

Research on Artificial Intelligence Technology Based on Electrical Automation Control

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Abstract: the development of science and technology has provided great convenience for people's life, especially the application of artificial intelligence technology in life is more and more widely, saving time and improving efficiency for the fast-paced modern life, so that people can make better use of their leisure time, fully enjoy life. artificial intelligence technology is widely used at present, which can not only save costs but also improve the efficiency and quality of electrical automation control process. This paper focuses on the general situation, function and application of artificial intelligence technology in electrical automation.

1. Introduction

In the modern scientific information age, the emergence of artificial intelligence has become the inevitable outcome of the development of modern society, and it is also the main supporting technology to promote the development of industrial modernization. At present, artificial intelligence technology is constantly developing, and it is widely used in actual production and life, which fully shows its own use value. Artificial intelligence technology is a brand - new science, its use value is more extensive. Moreover, it can effectively promote social development, especially improve the level and speed of modern industrial development. Relevant researchers said that artificial intelligence technology has certain advantages, mainly for information collection and feedback, processing methods, the use of artificial intelligence technology in electrical automation control, can ensure that the production process of the system is more reasonable, effectively realize the significance of automation. It can also reduce labor costs, improve production efficiency and quality, and optimize product structure.

2. An Overview of Artificial Intelligence Technology

Artificial intelligence technology is a new type of science and technology, mainly refers to the use of computers to replace human brain work. In fact, artificial intelligence technology has been around since the 1950s. This technology manifests itself in electronic computer technology, but involves philosophy, mathematics, science and other aspects of knowledge. The main purpose of researching artificial intelligence technology is to improve work efficiency. Artificial intelligence technology, which uses computers to simulate the human brain, is very complex and needs to be analyzed, processed and designed through a series of Settings. In the practical application of artificial intelligence technology, different designs should be made according to different enterprises and different equipment requirements. Artificial intelligence technology has positive significance, it solves the problem of labor force, reduces the complexity of work, and is conducive to ensuring the safety of the operation of enterprises. As long as the staff use the computer can complete the data analysis and equipment operation and management.

Artificial intelligence technology has a wide range of applications, including mechanical control technology, automatic control technology, etc., to control, monitor and manage the operation of mechanical devices with the help of computer systems, and to deal with technical accidents. In the future, electrical automation control system will develop in the direction of intelligence, and more and more attention will be paid to the application of artificial intelligence technology in the design of mechanical products. Artificial intelligent technology is a comprehensive discipline, fully

integrated computer technology, operations research and artificial intelligence technology, imitate the human language and behavior, give the machine logic thinking and judgment reasoning ability, and increases the mechanical equipment of the new function, can replace human work in the dangerous environment, or do some repetitive work, greatly improve the working efficiency, reduces the risk of safety accidents, make human free from heavy manual work in more creative work. In the future, the electric automation control system will develop in the direction of artificial intelligence, which gives the mechanical development of artificial intelligence a broad prospect. Innovative technology promotes the development of artificial intelligence. At the same time, attention should be paid to the declaration and protection of intellectual property rights to prevent the leakage of technology. In the application of electrical automation control system, we should pay special attention to the integrated application of modules. The development of modularization brings great advantages to the integration of technology is the inevitable trend of future development, and the application prospect is broad.

3. The Role of Artificial Intelligence

3.1 Improve Labor Efficiency and Optimize the Labor Force

For manufacturing enterprise, due to the product process is various, the deviation of artificial operation controllable degree is not high, the operation level is not uniform, so the quality control has certain difficulty in the process of production, applying artificial intelligence technology to production can be achieved in the production progress and quality of comprehensive control, not only save a large amount of human labor, and the precision of the product also has very significant improvement. The realization of intelligent electrical industry needs to be based on the operation of a large number of monitoring equipment, so as to ensure the normal operation of the equipment and the effective control of the site. Therefore, a large amount of manpower and material resources should be invested in monitoring equipment^[1]. The introduction of artificial intelligence technology with the help of computer to deal with the collection and processing of electrical equipment and facilities related data, so as to perfectly solve this problem, achieve the goal of complete automation of equipment management and control, greatly improve the production efficiency, save manpower and material resources.

3.2 Reduce Project Management Costs

The application of artificial intelligence technology in electrical automation projects can further improve the regulatory system and scientific management system and mode, so as to ensure the normal operation of equipment and greatly improve work efficiency. In the aspect of data information collection, artificial intelligence technology can bring the electrical routine management data into the analysis scope, in order to reduce the cost of electrification operation. Therefore, artificial intelligence technology has played an irreplaceable positive role in reducing the management cost of electrification projects.

3.3 Reduced Control Modeling Difficulty Requirements

Safety is the most basic requirement of electrification system operation. The application of intelligent technology in electrification system should not only improve efficiency, but also take into account the requirements of safety. By applying artificial intelligence technology to electrification system, the difficult problem of complex dynamic equation modeling is solved, the difficulty of modeling is simplified, and the accuracy of system operation is improved. Compared with the traditional modeling method, artificial intelligence technology is very convenient in predicting the future situation, which is its advantage.

3.4 Image Hierarchy Management

Image management is an indispensable link in electrical automation, artificial intelligence technology has realized the hierarchical management of images, so that the operation of equipment in a stable and safe state, but also to the staff to provide great convenience. In the traditional

electrical automation application, the relevant personnel of the enterprise need to have the automation control theory and practice experience, the cross demand of theory and practice makes the enterprise talent is rare. Research and extension of artificial intelligent technology, puts forward new requirements on staff, while employees still possess professional knowledge, but its main focus become understanding of artificial intelligence, don't need to learn the structure of the each machine, but through computer data analysis, to grasp the equipment running status, this will ease the pressure on the staff.

3.5 Strong Operability and High Safety

In electrical control, artificial intelligence technology is used to collect, analyze and process data with logical computing ability, which greatly improves the efficiency of data analysis and processing. In addition, the use of open digital platform for code standardization procedures to operate and set, can effectively avoid by manual operation of equipment errors and other problems, equipment utilization rate has been greatly improved. In the past, the development of intelligent electrical system was delayed due to the occurrence of human operation error. The combined application of artificial intelligence technology and electrical automation control greatly reduces operational errors, improves work efficiency and liberates the labor force. With the help of computer to monitor and monitor the operation data of intelligent operating system, and through the fault recording function of artificial intelligence technology to catch the fault wave, so as to improve the operation efficiency of electrical equipment, effectively prevent the occurrence of safety accidents, and ensure the normal operation of equipment.

4. Application of Artificial Intelligence Technology in Electrical Automation Control System

Artificial intelligence technology has powerful functions and unique advantages to replace human beings to carry out difficult work. Especially in the field of electrical automation control, the effect of artificial intelligence technology has been effectively played and used. The application of artificial intelligence technology in electrical automation control can truly realize the automation of production and circulation process, make it more convenient and efficient, and play a strong role in promoting the development of electrical automation. The following is an overview of the application of artificial intelligence technology in various aspects.

4.1 Production Control Efficiency

Electrical automation is the core of the electrical control process. The application of artificial intelligence technology in the electrical control process will greatly improve the efficiency of production control. The cloud computing power of AI technology improves data collection, categorization and computing power. The database is input into the computer terminal, and the input data is classified and processed with the help of the computer, and the processing results are taken as the reference basis for subsequent work ^[2]. Artificial intelligence can also be used to monitor electrical systems. By monitoring the value of the electrical instrument, the system will automatically give early warning when the data is abnormal. For the abnormal early warning operating system can be forced to shut down the power supply, cut off the path of the occurrence of safety accidents, reduce the probability of safety accidents. Artificial intelligence technology in the process of electrical automation control can focus on processing complex information flow and complex work, greatly optimize the industrial structure.

For example, the constant pressure water supply technology, which is widely used in industrial water supply, is mainly used to control and calculate the water pressure by using the traditional P I D algorithm to adjust the difference of water quantity in time and space. However, there are many unstable factors in this way and it has been unable to match the market demand. In the constant pressure water supply system, the introduction of artificial intelligence 808 regulator as the main controller can greatly improve the stability of constant pressure water supply, and achieve automatic control in the whole process of constant pressure water supply. Artificial intelligence technology is applied in the industrial field to make up for the deficiency of traditional control technology

effectively and realize the intelligent control in industrial production.

4.2 The Application of Artificial Intelligence Technology in Daily Operation

Under the promotion of modern industry, electrical automation has been developed rapidly. Intelligent and automatic applications in daily life are more and more wide, and the popularity is getting higher and higher. Electrical equipment has been all over the people's clothing, food, housing and transportation, in people's life has an irreplaceable role. The electrical system has corresponding operation specifications and processes, which must be carried out in accordance with the specifications^[3]. The operation process of traditional electrical system is complex, and people need to spend a lot of time to master these operation skills, so as not to cause system failure or even paralysis due to operation error, which brings a series of maintenance problems.

The application of artificial intelligence technology in the electrical field makes the operation process of electrical appliances simple and convenient, reduces the difficulty of operation, greatly improves the operation efficiency, effectively avoids the mistakes caused by manual operation, greatly reduces the operation risk, and greatly improves the safety of the operation of electrical equipment.

4.3 Application of Artificial Intelligence Technology in Fault Diagnosis

Once the transformer, engine and other important equipment in the electrical equipment fails, it will affect the safe operation of the whole system, and it needs to invest a lot of time and manpower and financial resources for maintenance. Moreover, the accuracy of traditional data analysis is low, and the hidden dangers cannot be effectively estimated and eliminated. The combined application of artificial intelligence technology and electrification equipment has realized the automatic diagnosis and elimination of system faults. For transformers and other important equipment, effective early warning and elimination can be carried out through automatic diagnosis, which saves a lot of manpower and material costs.

5. Electrical Automation Control Case Based on Artificial Intelligence Technology

5.1 The Actual Situation

A power plant has a total of five generators, six main transformers and one high-voltage standby transformer. The output voltage includes three voltage levels, namely, the 110kV bus section, the east and west ends of the 10kV bus and the north and south parts of the 35kV bus. All of them can be connected with each other by means of contact transformers and bus switches. The outgoing voltage of the generator is 6KV. The high voltage plant electricity is used at the generator end of the reactor. The five electromechanical and gas parts are controlled in the main control room.

5.2 System Solutions

The final scale of the whole system mainly includes the electrical system of the whole plant, artificial intelligence regulator, five sets of generator transformer sets and each generation group unit supporting 6kV plant power system and excitation system.

5.3 Transformation Function

Eliminate the original control screen and protection screen, change into a microcomputer control and protection device; The original protection control screen self-switching equipment and reactor protection are updated into reactor microcomputer protection and self-switching device, measurement and control device, and DC, temperature and command signal control are realized. Make the original microcomputer protection measurement and control device installed in the corresponding switchgear, set the factory electricity meter, installed in the corresponding switchgear, protect each unit and the collection of electric energy. After the transformation of the system can effectively achieve the unplanned, the original console, control and protection screen are basically cancelled, updated into 18 computer protection measurement and control screen and computer workstation, the use of advanced network technology to achieve resource sharing and

two-way communication. In addition, the electrical operation personnel work habits of a comprehensive consideration, set up soft hand operation, electrical equipment to achieve efficient, comprehensive management, so that the incidence of misoperation and accidents are reduced, and the level of automation and safe operation has been improved.

In addition, expand the control of the main control room, reasonable layout, so as to create favorable conditions for power plant management. The use of artificial intelligence technology in electrical automation control can realize the real-time collection of all analog quantities and switching quantities, and store and process them according to the requirements. The simulation screen can fully show the running state of the system and the primary equipment. And the realization of the main equipment switching state, analog value of real-time intelligent monitoring, with alarm function. The mouse and keyboard can control the switch of electric isolation and circuit breaker, adjust the excitation current, according to the shunning control program to achieve the same period of grid-connected with load and stop operation, the system limits the operation authority of the operator, to meet the needs of each operation duty management. The fault recording analysis tool can effectively analyze the data file of fault recording, restore the fault, and reproduce the fault situation, so that engineers can analyze the cause of the fault with the fault analysis results, deal with the accident in time, and evaluate the action and operation of circuit breaker and relay protection.

6. Conclusion:

The application of artificial intelligence technology in electrical system greatly facilitates people's life, improves people's electrical operation efficiency and saves time. Artificial intelligence technology has prominent advantages in the application of electrification equipment. Electric enterprises should pay attention to strengthen management while using artificial intelligence technology, ensure the stable operation of the system, make full use of the development opportunities of artificial intelligence, and further promote the development of electrification.

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