Discussion on the Application of Artificial Intelligence in Electrical Engineering Automation

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Abstract: With the rapid development of modern information technology, artificial intelligence has been widely used in human production and life, which plays a vital role in enhancing the level of intelligence. In particular, the introduction of artificial intelligence in the field of electrical engineering automation will further enhance the degree of automation and promote the development of the electrical industry to a high-quality industry, so as to obtain the maximum economic benefits. To give full play to the effectiveness of artificial intelligence and provide more intelligent support for electrical automation, it is necessary to study in depth the driving role of artificial intelligence on electrical automation and clarify the in-depth application of artificial intelligence in the field of electrical automation in order to improve the level of electrical automation.

Keywords: Artificial intelligence; Electrical engineering automation; Application

Introduction

With the progress of science and technology, artificial intelligence has developed rapidly and is used in various fields, greatly promoting the modernization of various industries. The electrical engineering industry must have artificial intelligence if it wants to improve its technical level and better realize automation, but in order to maximize the use of its functions, it is necessary to increase the research of the relevant departments on artificial intelligence technology, enhance the scientific, rational and flexible application, so that artificial intelligence can play a greater role in the process of its own development.

1. The application value of artificial intelligence in electrical engineering automation

1.1 Intelligent production operation

In traditional industrial production, the controller mostly relies on manual operation, which is not only inefficient, but also cumbersome and time-consuming. The introduction of artificial intelligence technology into the field of electrical automation can not only improve production efficiency, but also make the production operation intelligent, giving full play to the adaptive and processing capabilities of artificial intelligence on data, so as to achieve the purpose of intelligent production operation. In this way, it can reduce the burden of workers and increase productivity, and at the same time, it can also automate complex production work, reduce human error, and improve the quality of products in general. Artificial intelligence can also optimize the production process, improve the efficiency of resource utilization, enhance the competitiveness of enterprises, and promote the sustainable development of enterprises.

1.2 Improve the safety of electrical equipment operation

In the operation of electrical equipment, the use of traditional control methods cannot effectively ensure the safety and reliability of real-time monitoring due to limited manpower and other reasons. Artificial intelligence can not only carry out all-round monitoring of electrical equipment, but also realize automatic shutdown in case of danger, preventing human operation errors from endangering the lives of employees.

1.3 Reduce resource costs

Artificial intelligence can learn and analyze huge amounts of data to achieve precise control and optimal use. For example, the application of artificial intelligence in the energy system can monitor and predict the load and energy supply of the power system in real time, thus realizing the intelligent regulation of power generation and reducing the dependence on traditional energy sources, which can reduce energy consumption and minimize the negative impact on the environment.

2. The practical application of artificial intelligence in electrical engineering automation

2.1 Application in data acquisition and processing

In the field of electrical engineering automation, one of the major advantages of artificial intelligence technology is data collection.

For electrical equipment, the performance parameters of each process can be well represented by the collected data. If there are hidden errors or faults, the operation data will change abnormally. However, the development of electrical engineering automation is constrained by the fact that traditional electrical automation methods cannot collect all types of parameters in electrical equipment in real time and on a large scale. By applying artificial intelligence to electrical equipment and utilizing similar software and data acquisition devices, it is possible to achieve large-scale acquisition of the operating parameters of electrical equipment. When different types of data are extracted, the system automatically compares them with ordinary data in the database. When abnormal data are detected, sound and light alarms and information transmission are used to notify the manager to carry out detection and processing. At the same time, through the evaluation of the data, specific failure points, possible failure problems and corresponding solutions can be given to allow the relevant personnel to better carry out the management and maintenance work, effectively improve the quality and efficiency of the relevant work, and prevent the failure problems from bringing negative impacts on the normal operation of the electrical equipment and the economic benefits of the enterprise. The normal operation of electrical equipment and the economic benefits of the enterprise will not be adversely affected by fault problems.

2.2 Production monitoring

In the electrical engineering production monitoring, the interference of external factors will cause instability of quality control, and it is difficult to achieve the expected results. The application of artificial intelligence technology can greatly improve the monitoring efficiency and quality, and reduce the negative impact of external factors on the production process. Artificial intelligence can play a great role in production monitoring, the key lies in the ability to pre-set the operational steps, and then use intelligent commands for remote control of the device to ensure that the device has been maintained stable and efficient work. At the same time, through the real-time collection and analysis of each working condition, and by comparing with historical data, it can accurately determine whether the system has any undervoltage, overload and other problems. However, constrained by technical conditions, the current production monitoring system still cannot fulfill the requirements well. For example, not being able to fulfill the task positively, or not being able to alarm in time after discovering the faults will prevent the electrical works from proceeding smoothly according to the plan. To solve this challenge, a comprehensive study of artificial intelligence technology is necessary. The new method will be dedicated to real-time collection of key parameters, comprehensive analysis and comparison of historical data, identification and prediction of the risk of systematic errors, or their detection based on data analysis, in order to ensure the effective elimination of hidden dangers and minimize the probability of equipment damage.

2.3 Fault diagnosis link

The traditional control mode can not well guarantee the reliability and safety of electrical equipment, and the use of artificial intelligence can be a good solution to this problem, through a large number of monitoring of electrical equipment, it can be timely to find and eliminate a variety of hidden dangers. There are several ways to solve the problem by using artificial intelligence.

2.3.1 Troubleshooting and diagnosis

During the use of electrical equipment, a variety of fault phenomena often occur, which requires technicians to be targeted and efficient troubleshooting. In the new period, some traditional troubleshooting means have shown their inadequacies. Take the transformer as an example, the traditional troubleshooting needs to collect the degradation gas in the transformer oil first, then analyze it and finally get the result. This method is not only time-consuming and laborious, but also difficult to ensure the accuracy. The use of artificial intelligence technology can well solve the problems existing in the traditional model. The intelligent fault diagnosis method combining expert system, fuzzy theory and neural network is applied to the fault diagnosis of electrical system, which can quickly locate the place and cause of the accident. The fault diagnosis method based on artificial intelligence is: first, the new controller is configured according to the requirements, and the corresponding instructions are prepared in the automatic control system; second, the intelligent chip is used to process the image, analyze the data, and troubleshoot the faulty line, so that the transformer and other equipment has a more complete understanding of the working condition; third, through the analysis of the system parameters, determine the system Third, through the analysis of the various parameters of the system, determine whether the system is abnormal, start the fault diagnosis process, and give an alarm signal to ensure the safe operation of the system. Among them, the role of artificial intelligence is mainly manifested as: first, real-time collection and analysis of operational data; second, extraction of characteristics. Third, to determine the operating condition and operating age of the equipment. Various technologies such as fuzzy logic diagnosis and expert think tank can improve the efficiency of troubleshooting and diagnosis work, and among these technologies, the most noteworthy is the expert think tank. By utilizing the expert think tank, fault diagnosis and troubleshooting are carried out. By comparing the data curves, the types and causes of faults can be determined, and the use of existing intelligent algorithms can realize the automatic analysis of faults.

2.3.2 Issuing early warning

The study shows that under normal conditions, the control system collects the device parameters, temperature, humidity, current and voltage in real time through sensors and other devices, and then, synchronizes the collected data with the background, processes these data and converts them into numerical values. If the difference between the collected parameters and the preset parameters is very large, it means that the device has some abnormal phenomena, in which case, the device will issue an alarm to notify the staff, so that they can carry out appropriate repairs to the device to avoid complete destruction due to the development of the problem. The difference between Artificial Intelligence and traditional warning methods is that Artificial Intelligence focuses on real-time monitoring and collection of data, first analyzing the processed data and then determining the status of the device based on the trend of changes in these data, thus enabling the detection and resolution of possible problems and avoiding irreparable damage.

3. Conclusion

In summary, the promotion of artificial intelligence in the field of electrical engineering automation can effectively improve the degree of electrical engineering automation, operation quality and work efficiency. Therefore, the relevant departments should pay enough attention to artificial intelligence technology, keep up with the pace of the times, according to their own actual situation, in-depth study of related technologies, and rational use of technical and technological achievements, so as to make artificial intelligence play a better role in providing more support for electrical engineering automation.

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