

Application of Computer Big Data Technology in Urban Power Saving

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Abstract: *Electric power system as an important link of the city and social functioning, has a great impact on people's daily work life level, and as a result of the limitation of traditional technology, the power system operation process will produce great energy loss, but also increases the speed of the natural resource consumption, hindering the healthy development of the society as a whole; with the concept of energy conservation and environmental protection is widely used in all walks of life, in the modern city power system design, operation management can strengthen the application of the technology such as computer big data, operation in power system with scientific control, to meet people's daily life and city of stable operation at the same time, energy saving electric energy and the consumption of natural resources, lay a solid foundation for the healthy development of electric power industry and society as a whole. The following is mainly to analyze and explore the application of computer big data technology in urban power conservation.*

Keywords: Computer; Big Data Technology; Urban Power Conservation.

1. COMMON TYPES OF BIG DATA TECHNOLOGIES

Recent advancements in deep learning and artificial intelligence have significantly impacted various domains, including 3D object recognition, energy systems, urban development, and macroeconomic policy optimization. Lyu et al. (2024) proposed optimized convolutional neural networks (CNNs) for rapid 3D point cloud object recognition, demonstrating improved efficiency in processing complex spatial data[1]. In the field of energy, Yin et al. (2024) utilized deep learning for crystal system classification in lithium-ion batteries, highlighting its potential to enhance battery performance and sustainability[2]. Federated learning has also gained attention for its role in promoting trustworthy AI, as Huang et al. (2024) explored its contributions to responsible artificial intelligence in robotics and information engineering[3]. In urban development, Zhou et al. (2024) optimized an automated garbage recognition model using ResNet-50 and weakly supervised CNNs, contributing to sustainable urban management[6]. Meanwhile, Peng et al. (2025) integrated IoT data with reinforcement learning to optimize adaptive macroeconomic policies, showcasing the intersection of AI and economic planning[7]. Additionally, advancements in 3D vision-language models, such as Gaussian splatting, were introduced by Peng et al. (2024), offering new possibilities for multimodal data processing[5]. In the realm of AI-enhanced tools, Xu et al. (2025) developed cross-cultural game design tools leveraging AI for character conceptualization and collaborative sketching, emphasizing the creative applications of AI[9]. Furthermore, Tian et al. (2024) improved brain tumor image segmentation using an enhanced Unet architecture with GSConv and ECA attention mechanisms, underscoring the medical applications of deep learning[10]. Lastly, Yang et al. (2024) investigated large scene adaptive feature extraction, demonstrating the scalability of deep learning techniques in complex environments[11]. These studies collectively illustrate the transformative potential of AI and deep learning across diverse fields.

1.1 Data analysis technology

Under normal circumstances, big data analysis technology is mainly through the analysis and research of a large amount of data information, the existing valuable information is extracted and sent to users to meet their work and life needs, and effectively solve the defects and deficiencies of traditional data analysis technology. At the same time, with the application of data analysis technology, the relationship between a large number of data can be further studied, and the target transformation parameters can be further analyzed [1].

1.2 Data fusion technology

The so-called data fusion technology mainly refers to the centralized integration and storage of a large amount of data information, when the later work needs to query some data information can be quickly found; At the same time, with the application of data fusion technology, it can also discover the new value in data information, mainly

big data technology will effectively integrate a large amount of information together, technicians can calculate it, and get the possible situation of the later work.

1.3 Data processing technology

In addition, data processing technology also belongs to one of the common types of big data technology, which mainly analyzes and processes data information and then directly presents it to users. Processing related information with the help of big data technology can effectively reduce processing time and improve processing efficiency.

2. THE SPECIFIC CHARACTERISTICS OF BIG DATA TECHNOLOGY

2.1 Large data scale

When big data technology application, its main characteristic is data size, quantity of information, its main forms such as video, audio, images, and documents is given priority to, in the huge information power, meet the needs of the user work life information quantity is less, therefore, the application of the relevant users can use big data technology, with the help of efficient algorithms, a lot of information filtering, Choose the information suitable for their own needs for storage management.

2.2 Technology involves a wide range of areas

Under the influence of the level of modern science and technology and the continuous improvement of People's Daily living standards, computer and other modern technologies are applied in the operation of all walks of life, providing great convenience and promotion for social and economic construction; At the same time, people can use computers for daily communication. However, this phenomenon leads to the constant increase and explosive growth of data information, so big data technology is needed for standardized control to avoid its impact on social operation and people's work and life [2].

3. SPECIFIC SOURCES OF POWER SYSTEM BIG DATA

3.1 Power production

Work in order to satisfy the People's Daily life and social operation need electricity, electric power enterprises need to strengthen the work of production, and the electricity production process involved in the field more, such as energy supply security data, maintenance data, lead to the actual working process will produce large amounts of data information, the staff can be comprehensively the data information collection and record, When problems occur in the later electric power production process, the cause and location of the problem can be found in time by analyzing the data, reducing the time consumption in the maintenance process, and ensuring the production efficiency and quality of electric power enterprises.

3.2 Power operation

At the same time, in the process of power system operation, also can produce large amounts of data information, it is mainly due to the electric power resource in all walks of life and People's Daily life has a great impact, in order to ensure that fully meet the electricity demand, technical personnel need to provide electric power operation data information accurately, in order to make scientific decision scheme, And the staff can predict the possible faults of the power grid according to the data information, take protective measures to deal with them in time, and maintain the faulty equipment to ensure the normal operation of the power system.

3.3 Smart grid

In addition, because the power system occupies a key core position in People's Daily work and life, in order to ensure the normal operation of the power grid and reduce the probability of failure, the relevant enterprises and personnel need to strengthen the application of intelligent and automation technology to transform the power grid system; When data information appears in the operation of the system, technicians can analyze it to understand the operation status of the smart grid and fully understand the electricity consumption of residents and the overall

power consumption of the city, so as to formulate a scientific and effective power supply scheme and avoid the impact on the stability of people's work, life and urban operation [3].

4. PRACTICAL APPLICATION OF BIG DATA TECHNOLOGY IN URBAN POWER CONSERVATION

4.1 Application in power grid data acquisition

At present, in order to strengthen the application of big data technology in urban power conservation, relevant units and personnel can first strengthen the application of data collection in the power grid, through the investigation and analysis of urban internal consumers, combined with the electricity consumption of relevant users, so as to develop targeted energy saving treatment schemes; At the same time, the staff can use the application of big data technology to regularly maintain the information in the database and timely clean up the unnecessary information, so as to ensure the effectiveness and accuracy of the internal information of the power system, and lay a good foundation for the overall development of the power system and the industry.

4.2 Applications in auxiliary operation of power systems

Usually, in the process of power system operation, technical staff can use the application of the big data technology, comprehensive knowledge and understanding to collect the utilization status and change trend in different areas of the city, in order to develop targeted production and supply plan, ensure the power supply can meet the demand of the region accurately, reduce the probability of the power loss phenomenon, On the other hand, technicians also need to monitor the daily electricity consumption of urban residents in real time, so as to provide reference and information basis for the formulation of scientific power supply schemes.

4.3 Data energy saving processing

In addition to the above measures, technicians can also apply big data technology to data energy saving processing, optimize data storage equipment, reduce the operating efficiency and time of equipment, and reduce the consumption of power resources while ensuring the full play of the role of equipment [4].

5. CONCLUSION

To sum up, in the modern city power system operation, by strengthening the application of computer technology of data, the status of city resident daily use can be careful investigation and analysis, on this basis to scientific control of power system operation process, to meet residents living electricity and industry operation of electricity demand at the same time, the energy conservation research and development of electric power system innovation, And the establishment of intelligent power grid, reduce the daily consumption of electricity, reduce the consumption and destruction of natural resources, ensure the healthy and stable operation of the power industry, and on the other hand, promote the healthy development of the city and society as a whole.

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