Application Research of Data Visualization in the E-Commerce Product Selection Platform

Wei Yu[1,a], Jia Xu[1,b]

2001512206@dlvtc.edu.cn[a], 2006512472@dlvtc.edu.cn[b]

Dalian Vocational and Technical College (Dalian Open University), Dalian City, Liaoning Province, 116037[1]

Abstract—Through the application of D3.js visualization tool in the e-commerce commodity selection link, it can directly help the e-commerce platform to comprehensively analyze the internal data and external data, and provide strong data support for the decision-making of the e-commerce product selection platform, so as to improve the scientific nature of the product selection of the e-commerce platform. Moreover, it improves the operation of the supply chain of e-commerce platform, improves the operation decision-making efficiency of e-commerce platform and increases the operating income, realizes the rapid and healthy growth of e-commerce platform, further changes the traditional market structure and promotes the rapid development of the whole market economy.

Keywords-Big data technology; Data visualization; Electricity to choose goods

1. INTRODUCTION

With the great development of Internet technology and mobile communication technology, e-commerce, as an emerging industry, has grown rapidly in China, and countless e-commerce platforms have broken out, gradually pushing the development of the online shopping industry to the peak. In the process of daily business activities of e-commerce platforms, commodity selection is the first step in the operation of e-commerce platform. The core value of the e-commerce platform is that it can have goods that can attract customers. Whether the product selection is crucial to the e-commerce platform. The choice of commodities will determine the supply chain composition of the e-commerce platform, the design and implementation of the marketing strategy of commodities, and the profitability and development space of the e-commerce platform. Therefore, the e-commerce platform should optimize and upgrade the design and implementation of the product selection strategy according to the comprehensive data and information analysis results, and improve the sales volume and profit margin of goods, so as to enhance the core competitiveness of the e-commerce platform. The author

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believes that the electricity platform should use big data technology, in the process of selection of professional data analysis, intuitive see different goods in the electricity platform, consumer personality demand and the overall market environment of the data analysis results, and combining the above results of the scientific selection, to solve the electricity selection in the data island, commodity homogenization, cannot take measures to local conditions.[1] The information technology development index represented by e-commerce is showing a growth trend, and it has become an accelerant and important content of economic growth. The network information technology and big data technology behind it have become real productivity, which will quickly spread and spread in a cost-free way, produce chain reaction, drive the rapid improvement of productivity, thus promoting the rapid development of the whole market economy.

2. E-COMMERCE PLATFORM SELECTION OVERVIEW

2.1 Supply chain of e-commerce platform

The product selection of e-commerce platform belongs to the category of procurement management, which is also a part of the supply chain management of e-commerce platform. Due to the particularity of the e-commerce platform, the traditional offline transactions are all transformed into online electronic transactions, which completely changes the operation mode of the traditional upstream and downstream business collaborative processing of the supply chain. There are two types of supply chain processes in the current e-commerce platform. The first type is for the e-commerce platform to determine the purchase plan through product selection, complete storage in self-built warehouses, upload commodity information and inventory information to the e-commerce platform independently, sell commodities, and complete follow-up order delivery and after-sales service. Second, the e-commerce platform invites merchants to enter the e-commerce platform by selecting products, and the merchants upload commodity information and inventory information. The e-commerce platform only provides commodity information management and order information management, and the merchants handle order delivery and after-sales service by themselves. Therefore, the selection of the e-commerce platform occupies the starting position of the e-commerce platform supply chain system, which is the foundation of the construction of the e-commerce platform supply chain system and the key to the normal operation of the e-commerce platform.

2.2 Significance and role of e-commerce selection

E-commerce selection is to solve the problem of what e-commerce platforms sell, but also to help e-commerce platforms lock target customer groups, the key to market demand segmentation. The success of e-commerce selection is directly related to the number of sales channels of e-commerce platforms, the choice of rivals at the same level, and the size of cost and revenue space. Selection of e-commerce products in the operation process of e-commerce platform has become an integral part of the existence of e-commerce platform is the fundamental issue to be considered. The three general directions of e-commerce products are famous brand products, sales products and profit products. Brand-name products can bring more sales and user attention, and can also indirectly increase the sales of other similar products, which naturally brings pressure such as inventory, cost and operation. Most of the

products sold are popular categories with fast circulation speed and high per capita demand, which will also have low profits and a heavy inventory burden. Most profit-making products are unpopular, so naturally they will not have high sales and circulation, which will also affect the operation and development of e-commerce platforms. Therefore, e-commerce product selection is a game, which is also the key to highlight the core competitiveness of e-commerce platform.

2.3 Problems existing in e-commerce selection

2.3.1 Disconnection between data information and selection process

In the current common e-commerce product selection strategy, e-commerce platforms pay more attention to a series of data information such as product popularity, sales volume, inventory, base price. It seems to be able to intuitively explain whether the product is the current popular sales product, which can bring direct traffic benefits to the e-commerce platform. However, in the actual operation, it is found that the data information provided by different enterprises or suppliers is not unified, non-standard and not comprehensive enough, resulting in the disconnection of data information in the process of selection of e-commerce platforms. The selection decisions and planning of e-commerce platforms lag behind the market and lack of foresight. Therefore, when selecting products, it is necessary to refer to the sales data of e-commerce platform's own products, such as import and sales differences, flow conversion and evaluation. External data should also be taken into account, such as competitor sales volume, regional sales preference, logistics and warehouse throughput efficiency. The huge data information constructs the data model that is in line with different commodities. Only by using big data technology to quickly analyze, excavate and display different data information of products can e-commerce platforms select commodities with explosive potential from millions of commodities and achieve the profit goal of e-commerce platforms.

2.3.2 Lack of product selection system, serious homogenization of goods

The key to product selection is to seize the market opportunity and explore the market explosion to improve the profitability of e-commerce platforms. And in the current e-commerce platform selection process, to single goods, or popular goods as the main direction of choice, that is, often appear "what others sell, I sell what" experiential selection situation. This kind of product selection strategy lacks scientific data and information support, and the single product system easily leads to the situation of commodity homogeneity, forcing e-commerce platforms to adopt price war to obtain user traffic, which can make a small profit in the short-term operation of e-commerce platforms, but cannot realize the leapfrog development of e-commerce platforms. Therefore, in the actual process of e-commerce product selection, e-commerce platforms should make more use of big data technology to comprehensively analyze data results. Build a selection system in line with the characteristics of its own platform and operational advantages, improve the forecasting ability of e-commerce platform selection, and grasp the trend of the market and consumers. Scientific combination of brand-name products, sales products and profit-making products can reduce the market homogeneity of products, improve the characteristics and advantages of e-commerce platforms, and maximize the operating benefits of e-commerce platforms.

2.3.3 Low efficiency and lack of flexibility in product selection

In the process of the current electricity to choose goods, much depends on the manual operation, selection of data analysis tools also is Excel more, in the face of huge amount and complex data information, from the data information acquisition, sorting, analysis, and application requires a lot of artificial long work, directly affect the electric business platform of work efficiency, increase the labor costs. In addition, due to the huge workload, it is impossible to timely adjust or change the product selection plan of the e-commerce platform. If the product cannot be transported and sold online due to the influence of weather, environment and other irresistible external forces, the e-commerce platform will naturally be affected accordingly. Therefore, e-commerce product selection process needs to rely on big data technology, which can intuitively improve work efficiency in data information capture, cleaning, storage, analysis and mining, application and other aspects. At the same time, it can also rely on the analysis and decision-making ability of big data to increase the hierarchy of decision-making and planning of the selection of products on the e-commerce platform, and effectively improve the operation flexibility and risk resistance ability of the e-commerce platform from the selection stage.

To sum up, in the process of product selection, e-commerce platforms need to rely on big data technology and combine with the application technology of Internet platform to build an e-commerce product selection platform based on big data technology, and use big data visualization application to help e-commerce platforms build product selection system. Relying on the intuitive data and information analysis results, it can improve the efficiency, flexibility and scientificity of the formulation and implementation of selection strategies and plans of e-commerce platforms, expand the selection channels of e-commerce platforms, increase the profit projects of e-commerce platforms, and improve the anti-risk ability of e-commerce platforms.

3. BIG DATA TECHNOLOGY AND VISUALIZATION APPLICATION

3.1 Overview of big data technology

Big data itself is an abstract concept. Big data refers to collections of data that cannot be accessed, stored, managed and processed within a limited time using conventional software tools. Big data is characterized by Volume, Velocity, Variety and Value, which is referred to as "4V", namely, huge data Volume, fast data flow speed, various data types and low data Value density, as shown in Figure 1. [2]

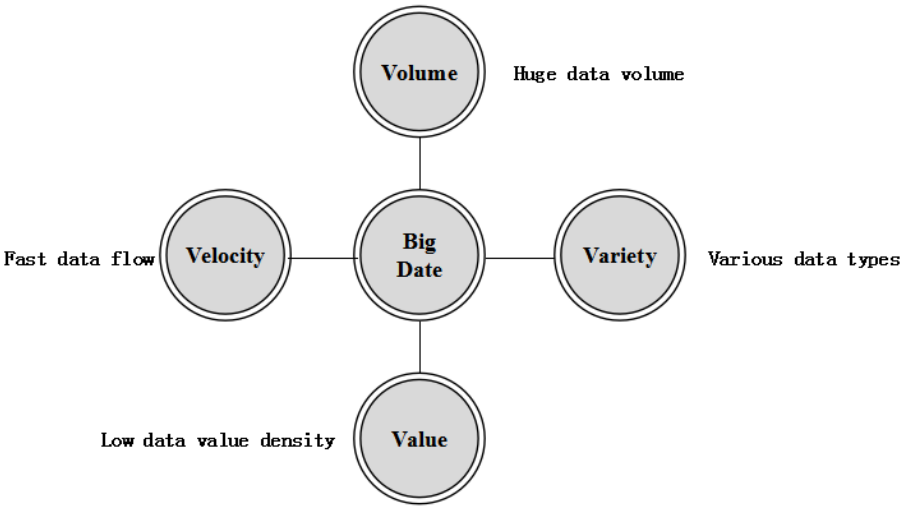

Figure 1: Big data characteristic diagram

Big data relies on information and communication technology, and gradually transforms from data information to data resources according to its own unique technical characteristics. Its importance is self-evident and has a great impact on our social progress, economic development and improvement of life. The ubiquitous information perception and data acquisition terminals have enabled us to continuously develop and expand the channels and methods for obtaining massive data information, and the data analysis and computing technology born at the same time has also made great progress. With the help of big data, various industries and fields in the whole society have set off a new wave of innovation and integrated development, and gradually realize the development from improving production efficiency to industry informatization and intelligence.

The full embodiment of the value of big data is the result of collaborative processing of various technologies, and the standard process of big data processing is formed under the mixed use of various technologies. It includes big data collection, big data pre-processing, big data storage, big data analysis and mining, big data display and other technical links. In this series of steps, modern data processing tools are used to process a large number of structured, semi-structured and non-structured data, and then obtain the analysis and prediction results of the data processing technology is collectively called big data technology.

3.2 Data Visualization

Data visualization technology refers to the theory, method and technology that comprehensively uses computer graphics and image processing technology to display relatively complex and abstract data in a visual way in a form that is easier for people to understand through the terminal, and conduct interactive processing. [3] Data visualization technology to the data analysis results in the form of a graphical display, intuitive reflect the relationship between data information and data in the future trend of development, multi-dimensional data attribute value is able to help us essentially provides a new way of thinking, that is our behavior decision-making increasingly under the influence of big data

analysis results, thus changing the situation of relying solely on experience and intuition in the past. Under the data visualization technology, people organically integrate big data analysis, data algorithm technology and large screen display technology to make the application of data analysis results have the characteristics of interactivity, multi-dimension and interactivity.

3.3 A data visualization selection platform

The data visualization selection platform is a data visualization technology based on Web technology and applied to the data analysis and decision-making assistance platform in the process of e-commerce selection. Through data visualization technology to image, curve, 2 d graphics, 3 d graphics and animation form to show the selected product links such as the platform needed to internal data, customer data, and the correlation relationship between external market data, to provide electricity to choose goods directly to the data analysis results support, help the characteristics of the electric business platform to build your own product system, Moreover, it lays a solid foundation for the development and implementation of subsequent supply chain management and marketing schemes of e-commerce platforms. Operators or managers of e-commerce platforms can easily see the sales data of various categories of goods in their own e-commerce platforms through logging in the data visualization selection platform, that is, internal data; And customer evaluation and feedback on different categories of products, namely customer data; There are also data on competitors in the whole market, warehouse supply, logistics and transportation, that is, external market data. [4] The analysis results of the three types of data can help e-commerce companies grasp product sales trends, truly understand customer needs, reduce trial and error costs, and launch popular products, so as to achieve the goal of increasing sales volume of e-commerce platforms, improving the accuracy of marketing services, and maximizing comprehensive income.

4. DESIGN AND IMPLEMENTATION OF A DATA VISUALIZATION SELECTION PLATFORM

4.1 Overall Framework

The construction of data visualization selection platform should be compatible with the e-commerce platform, and also adopt Web technology as the basic framework. Data visualization on the Web is the most widely and easily accepted way to present various types of business and data. Web technology realizes the cross-platform operation of product selection platform by unified network standard, that is, it is fully adapted to Windows, Mac, Linux and other different operating systems. In addition, it can also avoid affecting the presentation effect of data information in the form of software or plug-ins on different devices.

The realization of data visualization is mainly reflected in data storage and data analysis and mining in big data technology. The main technical means is Hadoop, and the application of data analysis results is realized by the functional components of Canvas under HTML5 and d3.js visual tool library. As shown in Figure 2, it is the overall framework diagram of the data visualization selection platform.

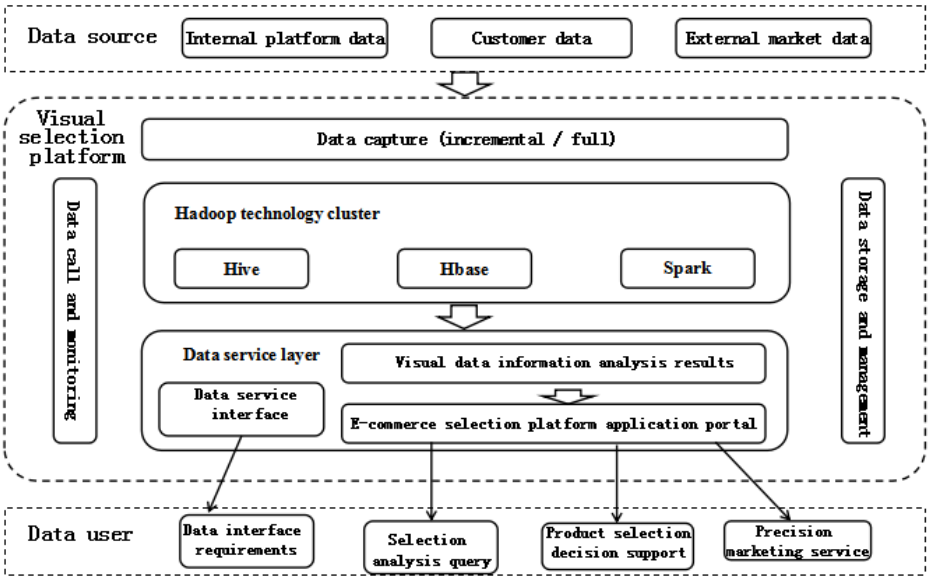

Figure 2: General frame diagram of a data visualization selection platform

4.2 Specific Functions

In the e-commerce platform each quarter or the beginning of each month, we will make corresponding purchase plans according to the schedule of products launched by suppliers in the current quarter or month and the sales tasks to be completed, and make corresponding online sales plans and seasonal marketing plans according to the purchase plans. The selection of products on the e-commerce platform every quarter or every month occurs before the supplier goes online. The manager or operator of the e-commerce platform logs in to the selection platform and performs the following two steps under the selection analysis function module. The first is the selection of goods owned by e-commerce platforms. The second is the supplier online product selection.

Commerce platforms screen and determine the existing products in their own warehouses. That is, different seasons, seasons, festivals under the influence of the market and customer demand changes to choose seasonal sales products. The historical consumption data of internal customers and external market demand data, the hot sales data of competitors in the current quarter, and the comprehensive collection, cleaning, storage and analysis and mining data of storage and logistics transportation in the supply chain are analyzed by big data technology, and the corresponding data results are obtained to build the demand model of selected products. And in the client side in the form of visualization of the data results presented. For example, Mid-Autumn clothing sales trend analysis, in which the data information includes commodity picture, name, brand, article number, size, color, category, product year, style, historical sales data, market demand, logistics delivery quantity, inventory, reserve price, price.

After the selection analysis and query, the data will be shared to the selection decision support module. Under this functional module, the e-commerce platform manager will formulate the

selection system according to the data information, that is, the main commodities (one or more) and the subordinate commodities (one or more groups) in the current season or month. There is a certain auxiliary and associated relationship between the main commodity and the secondary commodity, so as to create a commodity portfolio that meets the characteristics of the e-commerce platform and the current needs of customers and the market. In this way, the overall sales volume of e-commerce platform can be improved and greater income can be obtained.

After determining the product system, the precision marketing service module is entered, that is, marketing and promotional activities of the current season or month are planned according to the data analysis results. Formulate corresponding preferential policies according to different festivals or recognized e-commerce shopping preferential activities, such as Spring Festival, Dragon Boat Festival, Mid-Autumn Festival, National Day, Double 11, double 12. Common preferential policy has discount, full reduce, return voucher, return now, buy give. Multi-dimensional and multi-level marketing services can moderately stimulate consumer demand, which is beneficial to feedback and adjust the correctness and scientificity of e-commerce platform selection, and improve the scientificity and feasibility of e-commerce selection.

4.3 Technical Support

The core of e-commerce product selection platform based on big data technology is to quickly capture data and generate corresponding data analysis results through a series of operations, save a lot of manual work, improve work efficiency, and intuitively display the data analysis results in the form of data visualization. In the data capture stage, Sqoop and ETL are mainly used to directly capture data from the internal database of the platform, while the external market data and customer data are mostly obtained from the web page with the help of Python or website public API, and the unified structure of the local data into the data collection method. In the data storage phase, hadoop-based technologies such as Hive, Hbase, and Spark are used to expand and encapsulate data. The process of utilizing Hadoop open source advantages and related features to derive relevant big data technology. [5]

Web-based data visualization is the process of mapping data information to vision through the D3.js visualization tool library. Data visualization is the traditional single attributes of data can be read into visual properties, compared with the traditional artificial chart design, on the Excel data visualization can greatly reduce artificial workload, and editing, rendering, evaluate the process time can be greatly compressed, realize the effective improvement of work efficiency. The construction of the whole Web front section depends on the application of CSS, HRML and JavaScript. The database server adopts NoSQL matching with big data technology, and realizes the interaction and management between front-end users and back-end database through the middle business controller.

5. CONCLUSION

The construction of visual e-commerce product selection platform based on big data technology improves the scientific, intuitive and interactive data analysis results of e-commerce platform in product selection. It helps e-commerce platforms to achieve accurate

and digital management and implementation in product selection decisions, supply chain operation, marketing service planning and other aspects, effectively improve the profitability of e-commerce platforms, but also provides new ideas for the innovation and development of e-commerce platforms in the era of big data.

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