Research on Collaborative Application of Power Big Data and External Data

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Abstract: With the development of intelligent power systems and the development of power systems, social power consumption is increasing. In the context of the era of big data, how to effectively use power big data becomes very urgent. Based on this research, the collaborative application of power big data and external data in power regulation is firstly described. The concept of power big data is expounded firstly. The core technology of power big data is comprehensively analyzed, and the power of cloud computing technology is increasing in the power industry. The application of technology in big data analysis is discussed. Through the generation and characteristics of power big data, the specific application of big data technology in power regulation is discussed, and the power capability of power company for power big data analysis is comprehensively improved. The industry has laid the foundation for the era of big data, in order to better promote the level of intelligence and automation of power regulation.

1. Introduction

In the 21st century, the society has entered the information age [1]. With the rapid development of network and computer technology, office Informa ionization has penetrated into various industries, and global digital information resources have grown exponentially [2]. The power industry is also unable to enter the “big” road on the road of information development [3]. The age of data.” In the face of growing development, the number of power customers is increasing [4]. In order to improve the production efficiency of power companies, increase the safety and stability of power grid operation, and better meet the needs of power customers, the collaborative application of data center external data to establish power big data analysis has become a power enterprise development trend [5]. A must-have road. On the other hand, with the development of intelligent power systems and the development of power systems, social power consumption is increasing [6]. In the context of the era of big data, there is no doubt that higher requirements are placed on the quality and efficiency of power grid operations [7]. As an important content in information technology, power big data technology plays an important role in the power regulation of the new era [8]. Big data technology can better manage and monitor real-time processing, analysis and research of basic data in the grid operation process, and introduce intelligent early warning system to continuously reduce the load pressure of grid operation, so that the grid can be in the current grid scale. Better stability and safety with increased operating pressures [9].

2. Power Big Data Concept

With the continuous construction and improvement of the smart grid project in the power industry, the scale of the smart grid is also constantly expanding, and more and more intelligent hardware and software devices are used. These devices continue to generate large amounts of data at work, and these are power big data [10].

Power big data refers to a large number of structured and unstructured data generated by power companies in power generation, transmission, substation, power distribution, power consumption, and dispatching. These data are generally generated by power smart devices and intelligent software. After the collection and analysis into the data center, it is an important part of supporting the development of smart grid projects.

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Power big data generally has the following characteristics:

First of all: the volume of data: The national grid is based on the physical grid, and the modern advanced sensor measurement technology, communication technology, information technology, computer technology and control technology are highly integrated with the physical grid to form the new power grid. In this case, the data collected by sensors and various software installed on various smart devices is huge. Assuming that the national power users install 100 million smart meters, according to the current grid and other data collected every 15 minutes, the daily data growth will be close to 10 billion.

Secondly, the processing speed is fast (Velocity): With the development of information technology, the data processing speed is also faster and faster, and the intelligent software and hardware devices manufactured by the new technology can achieve hundreds of thousands of data processing speeds per second.

Furthermore, Variety: The power industry is an industry that spans units and across disciplines. It involves a wide range of fields, and generates a large amount of structured and unstructured data, including text, audio, and Different types of pictures, videos, analog signals, etc.; data sources are also more and more diverse. With the accelerated development of the industry, the amount of unstructured data has increased dramatically.

The fourth aspect, Value: Massive business data brings higher business value, and efficient data analysis methods can help power companies better analyze customer needs and problem handling.

Finally, Veracity: Real-time acquisition and uploading of intelligent devices ensures the accuracy of power big data. Accurate data can help enterprises simulate business scenarios in different situations and promote enterprise development and progress. Therefore, the characteristics of power big data can be divided into the following five aspects, as shown in Figure 1.

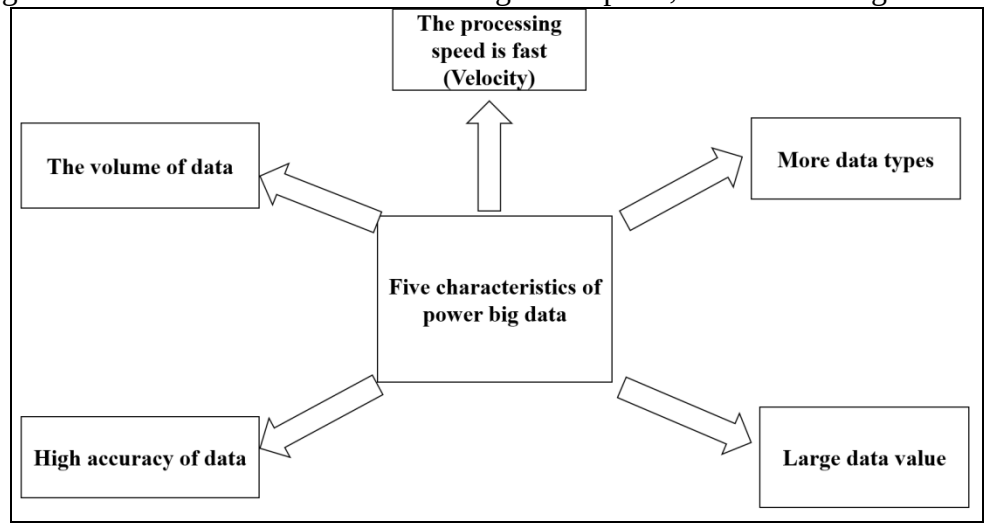

Fig.1. Five characteristics of power big data

3. Specific Application of Collaborative Work between Power Big Data and External Data

3.1. Collaborative application of power big data and external data

The core technology of power big data is generally embodied in data integration management technology, data processing technology, data analysis technology, and visualization technology. Data integration management technology generally collects and organizes various data information in the process of grid operation. It has combined the data transformation to achieve the acquisition of new data sources, and then better serves the operation of power regulation; data processing technology is to bring big data. Technology and computer are combined to process various dynamic data information in real time; data analysis technology is to analyze and mine various data in the operation process of the power grid to better serve power regulation; visualization technology is mainly processed in the form of graphics Data to make the display more intuitive.

3.2. Realize intelligent monitoring of grid operation status

In the process of power grid operation, the power control center combines the core technology of big data to detect various data on-line, and diagnoses and analyzes various problems in the operation state of the power grid to realize intelligent monitoring. For example, the most commonly used Kettle tool in ETL is used to extract data, use cluster to work on the machine, optimize the data source such as Posture, use Java scripts and SQL statements to complete data cleaning, and record the monitoring data in the electronic log.

At present, in the case of continuous increase in power equipment during power grid operation, data volume information is increasing. To ensure the effectiveness of power regulation, it is necessary to achieve a greater leap in the development of smart grids, and better to reduce the burden of intelligent monitoring. Improve the application level of big data technology and ensure the quality and efficiency of big data technology applications.

3.3. Realize intelligent warning of power system security

Intelligent early warning is a typical application of big data technology in power systems. The traditional security warning mainly predicts the operating state of the power system by evaluating the plan and off-line calculation. From the actual application situation, the inefficiency of this early warning method is difficult to meet the current grid operation requirements, so it is necessary to use the big data technology to realize the intelligent management of the power system. For example, the whole network simulation unified computing and data classification storage processing technology is used to co-ordinate the massive data generated during the operation of the power grid, analyze the abnormal data, track the fault occurrence area, determine the accurate position, and generate real-time The evaluation plan specifically addresses the faults and contradictions that exist in it.

3.4. Optimize the regulation of power load conditions

The biggest difference between new energy power generation and traditional thermal power generation is that naturalness is more prominent. For example, wind power generation and solar photovoltaic power generation depend on the natural environment, are not subject to artificial control, and have obvious intermittentness. Therefore, if the tradition is Power generation and grid-connected new energy generation will definitely pose greater challenges to power system grid regulation. The application of big data technology can determine more scientific scheduling technology based on the specific conditions of grid operation, effectively handle load information and realize power load regulation. Further optimization. For example, the HBase database is built in the Hadoop distributed file system by using big data technology to realize dynamic column increase and automatic segmentation of data, realizing real-time reading and writing and processing of various data.

4. The Value of Collaborative Application of Power Big Data and External Data and the Application of Cloud Computing

4.1. It helps to improve the management level of power system operations

In modern power systems, equipment and system construction have become more complex, placing higher demands on power operation management. The big data technology is used to analyze the data generated during the operation of the power system, and then combined with the automation equipment and intelligent equipment, the automatic regulation of the power system can be realized, and the accuracy of the power regulation is greatly improved.

4.2. It helps to improve the user's electricity experience

In the smart grid application based on big data technology, using the predictive analysis of big data technology, it can effectively judge the user's power consumption and consumption characteristics, form a scientific and reasonable supply plan and maintenance plan, so as to better the operation and planning of power dispatching. Improve the efficiency of power dispatching,

reduce the waste of resources, and use electric customers to get better service and provide users with better electricity experience.

4.3. It helps to improve the quality of grid operation

The application of big data technology makes it possible to integrate monitoring and monitoring systems in the power system. Power grid monitoring technology based on big data technology can ensure flexible operation of the power grid on the one hand, and independent recovery capability on the other hand. Data collection and sharing in grid monitoring can be comprehensively diagnosed and conveniently and efficiently processed in the event of a grid operation failure, thereby improving grid power quality and power supply stability. It is for this reason that smart grid monitoring can work in different environments, even in relatively harsh environments.

Therefore, the value of collaborative application of power big data and external data can be divided into three parts, as shown in Figure 2.

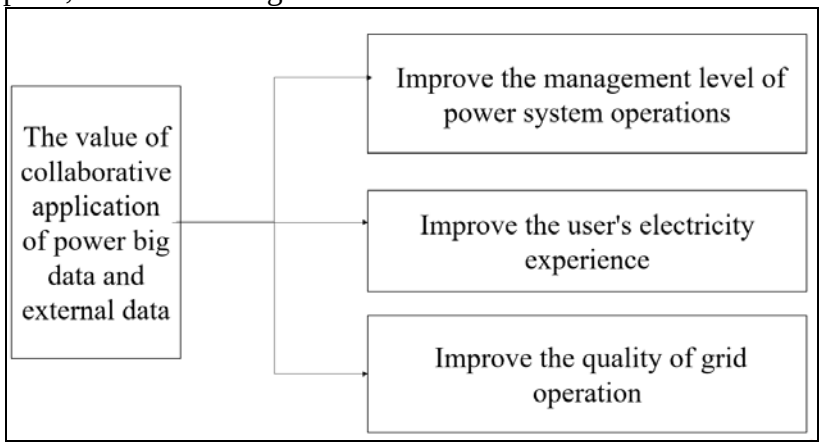

Fig.2. The value of collaborative application of power big data and external data

4.4. Definition of cloud computing

The current accepted definition of cloud computing is that cloud computing is a pay-per-use model that provides usable, convenient, on-demand network access and access to a configurable pool of computing resources (resources including the network, Servers, storage, applications, services) These resources can be delivered quickly, with minimal administrative effort or little interaction with service providers. By distributing the calculations across a large number of distributed computers, rather than local or remote servers, the enterprise data center will behave more like the Internet. This allows companies to switch resources to the applications they need and access computers and storage systems as needed. Cloud computing has the characteristics of ultra-large scale, virtualization, high reliability, versatility, high scalability, on-demand service, and extremely low cost.

In today's “big data era”, cloud computing and big data are just as inseparable as the front and back of paper. Cloud computing-based big data analysis technology has matured and applied to various Internet fields. The power industry is no exception. In order to meet the deep mining and data analysis of power big data, it is feasible to design and develop a cloud-based power big data analysis system based on cloud computing-based big data analysis technology in various industries.

4.5. Cloud computing applications

In fact, the cloud computing platform developed for power big data analysis has been put into use in many places across the country. Power Big Data goes through many steps from data collection to final analysis. Smart devices collect data through the sensors they install and upload them to the data center via the communication network. The data center is composed of a relational database and a cloud computing platform. The cloud computing platform is composed of a blade server. Through high-speed network connection, the data analysis and processing are completed by the cloud computing platform and updated synchronously with the relational database data.

Through hierarchical processing technology, the cloud computing platform can branch management of power data, and then through the powerful SQL processing system, the platform can process at the same time when analyzing data, which greatly improves the speed of data analysis. To ease the access pressure of the data center database, you can set up a pre-cluster. The device collects data and uploads it to the pre-cluster. The pre-cluster is uniformly uploaded to the data center after simple data buffering and processing. For communication security, you can use the pre-cluster. Install a firewall and gateway between communication networks. Due to the characteristics of the cloud computing platform, the cost is reduced and the data processing speed is increased while meeting the needs of enterprise big data analysis.

5. Conclusion

In the context of today's “big data era”, with the continuous development of China's electric power industry, the application of big data technology in power regulation has become an inevitable trend, and the automation and digital development of power construction management has also ushered in a new look. situation. The application of big data technology to the current power regulation work is of great significance for the improvement of grid operation quality and efficiency, as well as the reduction of grid operation costs. Based on this, this paper mainly studies the collaborative application of power big data and external data. Firstly, it expounds the basic concept of power big data, and analyzes the specific application of the collaborative work of power big data and external data in three aspects. The generation of big data and how to build a cloud-based power big data analysis platform are briefly discussed. Finally, it is concluded that the excellent performance of the cloud computing platform not only provides technical support for big data analysis in the power industry, but also can be used for power enterprise operation management.

Acknowledgement

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