Intelligent Decision-Making Method of Marketing Strategy Driven by Real-Time Data of E-Business Platform

Jingjing Wang

Shanghai Vocational College of Science and Technology, Shanghai, 201800, China

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Abstract: This article focuses on the difficult problem of marketing strategy formulation of e-business platform in digital competition environment, aiming at exploring the intelligent decision-making method of marketing strategy driven by real-time data, and providing scientific and effective marketing decision support for e-business industry. This article systematically sorts out the relevant theoretical basis of e-business platform operation, real-time data and so on, and clarifies the key elements such as real-time data collection, preprocessing and intelligent decision-making model construction. Moreover, this article constructs an intelligent decision-making framework based on real-time data, and uses collaborative filtering, deep learning, decision tree and other intelligent algorithms to formulate decision-making methods for different marketing scenarios such as product recommendation and promotion activities. The intelligent decision-making method system can make full use of real-time data, accurately analyze market and user needs, and realize scientific formulation and dynamic optimization of marketing strategy. Therefore, the intelligent decision-making method driven by real-time data can effectively improve the marketing efficiency and competitiveness of e-business platform, and provide a feasible path for e-business industry to move towards intelligent marketing.

1. Introduction

E-business platform has become a key carrier of business activities in the global digital wave. With the rapid development of Internet technology, the competition in the e-business industry is becoming more and more fierce. How to formulate accurate and effective marketing strategies in the massive information and rapidly changing market environment has become the core issue for e-business platforms to remain competitive [1]. Real-time data, as a direct basis for reflecting market dynamics and user behavior, is increasingly prominent [2]. Intelligent decision-making of marketing strategy driven by real-time data provides a new path for e-business platform to break through the limitations of traditional marketing and realize accurate marketing and efficient operation [3].

In the past, the marketing strategy of e-business platform relied on experience and periodic data analysis, and it was difficult to respond to market changes immediately [4]. Nowadays, consumer demand is increasingly personalized and diversified, the pace of market competition is accelerating, and the lag of traditional marketing decision-making methods is becoming more and more obvious [5]. Real-time data can capture users' behavior information such as browsing, purchasing and evaluation in real time, and reflect the real-time demand and trend of the market [6]. Based on these real-time data, with the help of intelligent decision-making methods, e-business platform can quickly adjust marketing strategies, realize accurate product push and personalized service customization, enhance users' shopping experience, and enhance users' stickiness and loyalty.

At present, although some e-business platforms have realized the importance of real-time data and tried to apply it, there are still some shortcomings in data mining depth, scientific decision-making model and integration with marketing strategy [7]. In-depth study on the intelligent decision-making method of real-time data-driven marketing strategy of e-business platform will help e-business platform to improve marketing efficiency and effectiveness, provide theoretical support and practical guidance for industry development, and push the e-business

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industry as a whole to a new stage of intelligent marketing. The purpose of this study is to build a scientific and systematic intelligent decision-making system of real-time data-driven marketing strategy, so as to win the competitive advantage for e-business platform in the complex and changeable market environment.

2. Related theoretical basis

The operation theory of e-business platform is the key to understand the business model and operation mechanism of e-business. E-business platform builds a multilateral market by integrating suppliers, consumers and various service providers. Under this model, the core task of the platform is to promote the transactions and interactions between all parties [8]. The theory of network externalities shows that the increase of the number of users on one side of the platform will improve the utility of users on the other side, form a positive feedback cycle, and promote the continuous expansion of the platform scale. For example, more suppliers move in to attract more consumers, and more consumers further attract more suppliers. User behavior theory focuses on consumer behavior patterns on e-business platforms. Consumer decision-making process usually includes problems identification, information search, scheme evaluation, purchase decision-making and post-purchase evaluation [9]. E-business platform needs to understand these stages deeply to optimize interface design, product recommendation and marketing communication, and guide consumers to make purchase decisions.

Real-time data refers to the data collected and processed at the same time as the event, which has the characteristics of high timeliness, mass and dynamic. Real-time data theory is the basis of intelligent decision-making. Data mining theory provides a method for extracting valuable information from massive real-time data [10]. Mining association rules can find the purchase association between different commodities. For example, when consumers buy a commodity, they often buy b commodity, which provides a basis for cross-selling. Cluster analysis can divide users into different groups according to their behavior characteristics, which is convenient for implementing differentiated marketing strategies. Machine learning theory is the core of constructing intelligent decision-making model [11]. Supervised learning algorithm can train models based on historical data and labeling information, classify or predict new data, help e-business platform to predict users' purchasing tendency and evaluate the effect of marketing activities, and help e-business platform to make scientific marketing strategy decisions.

3. Key elements of real-time data-driven intelligent decision-making of marketing strategy

Intelligent decision-making of real-time data-driven marketing strategy depends on several key elements. These factors are interrelated and influence each other to form an organic whole, which helps the e-business platform to make accurate and efficient marketing decisions in a complex and ever-changing market environment.

The collection of real-time data is the starting point of intelligent decision-making. E-business platform has rich data collection channels, covering user behavior data, transaction data, market feedback data and many other aspects. User behavior data includes the user's browsing trajectory, click record, stay time and so on, which can directly reflect the user's interest preferences. Transaction data records the purchase information, payment amount and purchase time of users, and is an important basis for analyzing users' consumption ability and habits. Market feedback data comes from user evaluations, social media discussions, etc., which helps e-business platforms to understand the market's views on products and services. Figure 1 presents various data collection channels and their characteristics.

The collected real-time data often have problems such as noise and incompleteness, so data preprocessing is very important. Data cleaning is responsible for removing duplicate data, correcting erroneous data and improving data quality. For example, in the transaction data, there may be duplicate order records caused by network failures, which need to be eliminated through data cleaning. Data integration integrates data from different data sources to achieve unified

management and analysis of data. For example, integrate user behavior data with transaction data to fully understand the relationship between user behavior and consumption. Data conversion is to standardize and normalize data to make different types of data comparable. The preprocessed data provides a reliable basis for subsequent intelligent decision-making.

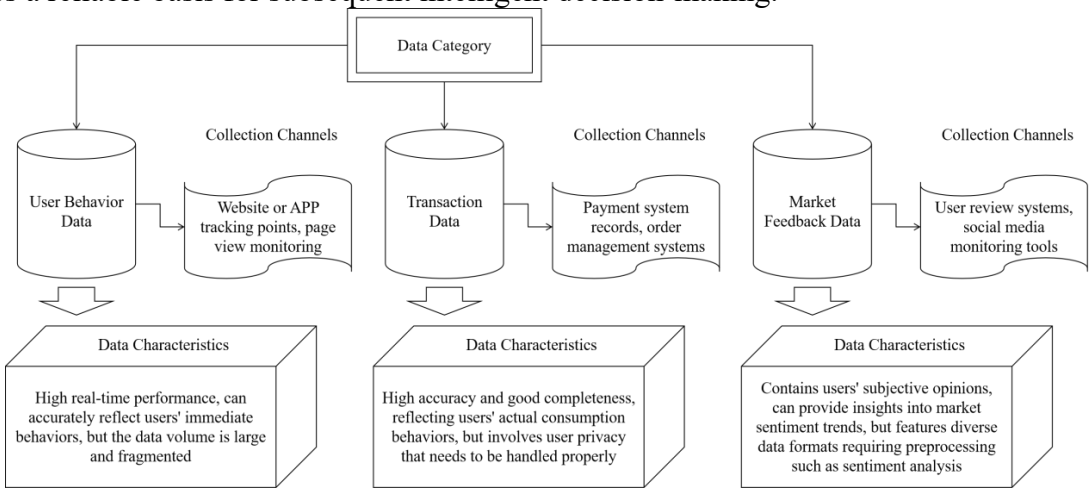

Figure 1 Real-time Data Collection Channels and Characteristics of E-business Platforms

The construction of intelligent decision-making model is the core element of intelligent decision-making of real-time data-driven marketing strategy. Machine learning algorithm plays a key role in model construction. Taking the prediction of users' purchasing tendency as an example, the logistic regression model can be used. By training historical purchasing data, this model can learn the relationship between different characteristics (such as users' age, purchasing frequency, types of products browsed, etc.) and purchasing behavior, so as to predict the purchasing possibility of new users. Deep learning algorithms, such as neural networks, can deal with complex nonlinear relationships, and have made remarkable achievements in the fields of image recognition and voice recognition. They can also be used in e-business platforms to tap the potential needs of users and realize personalized recommendations. Reinforcement learning algorithm can make the decision-making model constantly learn and optimize in the interaction with the environment. For example, in the formulation of promotion strategy, the model can adjust the follow-up activity strategy according to the feedback results of different activity schemes to achieve the optimal marketing effect. The rational use of these intelligent decision-making models, combined with the dynamic update of real-time data, can formulate scientific and effective marketing strategies for e-business platforms and enhance their competitiveness.

4. Intelligent decision-making method system construction

In order to realize the intelligent decision-making of marketing strategy driven by real-time data of e-business platform, it is essential to construct a scientific and reasonable intelligent decision-making method system. After all, the operation and marketing scenarios of e-business platform are complex and diverse, and this system should cover all scenarios comprehensively, and provide accurate and effective decision support for the formulation of marketing strategy based on real-time data and various intelligent algorithms.

The first step is to build an intelligent decision-making framework of marketing strategy based on real-time data. This framework starts with the real-time data collection module, which is like an information collector, constantly collecting data on user behavior, trading situation, market feedback and other aspects. Subsequently, the data enters the preprocessing module, and after cleaning, integration and conversion, it becomes high-quality usable data. The processed data is then sent to the intelligent decision-making model module. According to the needs of different marketing scenarios, the model uses algorithms such as machine learning and deep learning to analyze and predict, and finally gives marketing strategy suggestions. For example, in the product recommendation scenario, the model will analyze the user's preferences based on the user's

real-time browsing and purchasing data, and then accurately recommend related products.

Under different marketing scenarios, the emphasis of intelligent decision-making methods is different. Taking the product recommendation strategy as an example, this article constructs a portrait of users' interests by analyzing users' historical purchase records, browsing behaviors and real-time search for keywords. With this portrait, collaborative filtering algorithm and deep learning recommendation algorithm are used to recommend personalized products to users. Collaborative filtering algorithm is to find other users with similar interests to the target users according to the similarity between users, and then recommend the products that these users like. The deep learning recommendation algorithm is to deeply mine massive data and discover the potential needs of users. Figure 2 shows the characteristics and applicable scenarios of different recommendation algorithms:

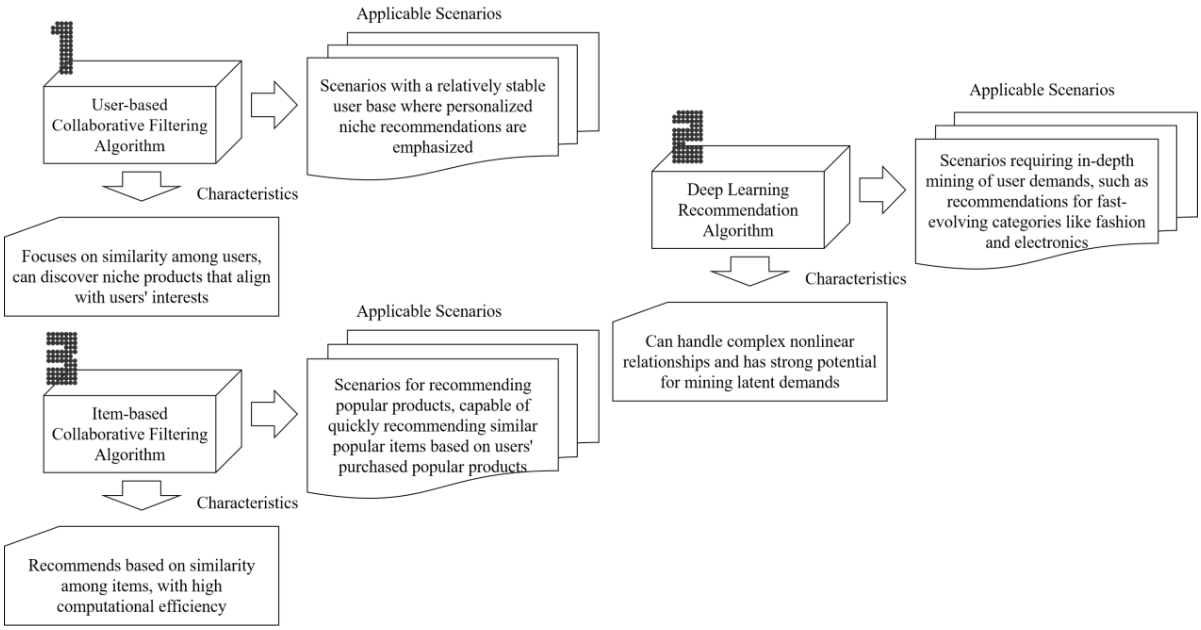

Figure 2 Characteristics and Applicable Scenarios of Product Recommendation Algorithms

Intelligent decision-making of promotion strategy also depends on real-time data and intelligent algorithm. Real-time monitoring of market dynamics, competitors' promotion activities and users' feedback data on promotion activities, and making promotion plans by using decision tree algorithm. Decision tree algorithm can make branch decisions according to different conditions (such as product inventory, user purchase frequency, competitor promotion intensity, etc.), and determine the form, intensity and duration of promotion activities (such as full reduction, discount, gift, etc.). When the product inventory is high and the user's purchase frequency is low, the decision tree algorithm may suggest to take a larger discount promotion activity and extend the activity time to stimulate the user to buy. Moreover, combined with reinforcement learning algorithm, according to the real-time feedback data during the implementation of the activity, the promotion strategy is dynamically adjusted to optimize the effect of the activity. Through such an intelligent decision-making method system, e-business platform can make scientific and accurate marketing strategy decisions based on real-time data in different marketing scenarios, and improve market competitiveness and user satisfaction.

5. Conclusions

This article focuses on the intelligent decision-making method of marketing strategy driven by real-time data of e-business platform, and builds a relatively complete intelligent decision-making system on the basis of analyzing the development status of e-business platform and the disadvantages of traditional marketing decision-making. Firstly, the research expounds the related theories such as e-business platform operation and real-time data, which lays a solid foundation for the follow-up discussion. This article clarifies the multi-channels and characteristics of real-time

data collection, emphasizes the importance of data preprocessing to improve data quality, and analyzes the key role of machine learning algorithm in the construction of intelligent decision-making model. By constructing an intelligent decision-making framework, specific decision-making methods are formulated for marketing scenarios such as product recommendation and promotion activities, covering the application of various intelligent algorithms to meet the needs of different scenarios. This intelligent decision-making method system has obvious advantages. It can efficiently integrate real-time data, gain an accurate insight into market trends and user needs, and make the marketing strategy formulation of e-business platform shift from relying on experience and periodic analysis to scientific and intelligent decision-making based on real-time data. In the product recommendation scenario, products can be accurately pushed according to users' real-time behaviors, and the purchase conversion rate of users can be improved; In the formulation of promotion strategy, the scheme can be dynamically adjusted according to real-time feedback to optimize the effect of the activity.

Real-time data-driven intelligent decision-making method of marketing strategy provides a powerful weapon for e-business platform in fierce competition, which helps e-business platform to improve marketing efficiency, enhance user stickiness and loyalty, and then promote the transformation of e-business industry to intelligent marketing mode. With the continuous development of technology, the research in this field is expected to make further breakthroughs in deeper data mining, smarter decision-making model optimization and integration with emerging technologies, which will continue to inject new impetus into the development of e-business industry.

References

[1] Wang Chenyu, Sun Jingchun, Shi Siyu. Research on Sales Model Selection and Live Streaming Marketing Strategies in E-business Platforms[J]. Journal of Industrial Engineering and Engineering Management, 2023, 37(05):190-199.

[2] Han Xiaoya, Li Bei, Zhang Huichen. Research on Marketing Decisions for By-products in E-business Platform Supply Chain Systems[J]. Operations Research and Management Science, 2025, 34(4):58-64.

[3] Huang Weihua, Fan Xin. Research on a Refined Push Algorithm for Marketing Data Based on Artificial Intelligence[J]. Modern Electronics Technique, 2021, 044(014):147-150.

[4] Niu Yifan, Lü Xiaoyan, Li Shiwang, et al. Intelligent Interaction of Railway Passenger Transport Marketing Data Based on NL2SQL[J]. Journal of Railway Science and Engineering, 2024, 21(09):3529-3539.

[5] Xing Peng, You Haoyu, Fan Yuchen. Quality Effort Strategy in Live E-business Service Supply Chain Considering Platform Marketing Efforts[J]. Control and Decision, 2022, 37(01):205-212.

[6] Wang Xuhui, Liu Xitong, Song Song. The Impact of Platform E-business Gamification Marketing Strategies on User Consumption Behavior[J]. China Business and Market, 2023, 37(4):47-59.

[7] Sun Quan, Tang Tao, Zheng Jianbin, et al. Intelligent Fraud Detection in Graph Networks Driven by Financial Transaction Data[J]. Journal of Applied Sciences, 2020, 38(05):713-723.

[8] Wu Xin, Liu Jian, Zhang Yongming, et al. A Differential Game Model of Joint Public Welfare Marketing Between E-business Platforms and Merchants Under Government Subsidies[J]. Journal of Systems Science and Mathematical Sciences, 2024, 44(1):179-199.

[9] Yu Fan, Nie Jiajia. Research on Financing Decisions of Capital-Constrained E-business Supply Chains Under Joint Marketing[J]. Soft Science, 2023, 37(10):136-144.

[10] Mi Encheng, Ren Jun. Evolutionary Game Analysis of Different Marketing Channels Under Cooperation Between Apparel Enterprises and E-business Platforms[J]. Textile Dyeing and

Finishing Journal, 2023, 45(12):61-64.

[11] Jiao Yuanyuan, Gao Xue, Zhang Dan. Conceptual Development and Formation Mechanism of Customer Stickiness in the Context of E-business Platforms[J]. Journal of Industrial Engineering and Engineering Management, 2023, 37(4):67-84.