

Research on the Application of Computer Big Data Technology Based on Distributed Data Flow in Urban Power Saving

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Abstract: Big Data Technology is Introduced into the Power Industry to Improve the Economic Benefits of Power Operation. the Distributed Parallel Computing Platform Completes the Optimization and Transformation of the Traditional Relational Database Platform. the Performance Test Results in Typical Business Scenarios of Power Grid Prove the Feasibility and Performance Advantages of the Scheme. Based on the Distributed Data Stream as the Data Expression Carrier, the Big Data Technology is Designed, and the Algorithm Corresponding to the Key Steps is Constructed Aiming At the Key Problems That Need to Be Solved in the Classification Mining of Big Data. the Power Grid of Big Data Will Inevitably Make the Urban Power Consumption More Energy-Saving, and Lay a Good Foundation for the Rapid and Steady Development of Power. Key Technologies Such as Distributed Computing Promote the Application of Big Data in Power Production and Management, Which is of Great Significance to Better Serve Energy Conservation and Emission Reduction, Economic and Social Development, Resource Conservation and Environmental Construction.

1. Introduction

While Fully Enjoying the Convenience and Rapidity Brought by Informatization, the Global Digital Information Resources Are Entering an Unprecedented Period of Rapid Growth [1]. the Era of Big Data Has Produced a Certain Degree of Influence in the Power Industry, Improving the Production Level and Economic Efficiency of the Power Industry. in Fact, Big Data Attributes Give the Representation Characteristics of Big Data, So It is Difficult to Carry out Formal Research. Therefore, Combining the Application Characteristics to Find More Conducive to Formal and Abstract Technical Characteristics May Be a Good Breakthrough in the Research of Big Data Technology. for Unstructured Data, It is Impossible to Use the Two-Dimensional Mode of Database for Editing, and This Type of Data Shows a High-Speed Development and Growth Trend [2]. the Construction of Smart Grid Can Not Only Promote the Upgrading of Traditional Electrical Equipment Industry, But Also Greatly Promote the Rapid Development of Emerging Industries, and Promote the Revitalization of Electrical Equipment Industry. in the Power Grid System, for Smart Grid Data, Unstructured Data Accounts for a Large Proportion [3]. a Brand-New Understanding of the Continuous Development of the Information Society Has Emerged. Big Data on Electricity Goes Hand in Hand with the Flow of Electricity, Providing a Solid Data Base and a Space for Improvement for Optimal Allocation of Power Resources, Improvement of Energy Efficiency, Quality Services and Auxiliary Social Management [4]. in This Era of Popular Big Data, Resources in Various Industries Can Use Big Data for Statistics, Analysis and Planning. the Combination of Power Dispatching System and Big Data, with Its Powerful Data Mining and Intelligent Judgment Ability, Can Create an Efficient Business Process for Power Dispatching [5].

The Distributed Platform Can Schedule and Optimize Tasks, Run Different Tasks Processing Different Business Data in Parallel, Make Maximum Use of System Computing Resources, and Shorten the Overall Data Analysis Time [6]. from the Perspective of Big Data, Based on the Analysis of the Existing Problems of Smart Grid Energy Consumption, This Paper Discusses the Feasibility, Support and Necessity of Big Data Technology in the Application of Smart Grid Energy Saving in the Future. Distributed Data Stream Storage and Calculation is an Effective Way to Solve the Problem of Power Big Data Storage and Calculation [7]. Large Scale Structured Storage of

Power Dispatching Big Data Provides an All-Round and Multi Connected Medium for Power Data with Multiple Points and Miscellaneous Aspects. It Can Store Historical Data in a Large Scale and Provide Data Basis for Statistical Analysis. Organize the Data for Overall Analysis [8]. Energy Big Data is Not Only Reflected in the Use of Energy Direction, But Also a Reasonable Allocation Plan for Resources, So That the Use of Energy Can Be Reasonably Controlled. Grasp the Business Focus and Correct Positioning of the Development, to Achieve Effective Control and Planning of Customer Service, Orderly Power Use, Energy Management Effectiveness and Monitoring Quality [9]. the Whole Network System Shall Be Regularly Tested and Maintained. If There is a Fault, Relevant Technologies Shall Be Adopted to Analyze and Deal with the Fault Phenomenon So as to Remove the Fault At the Root and Ensure the Normal Operation of the Data Network. It is Difficult to Abstract the Data from the Attributes of Big Data, So It is a Feasible Technical Path to Find the Technical Characteristics of a Certain Type of Big Data According to the Application Characteristics and Then Conduct Formal Research. Therefore, This Paper Studies the Application of Distributed Data Stream Computer Big Data Technology in Urban Power Energy Saving [10].

2. Intelligent Collection and Control of Big Data

2.1 Big Data Technology and Power Big Data

Big data is a super data collection with huge volume, low value density and various types. At the same time, it also contains the corresponding data collection tools, platforms and analysis systems. Data mining technology in the power industry can summarize all data and realize data sharing, to ensure that the power industry can adapt to the era of big data. When a single point of failure occurs in a distributed file system, the data can be recovered quickly; the distributed file system uses a simple consistency model to simplify the complexity of the system while providing the characteristics of high concurrency and high throughput. When a single point of failure occurs in a distributed file system, data can be recovered quickly. Distributed file systems use a simple consistency model to simplify the complexity of the system while providing the characteristics of high concurrency and high throughput. In the aspect of power grid data transmission, the data transmission amount can be reduced by using the method of data compression to ensure the improvement of data transmission efficiency. Get new information optimization, and standardize the integration of information results with other details, and ensure more reasonable operation of the entire power system.

2.2 Distributed Data Flow Parameters

In the urban power supply work, mainly through power generation, transmission, distribution, power consumption and so on are all linked one by one. In these processes, we can use big data technology. Big data energy-saving information analysis mainly refers to the establishment of relevant power analysis models (such as smart city lighting energy-saving analysis model based on big data, power intelligent energy-saving scheduling analysis model) on the basis of power big data. Data fusion needs to deal with the extraction and association of various data sources, such as the life cycle management of power assets involving multiple disciplines, marketing and distribution coordination management. Multi node distributed collection of data forms that flow and grow with time, then this kind of big data can complete the data format abstraction with the help of the existing (isomorphic) concept of distributed data flow. Second-level indexes, such as B-tree and B+ tree, are established on the dimensions with higher query frequency. When querying this dimension, you can directly pass through a secondary index transition and then locate the required data, greatly accelerating the search speed. The distributed data stream parameters are shown in Table 1. To promote the electricity marketing plan to meet the needs of users and achieve energy conservation, the current power industry has put forward “intensive” requirements in electricity management, while big data technology promotes the implementation of “intensive” electricity use in electricity management.

Table 1 Distributed Data Flow Parameters

	Dispatch	Forecast
Library table management	13.30	12.90
Index management	12.16	11.62
Task management	13.64	12.08

For power dispatching managers, data collection is the premise of all analysis and decision-making, and dispatching big data system has the natural advantage of data, which can provide a comprehensive platform for the lean management of dispatching disciplines. Big data technology can be combined with the operation environment of power system to analyze power data. Big data technology comprehensively considers the power consumption status of different regions, collects the power consumption information of different geographical locations, introduces the distributed parallel computing platform, and optimizes the technical architecture and improves the performance of the traditional power consumption information collection system based on the database platform. It is a key problem to obtain the training sample set needed for integrated learning at the central node. A feasible method is to reconstruct the global learning sample by using the micro cluster mode transmitted from the local node. Big data can also monitor the existing data. People can judge the problems in the process of power production and use according to relevant big data information, and can make timely adjustments. So as to gradually form a data-centric information management system, change the traditional business system-centric information construction ideas, promote the sharing of data resources, and give full play to the great value of data. Realize the functions of energy-saving situation analysis, energy efficiency analysis, carbon emission analysis, etc., and improve the forward-looking and energy-saving system data analysis of smart grid energy-saving regulation and management measures for relevant departments.

3. Energy Saving Information Analysis Based on Big Data

3.1 Energy Saving Storage Center Based on Big Data

On the basis of statistics, spatial data nodes are found and transformed to low energy consumption state to achieve energy saving. The main principle of data-based scheduling energy saving is to store data in the optimal storage device according to data access frequency to achieve energy saving. Good data visualization design should not only have artistic design, but also be able to show the details of data gracefully, and show the insight and new understanding of data. The data collected from the power system can be used for real-time monitoring, to adjust the power generation status in the network, and to make timely adjustments when there are problems or need to be updated and modified. Conceptually, different technical attributes and their combinations can evolve into specific types of big data patterns, focusing on the technical characteristics of the distribution and fluidity of big data. The distributed platform broke the problem that only single-column indexes can be carried out, and realized multi-column indexes. A distributed data center is built around big data technology in power data collection. The data center specially supervises the operation of power plants. It not only needs to grasp the actual operation of power plants, but also needs to obtain the operation information of power equipment, thus greatly improving the query efficiency of the system.

3.2 Energy Saving Monitoring Based on Big Data

To achieve the optimal control, according to data mining and data visualization results bearing high-value information data, through predictive analysis to provide forward-looking judgment with high certainty, to achieve the goal of intelligent energy saving. In terms of equipment information collection, big data technology collects the operation information and historical information of power equipment, judges whether there are defects in the operation equipment, understands the characteristics of power equipment in the defect state and collects the related information of defect characteristics. Carry out the real-time line loss calculation of electric power, use the massive energy data collected by smart meters to calculate the line loss in different areas such as zoning,

voltage division, line division and platform division area in real time, so as to provide support for power grid dispatching, trading and maintenance, and facilitate the economic and reliable arrangement of power grid operation. In the long-term accumulation of big data, it is estimated in advance that if there is a large amount of electricity consumption in this area, then the electricity in this area can be sufficient in the process of power generation. Intelligent applications such as load out-of-limit alarm, reactive power and voltage flow, protection defect analysis, mode adjustment and decision-making can be realized according to work requirements. In fact, almost all statistics, analysis, decision-making and reference information in the power system can be automatically generated in the data comprehensive processing server. The central node is mined, and there are corresponding CPU time consumption and memory space consumption on the corresponding nodes, so this experiment only tracks the time and space consumption of the central node. Combined with special service algorithm logic, parallel computation is completed on the stored data, and finally the processing result is returned to the target service application system through the service application service interface.

Big data is the key technology of smart grid construction, which helps to improve the transmission link of power system. In the power consumption management of the power industry, big data technology is responsible for sorting out the relevant data of power users and analyzing the key information in the data. The distributed parallel computing platform receives the collected data from all kinds of terminal information collection equipment and the archive data of relational database. It improves the classification mining effect of big data with the main technical characteristics of distribution and mobility, and obtains an optimized result on the balance of distributed computing, memory occupation and network communication cost between nodes. Through a series of problems such as customer relationship, electricity fee measurement and information collection, this paper makes a comprehensive analysis of orderly electricity use, comprehensive adjustment management, etc. Protection equipment statistics, protection defect analysis and other functions; Automation specialty can integrate state estimation, station operation rate, defect analysis, intelligent alarm and other functions, and even dispatching integrated management can benefit from its powerful data processing capability. In terms of foreign exchange and cooperation, the visualization of electric power data mainly reflects the overall situation of electric power development, reflects the social electricity consumption and the laws of economic activities, and reflects the role of electric power development in supporting the economy and society. To realize self-management of all energy users. By mastering the level of users, the total number of users can be effectively controlled, which is conducive to cost control, and at the same time, economic and social benefits can be taken into account, thus improving the refined management level of electricity consumption.

4. Conclusion

In this paper, the application of big data technology of distributed data flow in urban power saving is studied. Big data is the future development direction of the power industry, and the power industry should actively implement big data technology. Based on the energy consumption monitoring data and energy efficiency knowledge base, the existing energy consumption problems are found by analyzing the energy efficiency level of power. Innovative work has been done in distributed micro cluster mining, block to block incremental learning and integrated classifier learning based on elimination strategy. On this basis, through the optimization of energy conservation to assist in the formulation of optimized technical transformation and management measures. Promote the construction of smart city, provide convenient power services for users; on the other hand, provide useful help for policy-making, public utility management and business operation. In the future, the application of big data for power dispatching will definitely change the development mode of power companies, promote the transformation and upgrading of the power industry, and lay a solid data foundation for the comprehensive construction of smart grid. Under the fierce trend of the era of big data and cloud computing, big data technology, which relies on power saving, will gradually enter a new era. The efficiency and quality of power grid data

processing have been greatly improved, but there are still some deficiencies, which requires relevant staff to make continuous efforts and innovations to explore an effective solution to promote the stable and healthy development of China's smart grid.

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