Formulation and Implementation of Precision Marketing Strategy for Cross-border E-commerce under Big Data Technology

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Abstract. With the development of globalization, cross-border e-commerce began to focus on the reform of marketing model to improve its competitiveness and market share. In this regard, this paper will put forward a set of construction scheme of precision marketing management system in view of many problems faced by export cross-border e-commerce platform in the process of marketing strategy formulation and implementation, aiming at realizing precision marketing of cross-border e-commerce platform by using big data analysis and mining means. The system combines Hadoop and Javaweb to form a service application that can support online login, comprehensive data processing, visual analysis and mining. Practice has proved that the system reshapes the whole process of data collection, storage, mining and application, and completes the construction of user portraits based on machine learning algorithm models such as K-means, which provides necessary technical support for the implementation and management of precision marketing.

Keywords: big data technology; export cross-border e-commerce; precision marketing; data mining; computer application

1 Introduction

With the rapid development of the global digital economy, cross-border e-commerce, as a brand-new innovative economic format, has greatly promoted the digital transformation and upgrading of the international trade industry, and is also the key driving force for high-quality social and economic development in the new era. [1] Cross-border e-commerce can be divided into import e-commerce and export e-commerce according to the flow of goods. Compared with traditional export trade, export cross-border e-commerce has outstanding advantages in convenience, diversification and mobility, and has great development potential and expansion space. At the same time, the low threshold of industry access, serious product homogeneity, and the threat of substitutes in foreign markets have made the competition situation in the export cross-border e-commerce market severe, and more and more enterprises have

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begun to focus on the reform of marketing model, in order to achieve accurate marketing and customer management and improve the operational efficiency and profitability of enterprises. [2] In view of this, this paper believes that digital precision marketing has become an indispensable key ability for enterprises to go to sea, and it is also the first choice for many export cross-border e-commerce enterprises to achieve transformation and development. [3] The introduction of precision marketing management system of export cross-border e-commerce platform will give full play to the application advantages of big data analysis and processing technology, centralize internal and external data information, form a big data center, and build a user portrait engine, which provides necessary technical support for the implementation and management of precision marketing strategy.

2 System construction

The precision marketing management system of export cross-border e-commerce platform is divided into four parts: presentation layer, business application layer, data processing layer and source data layer. Among them, the data processing layer is under the responsibility of Hadoop framework, and adopts cluster deployment mode, with a total of five functional nodes, the bottom operating system of each node is Linux, the version is CentOS 6.8 (x86_64), and the JDK version is jdk-1.8.0_201-linux-x64. [4] Hadoop selects v2.6.1, and synchronously completes the installation and deployment of functional components such as Yarn, HDFS, Zookeeper, HBase, Kafka, Flume and Sqoop, so as to form a data management server for export cross-border e-commerce platform.

The construction of system business application layer mostly depends on Javaweb technology. The business application layer obeys the call and control of the server, and contains the algorithms and calculation processes of all functional applications needed by the system, and interacts with the data access layer and the presentation layer. [5] Taking the function of data processing and analysis as an example, many data mining algorithms involved in this paper need to take MapReduce distributed computing framework as the engine, and complete definition, training and encapsulation under each node of Hadoop cluster to form a Hadoop task class. When the user sends a request through the interactive interface, the server calls the main method of this task, which can realize the user calling MapReduce to complete the job with Java API and realize the analysis and mining operation of data information. [6]

3 Functional implementation

3.1 External data processing

The main users of the export cross-border e-commerce platform are overseas consumers, which are greatly different from domestic consumers in shopping preferences and shopping habits due to the influence of living environment and history and culture. [7] The formulation of marketing strategy for export cross-border e-commerce

platform cannot follow the previous empiricism, and it is necessary to re-complete product and market positioning and target group division. In the system, users can collect public data from overseas portals, social media and search engines through Apache Nutch crawler framework, and extract keywords from the obtained content by using text classification mining algorithm to form the final visual data results. As shown in Figure 1, it is a cloud picture of consumer goods classification words in a certain region.

Fig. 1. Cloud picture of consumer goods classification words

3.2 Internal data processing

The analysis and mining of user data is the process of constructing user portrait, which includes data preprocessing, variable standardization, clustering operation, result display and visual analysis.

In the data preprocessing process, all the user data in the export cross-border e-commerce platform for a period of time will be statistically processed, and the evaluation of user value and user spending power will be completed by combining RFM model. [8] As shown in Table 1, it is the original user data information, and based on this, an RFM model is constructed, in which R represents the average purchase time interval, F represents the consumption frequency, and M represents the average payment amount. The units of various data in the RFM model are not uniform, and the corresponding values need to be obtained after standardized calculation. The standardized calculation formula is shown in Formula 1, where X represents the

original value and X' represents the standard value, as shown in Table 2, which is the data conforming to the RFM model. [9]

Table 1. Raw user data

Field	1	2	3	4	...	87061
ID	ru0062	al0068	itl3368	us0566	...	mc2655
Sex	M	M	F	F		M
Age	18-25	25-30	30-35	25-30		35-40
Transactions number	0	9	19	7		4
Collection number	15	5	3	10		1
Amount of payment	0	229.3$	903.5$	88.4$		103.6$
...	...	...	...	...	...	

Table 2. Some data under the RFM model

ID	F	M	R
al0068	0.0261	0.0614	0.0399
itl3368	0.5513	0.0639	0.0346
us0566	0.0274	0.1154	0.0353
...	...	...	...

$$X' = \frac{X - X_{\min}}{X_{\max} - X_{\min}} \tag{1}$$

On the basis of RFM model, the data is introduced into the K-means clustering algorithm model to cluster users. The determination of the best K value needs the help of the calculation formula of sum of squares of errors (SSE). As shown in Formula 2, where C stands for category, p stands for data value and m stands for centroid, the calculation results show that the optimal value of K is 3. [10] The final K-means clustering results are shown in Table 3. The results show that the historical users in the export cross-border e-commerce platform can be divided into three categories. The first category is ordinary consumer users, whose purchase times and payment amount are at a low level, and their loyalty to the platform is average. The second category is loyal consumer users, which shows that the purchase frequency is high but the single payment amount is not high. The third category is high-value consumer users. Although the purchase frequency is not as high as that of loyal users, the single payment amount is the highest.

$$SSE = \sum_{i=1}^{k} \sum_{p \in C_i} \left| p\text{-}m_i \right|^2 \tag{2}$$

Table 3. User cluster analysis results

K value	F	M	R
1	0.0266	0.0316	0.7136
2	0.0274	0.0664	0.4043
3	0.5523	0.1152	0.1677

3.3 Formulation and implementation of precision marketing strategy

According to the results of external data information analysis and internal user consumption behavior analysis, the marketing strategy of export cross-border e-commerce platform is optimized. For the first type of users, personalized recommendation can be used to promote them to become loyal consumer users. The second type of users can directly take activities such as discounts and discounts to ensure the

user's stickiness. The third type of users need to focus on development, and they can use the one-to-one exclusive service model to build long-term and stable customer relationships.

4 Conclusions

In order to promote the precision marketing of export cross-border e-commerce platform, this paper puts forward a set of construction scheme of precision marketing management system based on many shortcomings of the current traditional marketing model. The system gives full play to the practical advantages of big data technology in dealing with massive data information, and provides necessary technical support for the implementation and management of precision marketing from two aspects: external information and internal users' use data. In the follow-up research, the system will further enhance the diversity of functional services, strengthen the application abundance of data mining algorithms, and provide reference for the application of digital marketing in cross-border e-commerce industry.

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