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Summary of Research on Intelligent Control algorithm and Application of Power system Automation

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Abstract: With the development of HVDC technology and the continuous progress of AC/DC hybrid power grid, the research of intelligent control in the direction of power system automation has made some progress and has a certain foresight. The power system automatic intelligent control technology algorithm discussed in this paper includes neural network, fuzzy control algorithm and genetic algorithm, application development and significance, through the development of related intelligent algorithms to provide some reference for the field.

1. Introduction

Power system in people's work and life of the role is much bigger. The progress of science and technology to promote the further development of electric power industry[].

With the development of power electronic devices and the evolution of various control algorithms, the control methods for power system automation are gradually deepening. By using the electrical automation technology, not only can improve the efficiency of power system operation, better realize intelligent electric power service, realize the real-time simulation work.

2. Overview of Power system Automation Technology

With the extensive promotion of computer and Internet technology, many businesses have begun to improve with intelligent technology, and important achievements have been made in terms of productivity and production efficiency, which is also the reason for the development of China's economy. The system itself puts forward three requirements for power system automation technology: including the reliability of safe operation, the stability of automation technology and the improvement of information level [1].

Generally speaking, the higher information level will greatly improve the efficiency of power system and improve the automatic control level of power system. Therefore, electrical automation technology first needs to meet certain information technology requirements [2]. At the same time, the operation of the power system is most concerned about safety and reliability, and the use of electrical automation technology can make the power system automatically monitor power faults, and

automatically deal with some faults, ensure the stable operation of the whole power system and reduce economic losses to the greatest extent. Automatic control system plays a very important role in the power system. In order to realize these points, it is necessary to meet the relevant requirements of efficient automatic control in the process of using electrical automation [3].

3. Intelligent control method for power system automation

3.1 Neural network control

Neural network control includes biological neural network and artificial neural network, which is similar to the model of human brain synaptic connection. This algorithm can approach any nonlinear function with strong fault tolerance and data processing ability, and has the ability of learning and memory [4]. It is suitable for multivariable systems and is suitable for the physical situation of multivariable parameters such as power system. However, the neural network model has higher requirements for the data itself, so different data sources have a greater impact on system stability, and there will be higher requirements for different power system structures that are difficult to optimize and difficult to converge.

3.2 Fuzzy control

The fuzzy control theory was first put forward by Zadejie in 1965. By fuzzifying the controlled object, the relevant information is obtained by fuzzy comparison with the knowledge base information, and then the control information is provided to the control object through clear processing [5]. This fuzzy control algorithm is widely used in power system, and there is no need for accurate mathematical model. With strong robustness and imitating human thinking, the processing process can effectively cope with the real-time parameter changes of the power system, especially in the case of multi-node power system. However, it has the disadvantages of low control precision and poor dynamic quality, so it is very important to optimize this algorithm.

3.3 Genetic algorithm

Genetic algorithm control is to get the optimal control by simulating the evolution process of nature, the survival of the fittest, the elimination of the bad, and generation-by-generation evolution. New populations are generated by combining crossover and mutation with the help of genetic algorithm. After this layer-by-layer screening, the optimal individual which is most suitable for the environment is finally obtained, and the approximate optimal solution of the problem is obtained after decoding. A single genetic algorithm coding can not fully express the constraints of the optimization problem, so the efficiency is lower than other traditional optimization methods, although it is easy to converge, but the accuracy is very low. However, the optimization of this algorithm does not need deep experience and foundation.

4. Function of intelligent control in power system

4.1 Generating terminal-part of the power plant

The electric automation technology needs to ensure that the operation safety and stability of the power plant meets the requirements of the power system, and the high-precision detection equipment is used in the power station system to detect and analyze the working condition of the power station in real time. Find the possible faults in time and solve them in the first time [6]. It can help researchers

to carry out real-time simulation work and improve work quality. At the same time, it can also realize the synchronous existence of temporary state and stable state to the maximum extent, making synchronous experiments impossible. It provides a large number of feasible accurate data for the normal operation of the power system, thus improving the accuracy and accuracy of the experiment.

4.2 Substation terminal-substation part

The application of intelligent algorithm can quickly and automatically remove the faulty power equipment, and automatically repair some faults, shorten the maintenance time and improve the maintenance efficiency. By using the relay protection device, once the fault is found, the relevant equipment can be removed automatically and the fault loss of the whole power system can be reduced to the minimum. By using the electrical automation technology, the real-time monitoring and data collection of the substation can be realized, so that the operation status of the electrical equipment can be grasped in time, and the fault can be found and solved quickly.

4.3 Power distribution terminal-power network dispatching

As the most important part of the dispatching in the power system, the dispatching center should complete the power load forecasting and state estimation of the power system and automatically complete the output distribution of each power plant. On the premise of ensuring the electricity consumption of users, the power structure can be optimized effectively. The relevant testing equipment monitors the operation status of the power grid, collects the operation data of the power grid, and then uses the proprietary communication network to transmit the collected data to the dispatching center. Therefore, power grid dispatching automation is an important way for power production enterprises to move from tradition to modernization.

5. Application and development of intelligent control in power system

The online diagnosis of power system is the current research hotspot, and the fault diagnosis is affected by many factors, which has a great impact on the overall normal power supply, and will bring negative factors to the production, life and work. The introduction of intelligent algorithm can independently explore the overall relevant content, solve the existing problems in time, and do a good job of early warning. Under the guarantee of the early warning scheme, the overall business efficiency and security are greatly guaranteed, and the relevant diagnosis is made more accurately and comprehensively.

At the same time, the introduction of electrical automation control link in the power system can make the real application of intelligent control technology, and the application of intelligent technology in electrical automation control can also liberate manpower and further reduce the cost. This is also very helpful for the improvement of the overall breadth of the industry platform. Promote the development of intelligent technology in various related enterprises, which is also very helpful to the construction of intelligent platform.

6. Conclusion

In this paper, through the research on the direction of automatic intelligent control of power system, three kinds of intelligent control algorithms are analyzed and their application significance is explored, and the development prospects of related fields are obtained. It provides some reference for the research of power system automation.

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