

Big Data Analysis for Supply Chain Management in Vehicle Industry

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Abstract. With the rapid development of big data technology applications, the application of big data technology has an increasing impact on the core competitiveness of automotive enterprises. This paper briefly introduces the development history and status quo of big data, introduces the role that big data technology is playing in the automotive industry, analyzes the problems in the automotive sales link and improvement programs that can be made by using big data, puts forward the current automotive aftermarket link optimization strategy, and also puts forward the limitations of current big data technology and the difficulties and pain points of research tasks, while looking forward to the future, affirming the development prospects of big data. In the future, big data technology will become an indispensable part of the automotive industry chain and play an important role in promoting the management optimization of the automotive industry. These results shed light on guiding further exploration of implementation of big data analysis in supply chain management.

Keywords: Big data; vehicle industry; supply chain management.

1. Introduction

As one of the current national key strategies, the big data strategy is a new driving force for economic development. Human beings are living in an era where there has been an explosion of data. It is vividly shown that it has made many new attempts by providing full sample analysis in many field which has made a significant impact. "Big data" was published by "Nature" on September 4, 2008. It was the first time that the famous American consulting firm Mckinsey put forward the concept of "big data" [1-3].

Big data refers to datasets whose sizes exceed the capabilities of conventional database tools to acquire, store, manage, and analyze. Compared with other countries, China's automobile manufacturing industry started late. The automotive industry is facing increasing challenges and pressures under the current environment. Big data analytics is a powerful tool and Kiron argue that big data (BD) has enough potential to revolutionize the automotive field. Deloitte believes that in the automotive field, predictive analytics is receiving widespread attention, it can not only greatly improve forecasting efficiency, but also save costs, improve operations and performance to some extent. Information technology is the foundation of supply chain management. In the process of data analysis, car companies drive value through the "four-wall breakthrough method", which is in line with reality needs and produce more meaningful results. When an enterprise builds a big data application, it needs to start from the enterprise's own business strategy and IT strategy to build the top-level framework design of the big data application, which requires the close cooperation of IT experts, business experts and algorithm experts. It is vividly shown that the current auto companies have begun to digitize and become intelligent when they manufacture cars. By comparing the cost, quality, reliability and supply efficiency of related product parts, companies can choose the best one. options, and then at the level of car marketing, especially the data-based behavior of car owners is the most valued by car companies. Information will form huge data to be mined and applied to generate value [4-7].

The second is the capitalization of car data. Therefore, these data will bring benefits to car companies and car dealers like other assets. The assets are applied to create more value. The third is the intelligentization of the automobile industry. People and cars can connect and interact. At the same time, the big data of the automobile industry will promote the formation of a more intelligent

automobile big data industry. Based on the Internet car, a huge and multi-level automobile big data ecological business will be built. Simultaneous big data OBD remote diagnosis of intelligent car networking is used in the field of situational e-commerce, big data on driving behavior is used in the field of auto insurance, big data on maintenance is used in the field of used car evaluation, and big data on intelligent navigation is used in the field of car insurance. There are applications in the field of traffic intelligence, and big data plays a very important role [8-13].

Starting from the definition and characteristics of big data, this paper will focus on the application of big data in various aspects of the automotive industry and the future development trend of big data in the automotive industry on the basis of sorting out the development status of automotive big data.

2. Description of big data in SCM

The basic characteristics of big data are large scale, various data types, fast processing speed and low data value density. Compared with traditional data, big data can provide the automotive industry with a new perspective to analyze and solve problems in terms of collection, storage, analysis and mining. The characters of big data is given in Fig. 1.

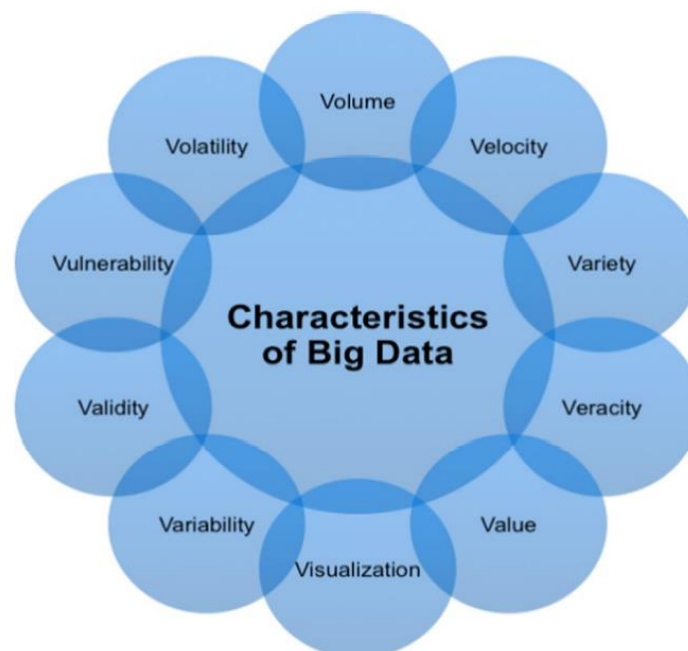


Fig. 1 The characteristic of big data.

Big data can help the full-link development of the automotive industry, from front-end R&D, production and transportation, sales and marketing to the after-sales market. Front-end research and development: With the help of big data, car manufacturers can better understand consumers' preferences, and be configured according to consumers' needs. Vehicles. Through data analysis, OEMs can make hundreds of improvements to their vehicles to improve their performance in different aspects. Consumers can not only buy their favorite cars, but also enjoy safer vehicles.

Production and transportation: Based on logistics big data, the supply chain distribution network can be optimized to make the transportation of materials faster, more efficient, and more economical. Based on the collected data on the operation behavior of production line workers, the entire production process can be optimized to improve production efficiency. At the same time, during the production process, the sensors on the production equipment can be optimized in time to obtain important information such as temperature, humidity, oil level, vibration, workload, production efficiency and reject rate during the working process of the equipment, and these data can be correlated with equipment failures. The combination of current records and historical maintenance

data helps to reasonably arrange the maintenance time of production equipment, avoid unnecessary production downtime, and minimize the risk of loss to the enterprise.

In the process of people using the Internet, big data accumulates process data, especially on some open platforms, the process becomes visualized. Through big data, users who are interested can click to enter the target website, and the customer's Dwell time, behavioral trajectory, and behavioral outcomes are all manageable. Through the long-term binding of customers, in order to form a promotion between businesses. In addition, big data has also spawned a new car sales model—social media marketing. These methods accelerate the digitalization of car marketing. The transformation has provided support for the increase in sales.

By building operational big data, automakers can better understand how customers drive, so they can provide better services, and at the same time, help them reduce insurance fraud. Big data also provides them with other useful information, such as data related to natural disasters and weather conditions. Using this data, insurance companies can finally offer one-to-one coverage options, which can motivate drivers to drive safely, get more drivers to follow safe driving rules, and make our roads safer.

3. Application in Sales

As mentioned above, big data has spawned a new model of car sales - social media marketing. Among them, this study would like to talk about the application of the “ByteDance” company, which has received widespread attention from the masses in recent years and has played a significant role in improving marketing efficiency, in the marketing of the automotive industry. A sketch of the bigdata analysis for sales of vehicle industry is shown in Fig. 2.

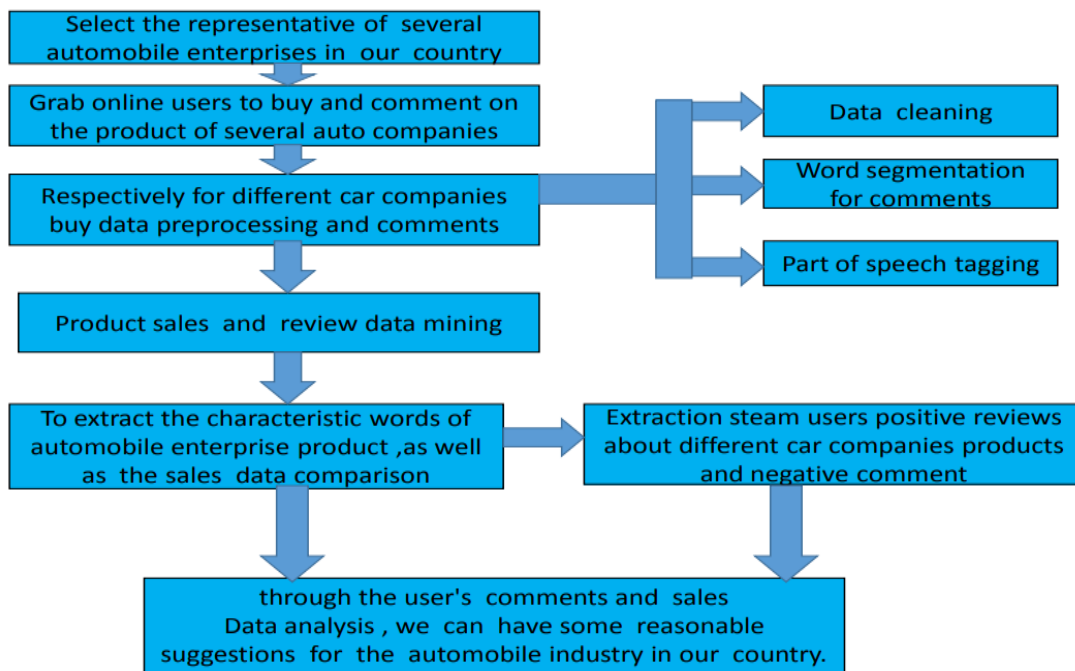


Fig. 2 A sketch of the bigdata analysis for sales of vehicle industry.

As it known to all, Douyin, a social media platform, has attracted everyone's attention because of its powerful big data analysis capabilities. Using big data, they have achieved a full range of data on user groups' geographic information, content of interest, consumption preferences, etc. dissect. Through the following technical means, they make data analysis and complete business transformation. Taking the application in the automotive industry as an example, Douyin is relying on its huge user scale, full-scene and full-link content layout to make it interesting, life-like, and professional. It provides fertile soil for the development of the automobile industry. Taking the

Douyin Double 11 Good Things Festival as an example, Wuling Motors created a record of over 1,300 vehicle transactions on Douyin, with a cumulative transaction volume of over 70 million, setting a new high of over 14 million GMV on that day. Judging from the survey data provided by Douyin, short videos have become the most important channel for users to obtain car information. Through data analysis, Douyin reaches out to users from interests, multi-dimensional and multi-scenarios to reach contacts with all generations. Whether it is a car manufacturer or a dealer, it can use this platform to complete business transformation.

Consumer habits and preferences, so as to complete the follow-up marketing actions. Compared with the traditional data collection mode, the marketing action completed through big data analysis has the characteristics of low marketing cost, accurate audience, high efficiency and more popular with customers. In the traditional data collection mode, customers are passively disturbed repeatedly, and customer satisfaction is getting lower and lower. Customers are not adaptable, and with the increasing influence of traffic platforms such as Douyin, big data analysis tools that match business needs and industry characteristics. It can better help collect customer data inside and outside the enterprise, build customer portraits, and automate marketing based on their customer characteristics. Its only drawback may be based on the user's personalized video needs. Both car companies and dealers need to spend some time to improve their video content production capabilities. As a matter of fact, for the whole company, bigdata analysis can be adopted as illustrated in Fig. 3.

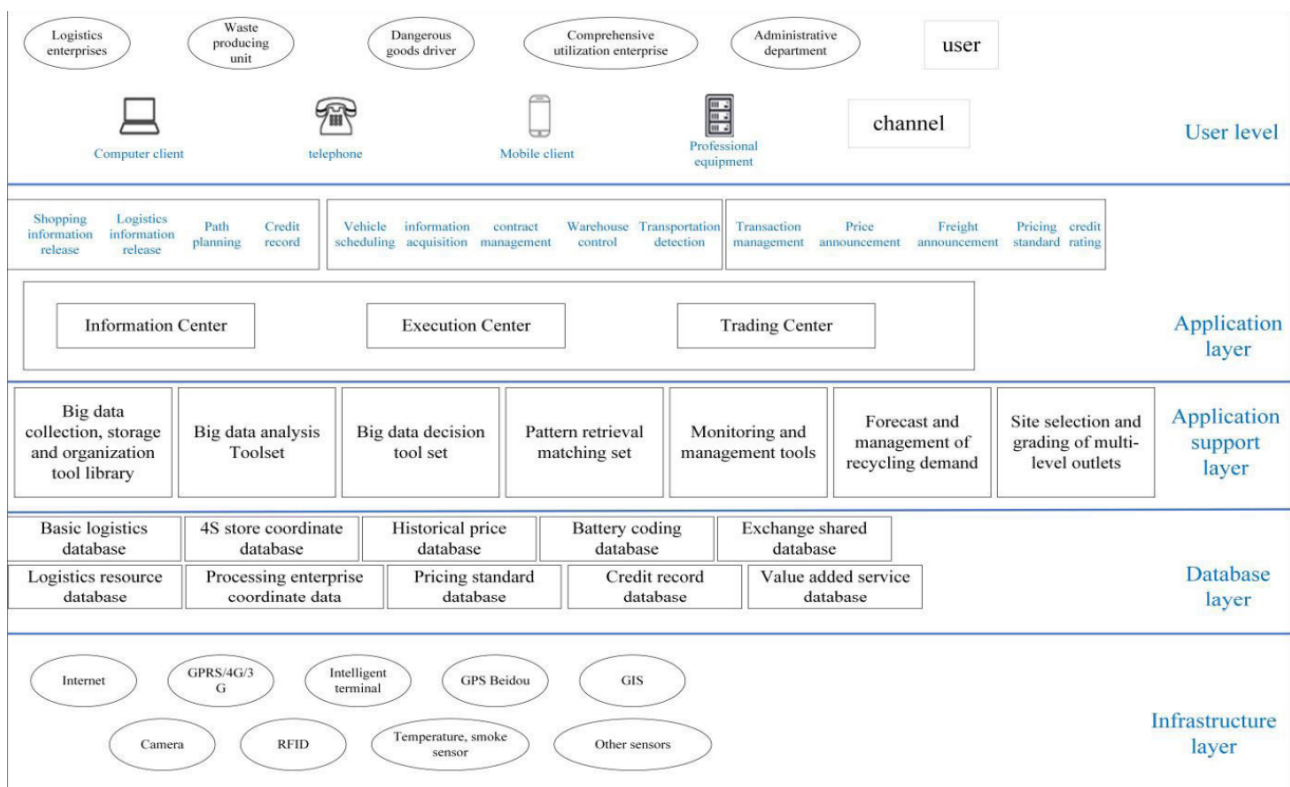


Fig. 3 The bigdata analysis routine for a whole company in vehicle industry.

4. Applications in Aftermarket

In the field of the aftermarket, one sees that the big data of driving behavior has also been applied. The principle is to collect the driving behavior data of car owners based on OBD or other smart boxes. Through data analysis, one can refuse to frequently violate regulations or cause car accidents. It can not only increase the number of insurances, but also improve the quality of insurance. A sketch of the monitor process is exhibited in Fig. 4.

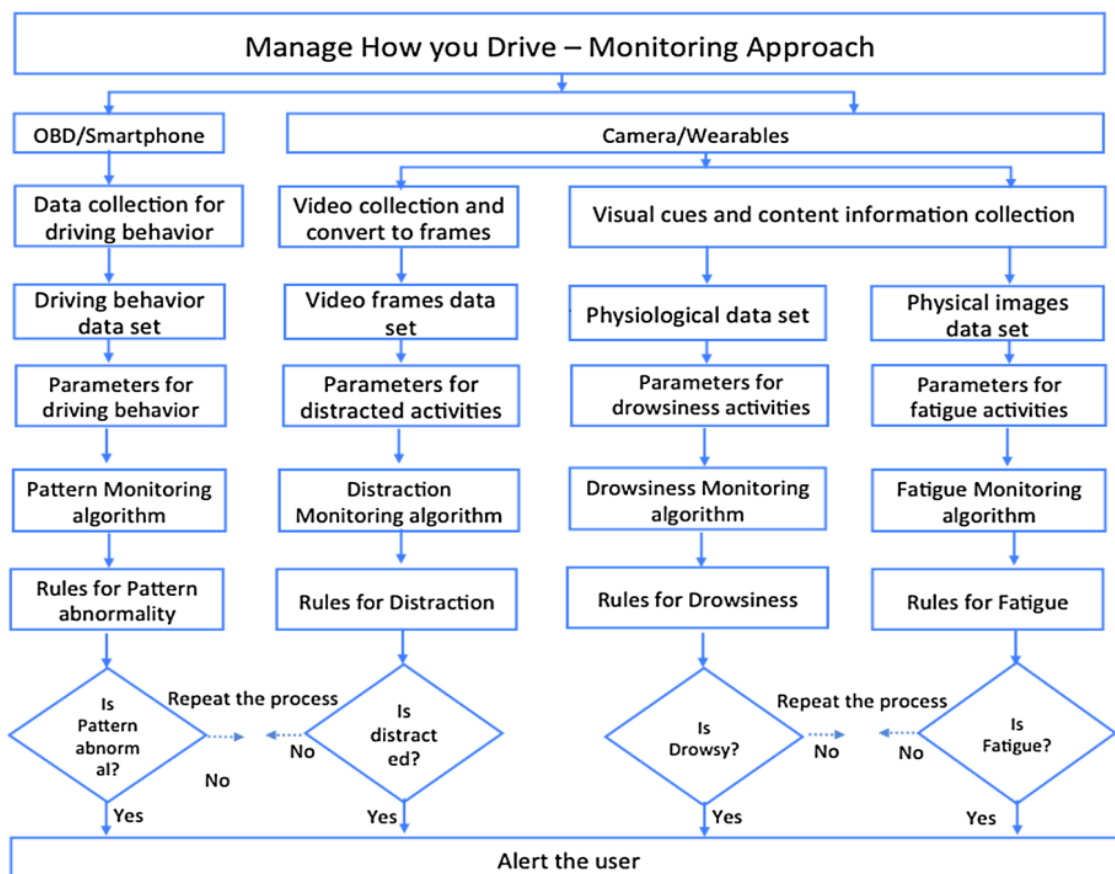


Fig. 4 Monitor process of driving behavior.

Meanwhile, it can also provide data for the use time and idle time of the vehicle. For example, Metromile used car monitoring equipment to subvert the pricing model, realizing a model of charging premiums based on the number of miles driven. On average, such a model could save a driver about 40 percent in the cost of driving 10,000 miles a year.

In addition, Liberty Mutual Insurance Company of the United States provides GPS tracking devices for companies or large fleets. Users install the device in the car to help monitor and improve drivers through the returned mileage, driving speed, acceleration, and location information. Driving habits, further realize the safety management of vehicles, and effectively control risks and the basis for decision-making of insurance premiums, which also improves the company's efficiency and base group. At the same time, for example, Insurethebox in the United Kingdom provides vehicle theft recovery and accident assistance services.

5. Limitations & Prospects

There are still many limitations in big data analysis. Its limitation is that not all data is useful, and most of the time, useful data is even only a small part of it. At the same time, when the application of big data floods into the business scene of the automobile industry and involves interests, there will inevitably be distortions, which will affect the overall judgment. In the meantime, big data analysis has no way to collect a complete sample, because not all customer group data can be seen, so it is still not very objective.

Similarly, big data mainly relies on the data foundation to make judgment and analysis of the situation. Over-reliance on big data and predictive models is dangerous because there are many decisive influences that cannot be included in the coverage of model parameters. From weather forecasts, earthquake predictions, football games to financial crises, and more, this is well explained.

However, what one can expect is that when the technology is continuously optimized, the future big data analysis can exert infinite imagination in the automotive field. From front-end manufacturing

of unmanned vehicles, to intelligent navigation big data to relieve urban traffic pressure and reduce accident rates, to the application of big data in the field of new business models of car sharing, to consumer marketing promotion, the influence of big data is increasing.

6. Conclusion

Overall, for the automotive industry, big data is undoubtedly an essential tool to help the industry develop. This paper aims to investigate the application and optimization of big data in automotive marketing and aftermarket. However, today's automobile manufacturing industry is still facing many problems, at present, the overall industry of automobile sales link is inefficient, high cost, the aftermarket still has many points to develop to help automakers optimize the maintenance structure. In view of the problems existing in the automobile manufacturing industry, this paper advocates the optimization scheme of building a marketing big data platform to improve the business level of the overall automobile manufacturing industry and promote the development of the national economy. However, this paper only gives certain suggestions in the direction, and the development of actual business also needs the continuous improvement and optimization of big data technology, and it is necessary to give researchers some time to break through and achieve.

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