



Design of Intelligent Voice Interactive Robot Based On Cloud Platform

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Abstract

At present, with the rapid development of the current intelligent distribution automation system, the traditional single man-machine interaction based on mouse and keyboard operation has been difficult to meet the needs of users of the control system. The rise of artificial intelligence technology, especially the application of a series of artificial intelligence technologies such as speech recognition technology, has made significant theoretical innovation and application breakthrough at home and abroad, which provides help to solve some problems in the field of distribution network regulation and operation. The load of power grid equipment is closely related to the safe operation of the whole power grid, and the increase of the number of users puts forward higher requirements for the transmission capacity of the power distribution network, so the load prediction and analysis system of power distribution network equipment based on artificial intelligence is proposed. Firstly, the hardware design of the load prediction and analysis system of the distribution network equipment is carried out, and the autotransformer is designed to adjust the voltage of the distribution network equipment. Then the distribution network equipment load prediction and analysis system software design, establish the distribution network equipment load intelligent prediction module, design the user management module based on artificial intelligence technology, design the user information module based on artificial intelligence technology, and finally complete the distribution network equipment load prediction and analysis system design. The practicability of the system is verified by the test.

Keywords

Human-computer voice interaction, Distribution network, Artificial intelligence, Dispatch assistant, Design

Introduction

In the process of power system development, the distribution network is an important link for users. After a large number of renewable energy sources are connected to the distribution network, the distribution network begins to develop into an active one. In order to improve the power supply stability of active distribution network, the perception of steady-state operation behavior is an indispensable link. Due to the increasingly complex operation structure of the distribution network, the conventional steady-state sensing system cannot meet the subsequent development of the distribution network in terms of sensing accuracy and calculation speed.

1. Characteristics of artificial intelligence

At present, artificial intelligence technology develops rapidly and is widely applied in all walks of life, improving

the productivity of many posts and enriching the management methods and business flow forms of many industries. In particular, with the development of deep learning technology, there are more and more intelligent management and use methods. The realization of intelligent dispatching service is the inevitable development trend of distribution network regulation. Regulatory data is not only from one system, but a collection of data composed of multiple systems, including static information such as geographic information system, production management system data, energy management system data, external environment data, etc. A large amount of data information in each system can be applied in the regulation and control of distribution network to provide basic data drive [1].

The basic data flow of artificial intelligence is data collection, data transmission, data processing and human-computer interaction. In order to fully embody the role of artificial intelligence technology and realize the intelligent upgrade of distribution network regulation and control, the characteristics of artificial intelligence technology should be integrated with the actual needs of regulation and control business. The main characteristics of artificial intelligence technology are data-driven, which can quickly solve complex and specific planning problems and realize intelligent control, human-computer interaction and visual display. For the rule analysis work which requires a large number of manpower, artificial intelligence technology can use the analysis model machine to control the work which cannot be effectively solved by manpower. At present, artificial intelligence technology is widely applied in the Internet industry, mainly reflected in language, image recognition and understanding of natural language [2].

2. Hardware design of AI-based embedded sensing system for steady-state operation behavior of distribution network

2.1 Front-end sensor design

In order to collect and transmit steady-state information of distribution network, a front-end sensor is designed. Considering node power consumption and information receiving sensitivity, the front-end sensor designed in this paper takes CC2530 chip as the core, and connects the CC2530 chip with the I/O port of the single chip micro-computer to achieve the purpose of information exchange. Then combined with wireless transceiver module, clock module and other structures, the front-end sensor design is completed.

2.2 Wireless gateway Design

The design of wireless gateway is mainly for data transmission, encapsulation and parsing. The research shows that the working frequency of the S3C2440 microprocessor can reach 400MHz, which can meet the working requirements of the sensing system. This paper takes it as the core of wireless gateway design, and then connects it with TFT-LCD display screen and remote control keyboard and other components. In order to enhance the stability of gateway application, a LM25965-5.0 switching voltage regulator is set at the gateway power supply.

3. Distribution network equipment load prediction analysis system software design

3.1 Establishment of intelligent load prediction module of distribution network equipment

Distribution network equipment overload will accelerate the aging of equipment, so it is necessary to establish the distribution network equipment load prediction model to predict the load value. Load sensing equipment is connected to the model, and the electrical value at both ends of the load cannot exceed the rated voltage of the line. The load access will increase the current of the distribution network, and the included Angle of the load voltage and current can be distributed between 0° and $\pm 90^\circ$. When the output voltage is constant, the output current depends on the load power, and the increase of the current will drive the increase of the electromotive force energy. Therefore, it is necessary to analyze the parameters of the distribution network to realize the judgment of line faults. During the normal operation of the distribution network, when the input current exceeds the rated value, if the equipment of the distribution network continuously runs in the overload state, the operating temperature of the equipment will be increased, the heat dissipation effect of the equipment will be affected, and the failure of the distribution network equipment may occur [3]. Long-term load overload will also directly lead to equipment damage in the distribution room. Too much current will lead to power increase of the distribution network, resulting in insufficient generator capacity. The damage of equipment and the unstable change of voltage and power lead to the decline of the overall economic benefit of the distribution network. When the power system of distribution network is connected to the inductive load, the output voltage decreases and the fault occurs. In order to predict voltage better, the random and

fluctuating characteristics of voltage series should be used. The load prediction model of distribution network equipment is established through the combination of grey correlation analysis and data updating matrix, and the prediction model is updated according to the real-time data. In order to improve the early warning accuracy of the model, data is used to correct the accuracy of the model. The model is applied to the load prediction and analysis system of distribution network equipment, and the output voltage of transformer secondary side is collected in real time every 5s. The data collected can be combined with the computer display data of voltage transformer by power acquisition equipment. At the prediction interval, the collected data will be processed in a unified format, and the original data will also be retained. Real-time rolling update of the data sequence will be realized on the premise that the data will not be deleted. Most access loads in the distribution network system are inductive loads, so the data update is relatively fast. Before data prediction, the previous set of undetected data should be deleted to ensure the integrity of data monitoring [4].

3.2 Design user management module based on artificial intelligence technology

The load prediction and analysis system of distribution network equipment can be logged in directly from the browser through the web page. Based on the particularity of the system, the system should be equipped with the management personnel of platform users to ensure the civilized and orderly application of the system. The personnel who log in the system have different rights according to their positions and responsibilities. The staff of the power system are divided into daily operation personnel, data monitoring personnel, operation and maintenance personnel and maintenance personnel after accidents. People related to the normal operation of power have the right to log in to the system, but because each person has different permissions, users with different permissions can access different pages. When the logins register, they should choose their positions and responsibilities, and the system will automatically assign different permissions to different users. The next time the user logs in and enters the password successfully, the system interface corresponding to the position will be successfully entered [5].

When the system is upgraded or a function is changed, the system administrator can directly change the permission on the page of the user information management module. The system administrator can also pull out the login and operation data of the staff from the background, for viewing and saving. The system administrator can view all the permissions in the background, in the allocation of permissions, if the permission is open to the personnel is displayed green, the permission is not open to the personnel is displayed red, the permission is not open to the personnel but because of special reasons to open it is displayed yellow, and the information of the page is public information is normal black, only the administrator private permissions is gray. The system classifies information by color, and the administrator page is clear and clear.

3.3 Design user information module based on artificial intelligence technology

The prediction of power information requires the effective analysis of a large number of data. Besides the powerful database, it also requires the fast and accurate processing of a large number of miscellaneous information. Classifying device information in detail helps you quickly query information. Basic device information is classified into the first category, including the type and quantity of devices. The basic condition of the equipment is conducive to the later monitoring when the original data as a basis. Equipment daily monitoring information is also included in the data management, mainly monitoring the voltage change of the distribution network and the temperature change of the cable, including the operation time and corresponding state of the equipment. The third kind of management data is generated during the monitoring of the running state, that is, the power data warning and the corresponding adjustment and maintenance data. Relevant personnel can directly refer to the third type of data for maintenance of power system faults. The update of real-time warning information is directly added to the database, and the fault cause and treatment status are added after processing. The data information management module adopts the intelligent management mode of artificial intelligence, which can provide the parameter information of the site equipment to the maintenance personnel. It is the symbol of the development of intelligent information of the power system.

4. Conclusion

Monitoring technology, distribution information collection and visualization technology are set up in intelligent distribution network, which can complete the integrated construction of detecting information and removing problems. Based on this, the application of intelligent distribution network is more conducive to ensure the smooth operation of voltage, and the electrical facilities will not be easily damaged during the peak power consumption. The

application of artificial intelligence technology can efficiently, comprehensively and accurately solve all kinds of problems in the regulation and control process of distribution network, deeply integrate artificial intelligence technology and distribution network regulation and control technology, and effectively ensure the good operation of distribution network regulation and control.

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