Application of Intelligent Technology in Power System Automation

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Abstract: This article gives an overview of intelligent technology and power system automation control, and then analyzes the importance of the application of intelligent technology in power system automation control, studies the application of intelligent technology in power system automation control, and discusses the development of power system automation intelligent technology The purpose of the implementation of the analysis is to clarify what is the intelligent technology and power system automation control, as well as the advantages of the application of the intelligent technology, and then use the intelligent technology reasonably and play a role.

1. Introduction

In recent years, the continuous development and improvement of the level of science and technology has promoted the in-depth research of intelligent technology, and the continuous progress of artificial intelligence technology has played a very important role in the field of power systems and automation[1]. For example, in power system operation, power control, power system management, etc., in-depth analysis of the application effects of smart technology in various fields. The advantages of intelligence and automation of the technology itself have made the power industry gain In order to achieve a more intelligent transformation, this technology plays a very important role in decision-making and management of power systems. The main direction of the construction and development of the power system is smart grid, user terminal equipment, energy equipment, etc., which is the main direction for the development of power system automation. It mainly replaces manual operation by existing advanced technology, and then realizes the improvement of power automation system. Run efficiently. Intelligent technology is of great significance to promote the development of power system automation[2].

In the era of big data, information and computer technology play a very important role in our lives and work. At the same time, it creates very good conditions for the development of the intelligent field[3]. After the power system is automated, intelligent technology is also applied in this field. Has supplemented and improved the control technology. The wide application of intelligent technology plays an important role in the advancement of human science and technology. Due to its special advantages and characteristics, this technology can improve work efficiency and save resources, as well as reduce costs in the production process[4].

The areas covered by existing intelligent technologies mainly include intelligent control, neural networks, and control technology. At present, smart technology has been widely used in many important industries. In the field of power system and automation, including dispatching, transmission, production and management, it has very important advantages. The power system monitors the whole process in the process of safe production, and at the same time accurately discovers the problems generated during the production process, so that the system can operate normally, safely and stably[5].

Artificial intelligence technology is not only widely used and concerned in various large and medium-sized enterprises, but also plays a very important role in the daily work of electric power enterprises. For example, artificial intelligence technology has also been applied in daily work monitoring and management, employee system management and assessment methods. The person in charge of management can manage daily work by operating artificial intelligence equipment. On the

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operating platform, the operation method of the artificial intelligence system is relatively simple, the operation process is relatively quick, and there are more functional styles.

In the power supply equipment, the automation equipment of the power system is a very important part. It is an advanced technology for controlling and adjusting the layout, which is mainly controlled by advanced equipment such as computers. At each logical level of the power system, computers are directly or indirectly controlled, which can make decisions and deployments on the content of automation very accurately and quickly, and control the entire work scheduling of power distribution equipment, power grids, and power generation processes, etc. Both constitute the automation of the power system[6].

With the deepening of the application of the Internet and computing technology, it has also been widely used in the field of power system automation. Through the effective integration of automation control theory, and at the same time, relying on the effective integration of computer software, Internet technology has gradually realized the power transmission, the automation of conversion, settlement, and information management is mainly reflected in the self-management and dispatching of various equipment in the power system, as well as automatic control and monitoring. It can realize remote control according to the actual scene and requirements of the power plant and master the work of power system equipment. The operating conditions ensure the stable operation of the power system.

Artificial intelligence technology has been widely used in the construction of electric power automation systems in recent years. With the rapid development of my country's electric power industry, many electric power companies pay more attention to this technology. Artificial intelligence technology is used in electric power and automation construction[7]. Advantages: In the production process, the external influence factors are small. In the process of applying traditional systems for production, they are usually affected by external factors. In the practical process of artificial intelligence technology, this is usually reduced. Kind of influence. The operating parameters can be adjusted at any time, which is more convenient for operation. In the past power system operation process, adjusting the parameters is very complicated. The introduction of artificial intelligence technology improves this shortcoming. Improve product performance and ensure relative consistency of performance. The operation error is small. Because this technology has strong anti-interference ability, artificial intelligence technology can maintain the equipment to work in an orderly manner and reduce the error during the operation of the equipment. Resource saving due to the introduction of artificial intelligence technology, without the need for traditional equipment upgrades, which helps to promote the improvement of the work efficiency of power equipment, while effectively reducing costs.

2. Research on the Application of Intelligent Technology in Power System Automation

2.1 Application of Neural Network Model in Power Control

The neural network model is mainly composed of some neurons, and is widely used mainly through optimizing the model structure and optimizing the algorithm of training the model, and has achieved very significant results after practice. In the power system, the training algorithm of neural network learning to optimize the structure to reduce the error has also been extensively and deeply explored[8]. Through special research, it has also been widely used in power systems, enabling real-time, convenient and efficient interaction between power system equipment, and the introduction of advanced technologies and methods has significantly improved the operating speed of the system. In the actual operation of power equipment, the short-term workload content of the power system can be predicted through BP neural network learning. By predicting the operating status of the equipment, the working time of the power equipment can be better set, and the system can be analyzed through the correlation with the equipment. Fault detection can achieve very good results. Neural networks have been studied by a large number of scholars since 1943. After 60-70 years of research and development, there have been a lot of effective research results in the structure

of the model or the algorithm for training the model. This model can be self-organized for learning, and has been widely favored by scholars. According to the learning, it can adjust its own parameters such as weights to realize mapping from a multi-dimensional space. According to the characteristics of the biological neural network, the information is processed in a distributed manner. At the same time, according to the complexity of the power system and equipment, the nodes in the system can be adjusted autonomously, and the system information can be processed efficiently.

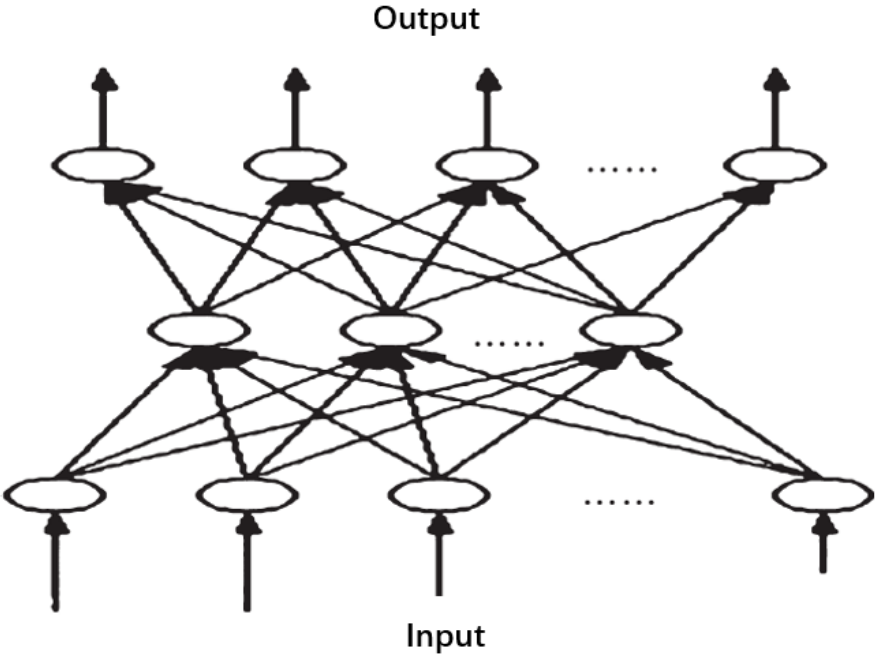

Fig 1. Artificial intelligence neural network control structure

2.2 Application of fuzzy control technology

Fuzzy control has very unique advantages, such as easy operation, randomness and simplicity[9]. Through fuzzy control, the power system can be controlled very efficiently under the condition of clear objectives in the automated production process. At the same time, it can also reduce the difficulty of automation. Through the application of this model, the difficulty coefficient of the control process can be reduced, and the operation and monitoring of automation can be strengthened. Fuzzy control technology makes the supervision process more clear and concise, which has strong advantages. During the operation of the entire automation project, fuzzy control technology also has certain application and practical value. The data generated by the system and related rules are deduced, and the output result can be finally obtained through a series of related calculations[10]. The results usually include the following aspects: fuzzification, judgment and related reasoning and other important parts. A series of problems solved by intelligent technology provide very good conditions for people's production and life. First, it can deal with some unnecessary noise and interference of daily household appliances such as electric fans; second, it can effectively deal with some inaccurate problems in work, which can improve the accuracy of the system; at the same time, this technology can also be more effective for knowledge The communication and sharing of information can be realized; finally, when the topology of the device changes and the device parameters change, artificial intelligence technology can immediately respond effectively, while ensuring that the system is more secure and stable run.

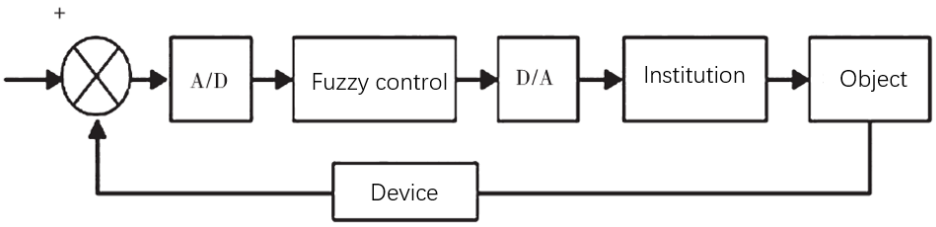

Fig 2. Schematic diagram of intelligent control structure based on fuzzy control

2.3 Application of expert system control

Intelligent expert systems have many advantages and have been widely used in power systems. Including warnings and early warnings to issue emergency status in the system, and the ability to deal with urgent matters and reply to the system's working status[11]. This technology has specialized knowledge procedures, large rules, and relatively rich experience. This system can efficiently judge and interpret system faults during work and production, and then more accurately find users who want to solve the problem. It plays a vital role in system planning, dispatching and fault point analysis and isolation. It can report when the work load of power equipment is overloaded. At the same time, it will also make safety performance analysis actions to perform man-machine work. Layout. This technology can conduct in-depth analysis through its own knowledge base, and then make decisions to make the system run more smoothly, make the problem clearer and concise, and solve the system's faults quickly and scientifically with smaller specifications.

2.4 Linear optimal control technology

The construction of the electric power system needs to realize long-distance power transmission, the technology is relatively backward, cannot meet the actual work needs, and has great limitations. With the development of science and technology, the existing power system construction still faces many problems. Existing researchers have proposed a new control technology, that is, a linear control method, which achieves the purpose of optimization by scheduling voltage, mainly to achieve more efficiency The purpose of simply using this single technology has limitations. At this time, it is necessary to introduce other technologies to adjust and change the voltage phase transition angle, so as to make the process of system operation more stable and safe.

2.5 Application of integrated intelligent system

The system mainly includes modern and intelligent control, and covers a collection of several intelligent controls. For traditional complex and huge power work systems, this comprehensive intelligent system has a large application scenario. At present, the most widely used power system is mainly the combined use of neural network systems and expert systems. Neural network models are mainly suitable for information processing of nonlinear data, and fuzzy systems are mainly structured data more efficient. Therefore, the combination of the two technologies can control the power system equipment from many different aspects, from the low-level neural network to the high-level data processing of fuzzy logic technology. The combination of these two methods can control and control the power automation system more efficiently. Information judgment. The neural network collects and processes the data transmitted to the model. After the data is processed, the fuzzy technical model is used for data mining, and finally the judgment result is fed back to the power system center, so that the system can recover from the failure.

3. Conclusion

Intelligent technology is widely used in the field of power system automation, and it also has a very important role: It can carry out intelligent work deployment and scheduling. This advanced technology can track and dispatch equipment in the production environment, collect system data accurately and comprehensively, and send out early warning notices to the parts of the system with

potential safety hazards after intelligent data analysis, and continue to implement system equipment throughout the process. Coordination between the equipment, more intelligent operation of the equipment

Efficient deployment. Can intelligently generate power and supply power. Through this advanced technology, the working links of the power automation control system have been improved, and at the same time, a complete power supply and grid working mode and internal structure have been constructed. Through this technological upgrade, new energy technologies can be widely promoted. For example, the new photovoltaic power generation technology, this technology needs to realize the efficient transmission of information through intelligent technology, and improve the level of power production and power automation control. The power automation system can be scientifically managed more efficiently. With the continuous development of smart technology, many goals for improving energy efficiency and environmental protection have also been proposed. Many companies are also actively exploring and studying how to improve

Use energy efficiently.

Intelligent technology is the product of scientific and technological development, which promotes the development of each industry, especially the application of power system automation, which plays a vital role in ensuring the smooth operation of power equipment.

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