Design of User Portrait Analysis System Based on E-Commerce Big Data

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Abstract: This paper analyzes the relationship between user portrait and e-commerce, and probes into the construction strategy of user portrait system. From the aspects of precision marketing, user statistics, data mining, building intelligent recommendation system, marketing effect evaluation, improving the operation mode of products and services, user satisfaction management, private customization of products and services, etc., with the continuous growth of user data, the scope and dimensions of user portrait model will be more diverse. According to the data of a shopping mall, multi-dimensional labels such as rule matching, statistics and data mining are implemented to form user portraits. Suggestions are put forward for the development of e-commerce user portrait system.

Keywords: E-Commerce, User Portrait, Analytic System.

1   INTRODUCTION

In the era of developed Internet, e-commerce industry has mushroomed, and now most people will choose to buy what they want online, which will be much more convenient. The rapid popularization of the Internet leads to the generation of a large amount of data, which leads to the problem of network information overload. To solve this problem, the creation of user portrait is the most important step to achieve accurate information recommendation [1]. Among them, the generation of the label of the user portrait is the digital description of the user's characteristics, and the final portrait model is formed mainly by analyzing and mining the behavioral data of the user. When users fill in data or browse the page, they will leave a lot of buried data, which invisibly reflects the diversity of user information. By analyzing the diversified data of users, we can get the general preferences and habits of users, and then label users. Users can generate the best recommendation through big data mining algorithm, which can provide huge data support for some advertising, accurate sending of short messages, network management and other aspects [2]. The development of big data has broken the traditional phenomenon of spreading the net indiscriminately, which not only saves the cost for enterprises, but also brings greater benefits to enterprises while meeting the needs of customers.

2   USER PORTRAIT AND E-COMMERCE

User portrait technology is to collect and label user information with the help of big data. Through big data, abstract important information such as users' social attributes, living habits and consumption habits, and establish a labeling model. From the perspective of e-commerce, based on the information that users fill in on e-commerce websites and the information of users' consumption behaviors, users are depicted with some tags, and the depicted user tags are user portraits. E-commerce is a kind of commodity trading mode that develops commodity trading activities with the help of network platform. E-commerce is the electronization and networking of traditional business activities. E-commerce has been developing with the popularization of the Internet and the increase of the number of Internet users [3]. At present, all industries have e-commerce platforms, which have become a new way for enterprises to organize commodity activities and played an important role in the economic growth of enterprises. The development of e-commerce can not only promote enterprises to generate income, but also change people's daily life style and consumption style. E-commerce has become a new driving force for China's economic development [4.

3   DESIGN OF USER PORTRAIT SYSTEM

3.1 Overview of User Portrait

User portrait is a bridge to depict customers and link users' needs with design. User portrait has a variety of applications in various industries in today's society. In the actual work process, we often use simple words that are close to life to connect the attributes and behaviors of users with the data in the database, so as to establish a relationship. User portrait is actually the virtual image of every user [5]. Its formation depends on and is higher than that of users, and it will not be independent of products and markets. Instead, we can learn about the target user groups of our enterprise through user portraits, and make appropriate adjustments and activity plans for them. This user model can bring intuitive and specific data information to the enterprise for reference. So as to understand users, discover their potential needs, finely locate different users according to different products and even dig out potential users. Especially, the application in the recommendation system is particularly important. Thousands of people refer to recommending different products according to different users. They can also combine the data obtained from advertising companies, manufacturers, express delivery companies, self-media websites, short videos, etc. to dig deep into the characteristics of users and discover their differences and common characteristics, so as to find marketing opportunities and plan directions for users and comprehensively improve the core influence of the company [6].

3.2 User Portrait Application

User portraits can not only help enterprises to understand users more comprehensively, but also subdivide different users and groups. According to different groups, they can make information predictions to analyze users' hobbies and product rising space, and dig out users' needs and pain points in different usage scenarios. Here's an introduction to the application of user portraits in different directions:

(1) precision marketing

According to the user's portrait, the different needs and interests of the user are analyzed, and then the products needed by the user are pushed pertinently. Introduce the right products to the right users at the right time to realize accurate marketing. For example, the classification of goods is analyzed by the user's shopping records, and similar goods are pushed when the user enters the shopping page next time, which can greatly shorten the user's search time, improve the click-through rate and repurchase rate of the user, and increase the user's dependence and loyalty to websites or software [7].

(2) Industry analysis

After having a large amount of user data, you can know the current development status of the whole industry, the advantages and disadvantages of the products that users like, and the direction provided for the adjustment of enterprises. At the same time, you have a clear understanding of the positioning of your own products in order to improve the products and services again.

(3) User positioning

By observing users' repeated purchases of certain commodities, the characteristics of such user groups and the competitiveness of products can be analyzed, so that similar commodities can be better recommended to such loyal customers, and more clicks and orders can be made.

(4) Advertising business

After knowing the user's preferences through the user's portrait, it can provide detailed data reference for the advertising of merchants. So as to maximize that benefit of the next advertisement [8].

3.3 User Portrait Construction Process

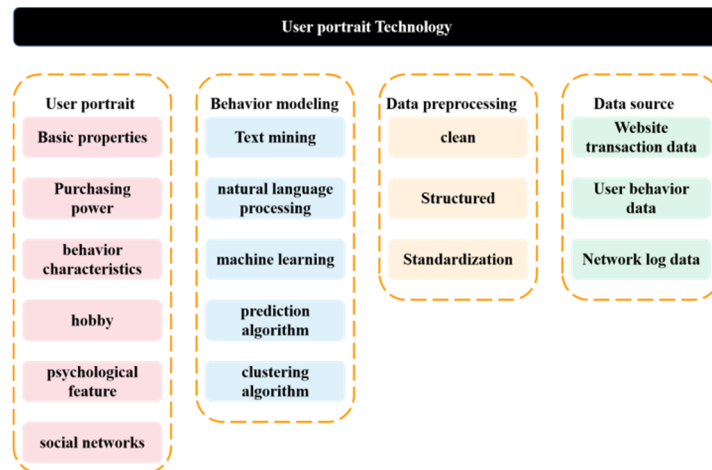The construction process of user portrait can be divided into the following four steps, as shown in Figure 1:

Figure. 1 User portrait construction process

(1) Source data acquisition. Static data often comes from the information filled in by users themselves in the website. When there is no data, it can be predicted by establishing a model. For example, when the gender information of users is unknown, a model can be established to judge by users' purchasing behavior. Dynamic data refers to the data generated by users' behaviors, such as browsing pages, purchasing goods, collecting, product evaluation, etc. These behavioral data can calculate the customer's brand preference, spending power, order quantity, category purchase ranking and other information.

(2) Data preprocessing. When data is collected, it is generally necessary to do some pre-processing, such as data cleaning and data structuring. While removing some dirty data, we can standardize the structure of the data to facilitate the subsequent better processing and analysis.

(3) Behavior modeling. Through statistics of different dimensions and calculation of algorithm models, users' static data and dynamic data are labeled to express users' interests, needs and preferences.

(4) Creation of user portrait. Deepen the process of behavior modeling, and use prediction, clustering algorithm, machine learning, text mining and other related technologies to complete the mapping of different attributes of users to tags. The completion of user tagging means that the portrait of the user is basically completed.

3.4 Gender Model Construction

In e-commerce websites, it is extremely important to know the gender information of users, because there are great differences between men and women in their shopping needs, interests and preferences, and shopping frequency. Therefore, in the construction of user portraits, gender tag is one of the tags that cannot be ignored. At present, the website can't accurately distinguish the gender of some users because users mistakenly fill in their accounts, don't fill in their gender, or often use their family accounts. Based on this situation, the best way to deal with the website at present is to predict and judge the gender of users according to their behaviors on the website. This paper also builds a gender model based on users' browsing and purchasing behavior. Because of the different needs of men and women, boys often like to search electronic products, men's wear, men's shoes, razors, belts and other commodities on e-commerce websites; Girls usually search for products such as skin care products, high heels and women's clothing [9]. According to the user's search records and click records, this paper uses the improved naive Bayesian classification algorithm based on the improved EM algorithm to predict the user's gender. The gender classification dimensions are divided into male, female and unknown. In order to facilitate the further study of user portraits, this paper adds several index dimensions in Table 1, so as to better understand users:

Table 1 Gender classification index dimension

Gender	Index dimension
1. Male	Purchase order quantity of male characteristic category
2. Female	Purchase order quantity of female characteristics category
3.Unknown	Number of browsing male characteristic categories
	Number of browsing female characteristic categories
	Time spent browsing male characteristic categories
	Time spent browsing female characteristic categories

3.5 City-Level Model

After the user's gender model is constructed, the user's urban model is constructed. In the e-commerce website, the city where the users are located is also an important dimension reference, and the shopping needs of users in different cities are also different. For example, the demand for down jackets in southern cities is not as big as that in northern cities, and the frequency of buying seafood in cities near the sea is not as high as that in other cities. At present, the IP of the network corresponds to the city, so the user's city is usually obtained by the IP address and the receiving address. For users who lack the information of the user's city, the naive Bayes algorithm can also be used to predict the city, and the same algorithm can be used to predict it. Also, this article adds several additional indicator dimensions in Table 2, so as to better understand users:

Table 2 City-level label model

City level	Index dimension
1 Line city users	Delivery address
2 Line city users	IP login address
3-4 Line city users	Use coupon amount
5-6 Line city users	Number of coupons used
	Total order amount
	Total number of orders placed

4   APPLICATION OF E-COMMERCE USER PORTRAIT SYSTEM

The application of e-commerce user portrait system has the following aspects. ① Precision marketing. Through the analysis of potential users, on the basis of information technology, we will carry out precise marketing for specific user groups. ② User statistics. Through e-commerce user portraits, users can be counted, and more scientific development goals can be formulated based on relevant data. ③ Data mining. Through e-commerce user portraits, we can deeply mine data and grasp user characteristics, so as to build an intelligent recommendation system. ④ Evaluation of marketing effect. Only by perfecting the operation mode of products and services can the quality of products and services be improved. With the help of user portraits, users can be accurately analyzed, service groups can be effectively positioned, and service levels can be significantly improved. ⑤ User satisfaction management. Through user portraits, e-commerce can effectively manage user satisfaction and formulate improvement measures according to user satisfaction. ⑥ Private customization of products and services. Based on user portraits, e-commerce can effectively grasp the consumption situation of certain consumer groups, so as to realize the personal tailor of products and services. User portrait technology can be applied to the whole process of users' purchase, helping e-commerce to provide better services for users, and helping to enhance the competitiveness of e-commerce [10].

5 Conclusion

In the era of big data, to develop e-commerce, user portrait technology is essential. This technology can accurately grasp the needs of users and provide personalized products and services for users. In the new period, to strengthen the design of user portrait system, we can improve the user portrait technology, strengthen the application of user portrait system, and promote the rapid economic development through technological innovation.

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