

Fig.2 Composition of Fuzzy Control System

4.3 Design of Fault Diagnosis

For the installation of electrical automation equipment, when there is a failure, there are usually some signs listed first. In other words, the difference between these signs indicates the difference of equipment failure. Therefore, in the operation process of electrical automation equipment, when technicians operate these equipment, they usually rely on their own experience to effectively predict these signs, determine the type of equipment failure, and repair the failure before the equipment failure, which is very important for equipment maintenance. In the process of application of artificial intelligence technology in electrical automation system, it can accurately locate, maintain and deal with electrical equipment faults, so that electrical equipment can operate effectively and stably. At present, neural network and fuzzy control technology in artificial intelligence technology have been widely used in fault diagnosis of electrical equipment. For example, transformer fault analysis and diagnosis using artificial intelligence technology can analyze the oil and gas of transformer, and use the analysis results to understand the type of transformer fault, so as to take targeted measures to solve it.

4.4 Use of Daily Operation

The operation process of the electrical automation system is complex, and the requirements for the operation process of technical personnel are also very strict. In the process of manual operation, there will be various problems, and the wrong operation will lead to failure and economic loss. The application of artificial intelligence technology in the operation of electrical automation can simplify the operation of electrical system to a certain extent, and improve the accuracy and efficiency of operation. In addition, the simplified operation interface can also realize the remote control and operation of the electrical system, so as to improve the production efficiency and ensure the stable operation of the electrical system, while effectively saving resources and costs.

4.5 Simplify the Control Process of Electrical Automation

Electrical automation system is very complex in practical operation, if there is a fault, it may seriously damage the mechanical equipment. Therefore, how to ensure the standardization of electrical automation equipment control, and at the same time simplify and program operation as much as possible is the problem that the current researchers emphasize. The application of artificial intelligence technology in electrical engineering automation makes it possible to store and

effectively analyze daily materials. Then, after the machine fails, relevant measures can be taken immediately to ensure normal operation. In addition, in electrical engineering automation, artificial intelligence technology can realize the remote control of electrical equipment, and through strengthening the simplification and programming of the control process, it can strengthen the inspection and maintenance of electrical equipment, greatly improve the operation efficiency, and provide convenience for the inspection of equipment.

5. Conclusion

To sum up, with the development of science and technology and social economy, the application of artificial intelligence technology is becoming more and more mature. Therefore, the application of artificial intelligence technology in the electrical automation system can greatly improve the operation efficiency, promote the stability of the operation of the electrical automation system, and accurately locate equipment faults and problems, so as to save enterprises The operation cost of the industry, so as to improve the unity of the economic and social benefits of the enterprise.

References

[1] Ding Yunhan.(2020).Research on the application of electrical automation in power system operation [J]. Science & Technology Innovation and Application,,no.3,pp.179-180.

[2] Liu Yu.(2020).Research on the Current Situation and Development Trend of Electrical Automation Engineering Control System [J]. Light Textile Industry and Technology,vol.49,no.1,pp. 106-107.

[3] Zhang Shangming.(2020).Analysis of the application of artificial intelligence technology in electrical automation control [J]. Science and Technology Wind,no.2,pp. 18.

[4] Shen Di.(2020).Research on Application of Artificial Intelligence Technology in Electrical Automation Control [J]. Computer Products and Distribution,no.1,pp.88.

[5] Zheng Xuying.(2020).Discussion on the application of artificial intelligence technology in electrical automation control [J]. Chinese and foreign entrepreneurs,,no.2,pp.151.