Research on Big Data Decision-making Support Platform of New Energy Bus

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Abstract: With the continuous development and progress of information technology, new energy vehicles have been widely concerned because of their high application efficiency and low environmental pollution. Establishing an information system platform can support the operation requirements of new energy bus vehicles, realize integrated linkage management and control mechanisms and modes; and optimize intelligent data sorting system. Scientific and efficient processing of multidimensional data is the key to promote the sustainable development of the industry. This paper expounds the background of the big data decision-making support platform for new energy public transport vehicles, analyzes the big data frameworks and decision-making schemes, studies the decision-making support methods and proposes the implementation methods.

1. Background of new energy buses application of big data decision-making support platform

In 2015, the Ministry of Industry and Information Technology of China put forward corresponding control requirements and standards for energy management work, and carried out project analysis on the national driving cycle conditions of passenger cars and various types of businesses, which involves relevant parameters and geographical information parameters in the running process of new energy vehicles. Systematic constraints are carried out on the process of acquisition, storage, analysis and modeling. In addition, in the Guiding Opinions of the General Office of the State Council on Accelerating the Promotion and Application of New Energy Vehicles the responsibilities of local governments in the promotion of new energy vehicles are also determined. In the promotion of new energy vehicles, scientific information platforms should be implemented to effectively promote the safe operation and management mechanism of new energy vehicles so as to develop new energy vehicles and give full play to the application efficiency of information technology, and create a good management platform for the further development of government supervision.

It is worth mentioning that some institutions of higher learning and enterprises in our country have developed and supervised the vehicle data acquisition equipment, and some regions have launched demonstration and promotion projects, but the management of the new energy vehicle data acquisition project and remote monitoring project are still in test. In order to deal with problems specifically, we should attach importance to the operation monitoring platform, and ensure that the government can grasp the operation and failure of new energy vehicles in the first time, so as to promote the overall progress of new energy vehicle development projects. However, there are still some problems to be solved urgently in the actual application and operation of the monitoring platform. Among them, the insufficient number of monitoring vehicles, the inconsistency of data acquisition equipment and data exchange interface, as well as the slow data transmission of equipment information center are the key problems, which also restrict the overall optimization of data analysis, so the establishment of
decision-making support platform for new energy bus application big data is one of the ways to solve this problem[1].

2. Systematic framework of new energy bus application of big data decision-making support platform

2.1. Source layer
In the big data decision-making support platform, source layer mainly refers to the most bottom of the whole system, which can provide base for the management of big data decision-making support platform data, among which vehicle internet system and charging information, as well as traffic flow information are involved. Besides, it can also establish an effective infrastructure analysis model, improve the basic effect of data management and ensure that the big data decision-making support platform can play its practical value on the basis of concrete analysis of specific problems, as shown in figure 1.

![Figure 1: Structure of Big Data Decision-making Support Platform](image)

2.2. Data layer
Data layer is the specific integration method of data, which can manage data from the source layer and complete data collection according to the basic process.

Firstly, to carry out data extraction, it is mainly to establish data classification after selecting the data specification and scope of the system, and apply the extraction mechanism to improve the integrity and consistency of data management.

Secondly, in data transformation, corresponding mechanism should be applied to supervise and control the data, optimize the data control mode, maintain the basic process of data collection and management project, and provide guarantee for the construction of multi-source high-granularity data mart.

Thirdly, data loading is mainly to complete data processing and storage with the corresponding carrier after data classification and summary, so as to ensure the integrity of data transfer process, avoid the mutual influence of data and improve the value of data utilization. Only by improving data storage can we improve the basic efficiency of data loading and the basic level of management.

2.3. Logical layer
For the big data decision-making support platform, the logic layer is the core system of the whole system. Combined with the actual application requirements, it can complete the multi-dimensional data determination and data mining algorithm processing. It is worth mentioning that in order to
ensure the effect of data management, it is necessary to implement intelligent data sorting system[2]. Because a lot of voice and video information is generated during the running of the vehicle. Although these data can be preliminarily analyzed by means of flattening processing, they will still take up a large amount of storage space, which will inevitably affect the management efficiency and application level of the operating system. Based on this, the project proposes intelligent data sorting technology. The so-called intelligent data sorting system is to establish data classification and management in the running process, scientifically process structured data in the application system, and use it as the basis of basic control management, effectively supervise projects such as unstructured data storage locations and sizes with structural data. For example, in the process of analyzing and judging the video signal data in the car, the corresponding remote transmission project can be established, and a good environment can be created for the overall progress of the follow-up management effect and application mechanism, because the driving condition and the corresponding sensor signal collection process are relatively convenient. That is to say, in the whole processing mechanism and control system, it is necessary to analyze and judge the parameter system, such as the abnormality of the sensor signal in the vehicle and the driving condition according to the program control module, and rationally control the threshold range to ensure the effective transmission of data and implement data remote push, which can realize the real meaning of remote server space and cost optimization[3].

In addition, the integrated multi-dimensional storage management of structured data and unstructured data should be carried out to ensure that the corresponding parameter patterns and management points can meet the requirements of practical application. Compared to structured data, unstructured data points are less, but most data is multidimensional. If structured data and unstructured data are to be processed in tandem, it is necessary to meet the effective management requirements in strict accordance with the corresponding relationship, and fundamentally enhance the specific level of data storage methods to ensure the comprehensive level of processing procedures and control projects. On the one hand, the technical route of time synchronization storage is proposed; on the other hand, the mixed data storage method is proposed. At the same time, the sorting and flattening processing mechanism of unstructured data can be established to optimize the storage effect[4].

2.4. Presentation layer
The presentation layer of the big data decision-making support platform is mainly a hierarchical structure which can integrate, summarize and process the data of each business layer. After the application structure is established, the corresponding data can be accessed by the browser, client and other projects.

3. Research on decision-making support means of big data decision-making support platform for new energy public transport vehicles
In order to apply the decision-making support system of big data decision-making support platform for new energy public transport vehicles, it is necessary to take vehicle operation decision as the key, establish corresponding analysis framework for fault analysis projects, utilization ratio of charging piles, etc., to ensure the integrity of data determination and processing process, thus maintaining management guidance work, as well as overall mention and lay the foundation for the improvement of management level of new energy bus[5].

3.1. Intelligent charging scheduling
After applying the big data decision-making support platform for new energy public transport vehicles, the intelligent charging dispatching strategy can effectively improve the operating efficiency and control level of the power grid, and ensure that the power project can play the time-effective value in the energy management work and achieve the goal of cost saving. It is worth mentioning that in the intelligent dispatch management project, the effective completion of grid system and traffic operation optimization are the basic requirements. Therefore, in the case that the electric vehicle is simultaneously connected to the grid, the rationality avoids the safety hazard caused by the increase of
the grid load. It is very important to use the intelligent charging scheduling mode to ensure the application effect is improved.

In the first place, it is necessary to analyze and judge the road traffic network structure in combination with the initialization state, and scientifically manage the initial cruising range and battery capacity, and effectively set the path search process to ensure that the weight analysis process meets the requirements\[6\].

In the second place, after centralized planning of charging paths and effective calculation of the corresponding vehicle status and traffic situation weight analysis system, the minimum value of comprehensive weight values can be searched to ensure that charging paths can achieve effective aggregation to a certain extent.

In the third place, the charging station load can be regulated by means of the corresponding treatment facilities, so as to determine whether the charging station voltage is overloaded rationally. The charging vehicle of the target charging station can be analyzed and the operation process can be improved, as shown in figure 2.

![Intelligent Charging Scheduling Flow Chart](image)

3.2. Parking planning

In the process of in-depth research on electric vehicle charging projects, it is necessary to conduct in-depth analysis from the perspective of environmental protection management and economic operation, effectively analyze the operation status of the charging station after it is connected to the grid system, and establish a multi-objective decision-making optimization control structure. While fundamentally maintaining the overall demand, we will improve the supervision of specific layout and operation mode\[7\].

3.3. Battery use

For new energy vehicles, the management of battery application is very important and lithium batteries are mainly adopted. Therefore, it is necessary to conduct centralized analysis and judgment on battery decay and decay modes, and effectively combine physical model description content to optimize corresponding control efficiency, which can also improve the basic effect of the overall application management process to a certain extent.
4. Conclusions
In a word, in the management of new energy bus application big data decision-making support platform, we should perfect the specific analysis mechanism according to the actual situation, construct the new energy application decision control project, lay the foundation for the overall progress of public transport management, realize the application value of the analysis system model, and ensure the system management. The overall effect of the work lays a solid foundation for upgrading the application and management efficiency of the new energy bus big data system.

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References
[1] Wang Fan, Cui Xiao, Di Yachan, etc. Analysis of the research direction of innovation and entrepreneurship education in Hebei Higher Vocational Colleges [J]. Modern business industry, 2016 (25): 134-136.
[2] Chen Xingqiang, Tang Ke, Chen Yuechuan, etc. Research on decision-making support platform for big data of new energy public transport vehicles [J]. Urban public transport, 2017 (3): 25-29.
[3] Liu Kaiyuan, Luowei, Li Lifeng etc. Design and research of intelligent bus dispatching system for new energy vehicles [J]. Value Engineering, 2017, 36 (15): 128-130.
[4] Wanjian, Ji Jinzhang, Wang Weifeng etc. Economic analysis of new energy bus considering time value of capital [J]. Highway Transportation Science and Technology, 2015, 32 (3): 154-158.
[5] Dong Enyuan, Yan Wensheng, Shen Jiangwei, etc. Demonstration operation analysis of hybrid bus in plateau area [J]. Science and technology and engineering, 2013, 13 (22): 6629-6632.
[6] Li Dusheng. The development of Zhongtong Bus New Energy Vehicle Remote Intelligent Monitoring Platform [J]. Commercial Vehicle, 2014 (7): 49.
[7] Liu Rongxian. Analysis of the characteristics of new energy bus promotion and application under the operation subsidy policy [J]. Digital users, 2017, 23 (25): 217.