

Research on e-commerce precision marketing algorithm from the perspective of big data

Qiulian Sun

Jiangxi Institute of Industry and Trade, Nanchang 330103, Jiangxi

Abstract: With the rapid development of society, the scale of Internet economy is expanding, and the field of e-commerce is also showing a trend of explosion. The following is a large surge in Internet users. The source of these data is far from being processed by human resources. At the same time, it also poses new challenges to e-commerce marketing. Therefore, this paper mainly combines clustering algorithm and other contents to apply to e-commerce marketing data processing, and combines genetic algorithm to optimize clustering, so as to process the huge e-commerce data information database, fully explore the existing commercial value, achieve accurate marketing of goods, and show the marketing value of goods.

Keywords: big data; E-commerce precision marketing; operational research

With the rapid development of Internet technology, social networks and mobile clients are gradually emerging. Various data scales faced by e-commerce are also showing a geometric development trend, and their expansion dimensions are also changing. The type of data has a certain complexity. In addition to the basic information of users, it also includes various commodity information on the business platform, the use information of mobile users, and so on. The maximum use of business value depends on the mining and accurate analysis of all kinds of information.

1. E-commerce connotation

E-commerce is everywhere, and people's production and life are inseparable from the existence of e-commerce, such as daily travel, online ticket booking, user remittance, shopping mall, mobile payment and other forms. Enterprises or individuals can conduct trade activities through the Internet, search engines and other forms. E-Commerce is an e-commerce form that realizes online shopping and multiple online transactions. It is also a means of combining network technology to conduct production and operation. In enterprises, combining e-commerce technology, it can effectively improve the actual efficiency of production, optimize the allocation of various resources, and effectively reduce operating costs, so as to create greater economic benefits for the company and society. The widespread use of e-commerce lies in its convenient operation, low use cost, safe account capital flow, and freedom from time and space restrictions worldwide.

2. Challenges of e-commerce precision marketing from the perspective of big data

Big data analysis has become an important basic condition for the development of China's e-commerce market. The great success of various e-commerce platforms in China, represented by JD, is largely due to the booming development of China's big data analysis and the service opportunities it provides. However, due to the emergence of various technical barriers, there are still some difficulties in the application of big data analysis technology in the e-commerce field, which also poses corresponding challenges to e-commerce refined marketing.

2.1. Risks to Big Data

The most critical basis for big data analysis and application is to have rich information, which is the basis for e-commerce companies to promote e-commerce. For many e-commerce companies, holding big data analysis is indeed a great risk. On the other hand, for big data holding requirements and corresponding infrastructure. The collection, processing and data analysis services of big data analysis must be supported by good infrastructure and IT systems. Taking JD as an example, in order to obtain more abundant consumer information, JD has specially set up a professional big data analysis department, equipped with more than 800 cluster servers, and established a JDW two point zero database architecture. At the same time, it also has full-time talents to carry out big data analysis, collection and data analysis, This has also become a key factor in the success of JD's marketing. However, due to the fact that many e-commerce companies in China are small and medium-sized, and their management ability at the financial level is limited, many e-commerce companies are unable to establish big data analysis institutions, let alone build cloud computing systems and database systems, which also leads to the limited role of big data analysis in e-commerce enterprises' precision marketing. On the other hand, big data holding requires a certain sharing mechanism. At present, several major e-commerce websites in China have special big data analysis systems and mechanisms, but the data they obtain is only for companies to share. Based on security and competition protection considerations, some major e-commerce companies usually do not share big data content in e-commerce with other companies. Moreover, at present, the domestic official data publishing institutions are not perfect, especially the authoritative institutions in the field of third-party information data are not enough, which objectively creates certain difficulties for the acquisition and sharing of big data, which is not conducive to the development of precision marketing for small and medium-sized e-commerce enterprises.

2.2. Challenges to data security

The age of big data information is actually the age of digital information. When people log on to the network or micro blog, WeChat, forums and other emerging media channels, they will generate all kinds of data, and these information is an important source of big data. In the age of big data, various data acquisition methods on e-commerce websites are becoming more and more convenient. As long as users access e-commerce websites, their information will leave a mark on the Internet, including name, contact phone number, home address, bank account number, etc. These information are real information of users. This information not only reflects users' preferences for e-commerce, but also directly relates to the

asset security of e-commerce users. In the process of precise sales, e-commerce companies must consider the use of customers' personal real-time data. Due to the relatively backward establishment of the legal system in the field of e-commerce big data information collection and application in China, it is not uncommon for users' personal information to be illegally embezzled and leaked on e-commerce platforms. If e-commerce companies use consumers' information for precision marketing services without official permission, the promotion effect will be counterproductive and they will not be able to effectively retain users. It will also lead to user infringement disputes. Therefore, how to use scientific and technological means to maintain users' personal privacy data and prevent infringement disputes caused by blind accurate publicity and use will become a topic that all e-commerce companies need to pay attention to in accurate promotion activities.

3. The role and process of data mining in e-commerce

3.1. The role of data mining in e-commerce

The reason why data mining technology can be applied to e-commerce is that potential information is applied to e-commerce marketing activities in the process of information mining, which is embodied in four aspects: first, fully explore the activity rules of network users and carry out personalized services; Second, explore potential user information by browsing electronic websites; Third, optimize all kinds of information on e-commerce websites to facilitate people's browsing; Fourth, understand the actual demand of the current market by exploring the information browsed.

3.2. Data mining process

The process of information data mining in e-commerce mainly includes three stages: preparation stage, implementation stage and final interpretation and evaluation stage.

3.3. Data preparation stage

The data preparation stage can be divided into data selection and data preprocessing. The purpose of data selection is to discover the object of data analysis. That is, combine the target data, select from the actual needs of users, and intercept a piece of data from the database. Data preprocessing includes several items: data noise reduction, data missing calculation, elimination of duplicate data, completion of data type conversion, etc., which is convenient for data induction and sorting. It can also convert all kinds of discrete data into continuous data, which is convenient for big data calculation or data dimension reduction, and find really useful variables from the initial characteristics of data.

3.4. Data Implementation Phase

First of all, it is necessary to define the goal and type of data mining, and the task of data mining. Then, it is necessary to select an appropriate data algorithm based on the data information to finally conduct data mining operations, and use the selected mining algorithm to extract the required knowledge from the database.

3.5. Final interpretation and evaluation stage

The interpretation and evaluation of results The knowledge found in the data mining stage may have redundant or irrelevant knowledge after evaluation, which needs to be eliminated at this time: it may also not meet the user's requirements, and the above mining process needs to be repeated for re mining. In addition, data mining will eventually face users So. It is also necessary to explain the knowledge mined for users to use in a way that users can easily understand (such as visualization).

It can be seen that the whole process of data mining above is a continuous cycle and iteration, so we can constantly refine and deepen the knowledge mined. Finally, the user satisfaction is achieved.

4. Research on Precision Marketing Algorithm for E-commerce in the Age of Big Data

4.1. Clustering algorithm

Clustering analysis is one of the key and basic algorithms in precision marketing. The use of clustering algorithm can promote the implementation of precision marketing services by combining the classification of target groups. The main contents are as follows: first, combine the classification of target groups; Secondly, according to different commodity values; Furthermore, the abnormal points are measured and explored. This kind of algorithm can be classified from the perspective of partition form, level, density, etc. The process steps of a clustering algorithm are as follows: Step 1: under the initial conditions, randomly obtain c clustering analysis centers $A = \{A_1, A_2, A_3, \dots, A_c\}$; Step 2: estimate the membership matrix of each sample data, so that these sample matrices can always ensure that they meet and are identical to the constraint requirements; Step 3: Recalculate the objective function value. When its scale is the same as the set threshold point, if it is lower than this threshold point, the result will be calculated; Step 4: Modify the A value of the target cluster center for the last time, and iterate the complete calculation process (return to step 2).

4.2. Fuzzy clustering improved by genetic algorithm

At present, there are many theories and applications about FCM algorithm, but this method has more prominent defects. Therefore, we can use the global search of GA and improve the selection method of FCM algorithm for random initial clustering. As a group of intelligent algorithms, GA algorithm can use a specific program to iterate layer by layer, and finally select the global optimal value. Taking the optimal solution as the initial cymose center of the fuzzy clustering method, FCM clustering can be well solved. If t can be used to describe the algebraic structure of iterative evolution in the whole calculation, then the next generation group $P(t+1)$ will be generated after the subgroup $P(t)$ is searched regularly, and then continue to iterate until the final optimal solution. Suppose that during the search process, the population enters the local extreme value, then all iterative operations will stop, and the final result of the calculation will also enter the local optimal predictive solution. This phenomenon is called precocity, which will make it difficult to cover the global optimal predictive

solution in the current search population. In order to ensure that the best individuals will not be damaged by the selection operation, a random ergodic sampling method is introduced in the screening process. The method of screening the offspring is very similar to that of roulette, but its advantage is that only one roulette needs to be brake and rotated, making the whole process more convenient. Using the fuzzy clustering FCM method of this genetic algorithm, higher processing performance can be obtained. At the same time, it can better meet the characteristics of e-commerce customer needs, and has outstanding performance in information preprocessing cleaning impurities, redundancy, information mining and data analysis.

5. E-commerce precision marketing strategy from the perspective of big data

In the face of the ever-changing market competition trend, e-commerce enterprises should timely reverse the current marketing model, integrate new ideas and new situations to bring new development opportunities for e-commerce marketing. Therefore, e-commerce enterprises need to timely respond to the challenges brought by big data applications and adopt appropriate marketing strategies.

5.1. Establish Internet precision marketing model

Precision marketing is to increase the participation of consumers in the whole sales process, so as to achieve one-to-one sales communication and interaction. Therefore, as an e-commerce company, the first step should be to establish a precision marketing model, as shown in Figure 1. It can be seen from this model that precision marketing can generally be divided into three stages, namely collection, big data analysis and big data processing application. In order to be based on this model, e-commerce companies must first collect potential consumers on forums, microblogs, QQ spaces and other media; On this basis, these data are imported into the accurate sales model process, and then the big data analysis method is used to calculate and analyze these data. The key methods and software include Mpp database, Hadoop big data analysis platform, ETL technology application software, big data analysis technology framework, etc; Finally, according to the conclusion of the analysis, the market positioning of the enterprise is determined, and the target group of sales is determined. All kinds of advertisements are accurately placed, and the actual needs of all user groups are clarified, so as to meet the precise service for customer groups. In addition, it is also necessary to monitor the effectiveness of effective publicity, use big data analysis of the promotion process, constantly abandon the publicity channels with low effectiveness, select effective user groups, more effectively position the market, and then conduct reasonable publicity to improve the effectiveness of effective publicity.

5.2. Establish big data sharing system

According to the analysis of the current application of big data analysis, small and medium-sized e-commerce companies have been in a very fragile stage in terms of information acquisition and management, which restricts the full play of big data analysis in the modern e-commerce business process. The key to solving this problem is to establish a big data sharing system. We can invest in building a big e-commerce industrial park integrating big data platform service facilities, data center, big data analysis and data operation. The park will take major e-commerce companies such as Taobao and JD as the main body, give full play to its own resource advantages in big data acquisition, research and application, and provide relevant technology development and information support to achieve the industrialization of big data services. With the help of big data services provided by big e-commerce companies, small and medium-sized e-commerce companies can effectively share big data resources, so as to carry out targeted and accurate promotion. However, it must be noted that in the process of establishing the big data information sharing system, the government should also emphasize the protection of consumers' personal real information and national secret information security, especially the important personal information related to consumers' personal and financial security, which should also be effectively protected in the big data sharing process. It shares data that does not touch the core privacy in terms of users' gender, age, purchase date, commodity price, etc., which facilitates e-commerce companies to make full use of these data and propose reasonable commodity strategies and marketing plans.

6. Conclusion

In a word, big data technology is a new technology developed with the development of computer technology, known as the oil of the information age. Through big data technology, analyze customers' purchasing behavior and consumption habits, so as to achieve precision marketing for e-commerce platforms and improve the reliability of marketing. Precision marketing is one of the means to promote various products of e-commerce enterprises and obtain certain economic benefits at the same time. The application of big data and cloud computing provides more development opportunities for e-commerce enterprises and also means facing greater challenges. Therefore, e-commerce enterprises should seize the opportunities, calmly face them, and improve the precision marketing model from multiple perspectives to promote better and faster development of enterprises.

References:

- [1] Zhang Yating Consumer demand analysis and enterprise precision marketing research under big data -- take fresh e-commerce industry as an example [J] Modern Marketing: Xueyuan Edition, 2021
- [2] Mu Shanwen, Zhao Huiqun Research on Algorithm of Automobile Precision Marketing Oriented to Operator Big Data [J] Software Guide, 2020, 19 (1): 4
- [3] Xu Tao Research on precision marketing of small and medium-sized e-commerce enterprises based on big data [J] China Business Theory, 2020 (4): 20-21
- [4] Li Yingying Research on precision marketing in the context of big data [J] Market Weekly · Theory Edition, 2017 (27): 1
- [5] Zhang Lei Research on the application of precision marketing in B2C e-commerce under big data [D] Changjiang University, 2019 Project No. GJJ215209, subject name: Research on personalized recommendation algorithm of artificial intelligence e-commerce shopping guide platform based on big data.