Research Article

Design and Application of Marketing Intelligent Platform Based on Big Data Technology

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The progress of big data technology has promoted the development of intelligent marketing for education companies. The online course selection system on the official website of the education company can provide users with online course selection and purchase services. The early marketing conversion rate remained below 0.09% throughout the year. After the analysis of the marketing department, it is found that there are some problems on the official website, such as a low marketing conversion rate. To improve the marketing conversion rate of the official website, the marketing department puts forward business needs. The experiential marketing strategy has been formulated, and it is planned to implement experiential course purchase and secondary marketing on the official website. The IT R & D department has established a big data marketing intelligent recommendation system project to meet the business needs put forward by the marketing department. Firstly, use the big data real-time computing technology to collect the user behavior information of users screening courses on the official website. Real time analysis of user behavior information can predict the courses given to users, which is conducive to the purchase of courses. Then, use the big data machine learning technology to integrate the marketing activity opportunity data in each marketing activity opportunity management system and establish a user portrait. For users who have participated in online or offline marketing activities but have not purchased courses, offline predict the courses and classes that can be recommended to users to carry out secondary marketing for them. Finally, the information of recommendable courses and classes predicted in real time and offline is displayed in the display area of the official website, which makes the marketing conversion rate of the official website reach 0.20%, which is 125% higher than that of the original official website.

1. Introduction

In the era of big data, information overload is serious, and a large amount of information is generated on the internet all the time [1–4]. A large amount of information is presented in front of the users. It is more difficult for users to filter out the information that meets their wishes. At the same time, a large amount of information has great business value for enterprises. How to transform this information to help the operation and development of enterprises has also been a problem perplexing enterprises. It is difficult for users to find information that meets their wishes, and enterprises are trying to push the information beneficial to the operation of enterprises to users. The intelligent recommendation system has built an information bridge between users and enterprises. Users search or browse information on the enterprise website, which records the behavior of the users searching or browsing information. The intelligent recommendation system constructs the user portrait based on the above user behavior recorded on the website, analyzes the user preference information based on the data of the user portrait, and recommends the information that conforms to the user's search intention and the enterprise's marketing strategy to the user in combination with the enterprise's marketing strategy [5–8].

The internet e-commerce industry has rich practical experience in using the intelligent recommendation system to help enterprises operate, such as Amazon, Taobao, etc. The internet e-commerce industry recommends users to search or browse similar products according to the products

selected by users and in combination with the industry attributes of e-commerce enterprises, such as commodity inventory location, merchant advertising investment, etc. Each industry has its own industry-specific attributes. In the process of studying the implementation of the intelligent recommendation system in its own industry, it will be combined with its own industry-specific marketing attributes, and the education industry is no exception. In the field of education, the research and practice of big data intelligent recommendation are mostly in the fields of intelligent evaluation, educational law discovery, educational management and decision-making, online learning, and adaptive learning. As the basic theoretical and technical support of big data landing research in the field of education, the recommendation system selects user learning behavior data, such as courses, learning processes, and test evaluation. Combined with the relevant research of education big data, build the relevant big data intelligent recommendation application with the business nature of the education industry. Learning from the practical experience of the internet e-commerce industry recommendation system and combined with the unique business attributes of the education industry, various educational institutions are exploring and studying to build a unique recommendation system for the education industry [9, 10].

This paper takes the big data marketing intelligent recommendation system of Education Company H as the research object, which provides a reference for educational enterprises on how to use the big data intelligent recommendation system to realize user experience class purchase. Since its establishment, Education Company H has gradually developed into an institution with foreign language training and basic education as the core. Its teaching products span a wide range, covering various educational stages, such as preschool education, middle school education, university education, and overseas consultation. The campus covers many provinces in China and has many users, however, the company has many problems in its daily channel business activities. The online course selection system on the official website of Education Company H provides users with online course selection and purchase services. The online course selection system on the official website has more than 600,000 classes of thousands of courses for users to select and purchase courses online. User screening courses consume a lot of time and energy. The online course selection system on the official website does not integrate the business opportunity information of various marketing activities. It is still unknown which marketing activities promote users to buy courses, and it has lost the opportunity to carry out secondary marketing to users on the online course selection system on the official website. In response to the above problems, Education Company H investigated the successful big data intelligent recommendation system cases at home and abroad, referred to relevant technical and academic literature, and learned from the intelligent recommendation system models of well-known internet and e-commerce companies at home and abroad, such as Amazon predictive shopping and Taobao intelligent recommendation. Combined with the relevant theories of market research and

prediction [11–13], consumer behavior [13–15], and user information behavior [16–18], the marketing department proposes to implement user experience course purchase in the online course selection system on the official website.

The IT R & D department has established a big data marketing intelligent recommendation system project to meet the business needs of the online course selection system on the official website to implement the user experience course purchase. Firstly, the big data marketing intelligent recommendation system uses the big data real-time computing technology to analyze the user behavior and predict the courses and classes that can be recommended to users by collecting the user's behavior of viewing the detailed information of courses and classes on the online course selection system on the official website. Then, the big data marketing intelligent recommendation system uses the big data machine learning technology [19–22] to integrate the marketing activity business opportunity data in each marketing activity business opportunity management system and mine the causal law between user behavior and user class purchase offline. Using the mining causal law, offline predict the recommended courses and classes for users who have participated in marketing activities but have not purchased courses. Finally, the online real-time predicted recommendable course class information and the offline big data predicted recommendable course class information are displayed in the "guess what you like" display area on the website of the online course selection system of the official website, which supports the online course selection system of the official website to implement the user experience course purchase and realize secondary marketing to users, and it improves the marketing conversion rate of the online course selection system of the official website.

Education Company H uses big data technology to enhance the enterprise's marketing ability, and it also provides a reference for relevant enterprises in the domestic education industry on how to apply big data technology to help enterprise operation. Although the field of big data recommendation in the field of internet e-commerce has been relatively mature, the education industry has many unique attributes in the field of education. It cannot fully learn from the big data application mode in the field of e-commerce. It can only develop a big data marketing recommendation system suitable for its own industry attributes in the field of education on the basis of reference. It is the application of domestic educational institutions in the field of big data, lack of relevant practice in the field of channel marketing, and lack of reference for successful practice cases.

2. Current Situation of Big Data Intelligent Recommendation System at Home and Abroad

The big data intelligent recommendation system originated from internet e-commerce. The most well-known foreign company that develops and applies the recommendation system is Amazon. Amazon applied predictive shopping

recommendations on its global e-commerce website in 2013. Amazon applies the famous item-to-item collaborative filtering recommendation algorithm [23–27] in predictive shopping. This algorithm records the user behavior data generated by users on the Amazon e-commerce platform, such as browsing goods, staying on the goods page, putting products into the shopping cart, and purchasing goods. Amazon uses the big data intelligent recommendation algorithm to calculate the goods users likes. It also predicts the goods that users may buy in the next stage.

The commodity recommendation ideas and rules of the internet e-commerce industry are not only applied to Amazon but also to Facebook, Walmart, and other companies. The application of big data personalized recommendation in the field of internet e-commerce greatly reduces the work of users screening goods, enhances users' shopping experience, and promotes the popularization of intelligent recommendation mode in various industries, including the education industry. The foreign education industry has widely used the big data intelligent recommendation technology in adaptive learning and other fields. The well-known product is the Knewton platform. The behavior of each student and the response to each content item can not only improve the system's understanding of a single learner and a single content item but also improve the understanding of all the contents in the system and all online students. At Arizona State University, more than 2000 students participated in the experiment of Knewton products in a two-semester course. The experimental results show that after students use the Knewton platform, the dropout rate of students decreased by 56%, and the passing rate of students increased from 64% to 75%. At the same time, 45% of students can complete the course four weeks in advance.

The Smartbook product is a personalized recommendation platform that supports thousands of McGraw-Hill courses, and it calculates the courses and fields that students should pay attention to based on their previous user behavior. Scootpad products identify the weaknesses of each student through diagnostic exercises to ensure that they receive personalized learning courses. At the same time, teachers can guide specific students by creating targeted homework. The successmaker product provides reading and mathematics software and personalized learning paths for students aged K-12. It was launched at Stanford in the 1960s as a joint project with IBM and Dr. Patrick supplies, a computer learning expert. The product mainly provides adaptive mathematics and reading guidance for primary school students. The perfect combination of the internet big data technology and education has promoted the development of educational science. The application of big data intelligent recommendation technology in the foreign education industry is worth learning from. The application of big data technology in the domestic education industry has just sprung up in recent years. While learning from the experience of internet e-commerce and big data in the foreign education industry, educational institutions have also made some breakthroughs in the field of big data application.

3. Business Requirements of Marketing Platform

3.1. Current Situation of Online Course Selection System on Official Website.
The online course selection system on the official website of Education Company H provides users with online course selection and purchase services. The online course selection system on the official website has a low marketing conversion rate, which is maintained below 0.09% throughout the year. The marketing department sorted out the current situation of the online course selection system on the official website to find the reasons affecting the low marketing conversion rate of the official website.

3.1.1. Show the Course Screening Results from the Perspective of Community Characteristics.
The online course selection system on the official website has more than 600,000 classes of thousands of courses for users to select and purchase courses online. The online course selection system on the official website provides the function of course screening, which is realized by keyword full-text retrieval technology (similar to Baidu search technology). In the process of course selection and purchase, the user selects and combines the screening course conditions to screen the course class information that meets the user's own purchase needs. The keywords for screening courses include the course subject, school, campus, class time, course class price range, etc. The course class information that meets the screening conditions is presented to the user in the form of a list. The information in the list can be sorted according to the course class price and class opening time. The results of course screening are displayed to users from the perspective of community characteristics, i.e., when the screening conditions of selection and combination are the same. We can see that the course class information after course screening is the same, the content and the sequence of content are unchanged, and the results sorted by price or class opening time are the same. The information of the displayed courses and classes is not differentiated, and there is a lack of content display of individual trait differentiation.

3.1.2. Business Opportunity Information of Various Marketing Activities to be Integrated.
The online course selection system on the official website has not integrated the business opportunity information of various marketing activities, and it is unknown which marketing activities promote users to buy courses. In all kinds of marketing activities, Education Company H will collect the marketing activity opportunity information of users' purchase intention. The business opportunity information of marketing activities is stored in the business opportunity management system of various marketing activities. The marketing activity business opportunity management system refers to the marketing auxiliary IT system that provides users with consulting, evaluation, and participation in offline marketing activities and other services before users buy courses, such as offline customer service consulting business opportunity management system, CRM telephone customer service business

opportunity management system, OTS online evaluation business opportunity management system, offline marketing activity business opportunity management system, etc. Users who have the intention to purchase courses finally need to enter the online course selection system on the official website for online course selection and purchase. As the online course selection system on the official website does not integrate the marketing activity business opportunity data in the business opportunity management system of various marketing activities, it is not known which marketing activities promote users to buy courses.

3.2. Problems of Online Course Selection System on Official Website.
After sorting out the current situation of the online course selection system on the official website, the marketing department found two problems affecting the conversion rate of the online course selection system on the official website.

3.2.1. Lack of Display of Individual Trait Differentiation Content.
In the process of screening courses on the online course selection system on the official website, users select and combine the conditional keywords of the screening courses to screen the courses and classes that meet the users' needs for the course purchase. The filtering function realized by the keyword full-text retrieval technology cannot fully reflect the user's demand for course purchase in the user's behavior, push the course class information that does not meet the user's own demand for course purchase, and affect the user's experience of course selection and purchase. Learn from the relevant theories of market research and prediction and big data marketing theory, investigate and collect the user behavior-related data and information in the process of user screening courses, analyze the user behavior-related data and information from the perspective of individual characteristics, predict the courses that meet the user's purchase needs, recommend the courses that meet the user's purchase needs to users on the online course selection system on the official website, enable users to quickly find courses and classes that meet their own purchase intention, and promote users to purchase courses and improve the marketing conversion rate.

3.2.2. Lack of Secondary Marketing to Users.
The online course selection system on the official website did not integrate, mine, and use the marketing activity business opportunity information of various marketing activities, and it lost the opportunity of secondary marketing to users. For example, the user calls the CRM call center and inquires about IELTS-related courses. Then, when the user enters the online course selection system on the official website, the system shows users IELTS-related courses for the first time. On the one hand, the user can no longer screen the courses. On the other hand, the user can conduct secondary marketing IELTS courses, which will certainly promote the improvement of the conversion rate of the official website. The user's intelligent behavior in the user information

behavior theory points out that the user's behavior is related to a specific goal. Integrate, mine, and use the marketing activity business opportunity information of each marketing activity to analyze the relationship between users' participation in marketing activities and users' purchase of courses, and predict the courses that users may buy to carry out secondary marketing to users.

3.3. Practical Experience of User Experience Shopping in Internet E-Commerce Industry.
The marketing department, after discovering the problems of Chu duo in the online course selection system on the official website, actively looked for ways to solve the problems. In the process of finding solutions to the problems, the marketing department found that the practical experience of the internet e-commerce industry in implementing user experience shopping on e-commerce websites and e-commerce apps is worth learning from. The marketing department summarized the practical experience of experiential shopping in the e-commerce industry as follows: (1) in the internet e-commerce industry, add commodity recommendation information to the page of the e-commerce website or e-commerce mobile app to recommend the same kind of commodity to users who have just viewed the commodity. For example, if users view commodity A on Taobao, Taobao will display the same kind of commodity to users in the "you may still like" commodity display area. (2) In the internet e-commerce industry, various information systems of e-commerce have realized the sharing of user behavior data. The user has viewed commodity A on the e-commerce website. When the user enters the e-commerce mobile app, he can see the recommendation information of commodities similar to commodity A. Similarly, the user has viewed product A on the e-commerce mobile app. When the user enters the e-commerce website, he can also see the recommendation information of products similar to product A. The second user of user marketing is thus realized.

3.4. Online Implementation of Experiential Marketing Business Needs on the Official Website.
To solve the problems existing in the online course selection system on the official website and learn from the practical experience of user experiential shopping in the e-commerce industry, the marketing department plans to implement experiential course purchase in the online course selection system on the official website to promote the improvement of the conversion rate of the official website.

3.4.1. Online Real-Time Experiential Course Purchase Business Requirements.
The online course selection system on the official website realizes the intelligent recommendation of online real-time marketing, recommends courses similar to the courses viewed by online users on the official website, and realizes the business needs of experiential course purchase. The specific business needs are as follows: (1) the display method of recommendation results: learn from the user experiential shopping practice method of the internet

e-commerce industry, and add the "guess you like" display area on the web page of the online course selection system on the official website. It is used to highlight the course class information recommended to users. (2) The formulation of online real-time marketing intelligent recommendation strategy: from the perspective of individual characteristics of users, the marketing department formulates the online real-time marketing intelligent recommendation strategy on the official website, which is used to clarify the business rules of online real-time recommending courses and classes to users on the official website. (3) Build an online real-time user portrait: investigate and collect the user behavior information of the course filtered and viewed by the user on the online course selection system on the official website, analyze the user behavior, and predict the course classes preferred by the user in real time. (4) The construction of the algorithm model and prediction: using an online real-time intelligent recommendation-related technologies, combined with user preferences and online real-time marketing intelligent recommendation strategy on the official website, calculate and obtain the course classes recommended to users and display the course class information recommended to users in real time in the "guess what you like" display area. Figure 1 presents the online real-time experiential course purchase business requirements.

3.4.2. Demand for Secondary Marketing Business of Offline Big Data. The online course selection system on the official website realizes the intelligent recommendation of offline big data marketing. Analyze the relationship between users' participation in marketing activities and users' purchase of courses using the business opportunity data of various marketing activities (business opportunity data, i.e., the information of users' intention to purchase courses collected in marketing activities). Predict the courses and classes that users may buy offline, and recommend the courses and classes predicted offline to users online on the official website to realize the business demand of secondary marketing for users. The specific business requirements are as follows: (1) build offline big data user portrait: investigate, collect, and integrate the marketing activity opportunity data in each marketing activity opportunity management system to build an offline big data user portrait. The marketing activity business opportunity management system is as follows: offline customer service consulting business opportunity management system, CRM telephone customer service business opportunity management system, OTS online evaluation business opportunity management system, and offline marketing activity business opportunity management system. (2) Build the algorithm model and prediction: based on the offline big data user portrait data, mine the causal law between users' participation in marketing activities and users' purchase of courses offline, and build an offline recommendation algorithm model. The offline recommendation algorithm model is used to predict the courses that may be purchased by users who have participated in online and offline activities but have not purchased courses on the official website. When users enter the official website, the

courses that may be purchased by users predicted offline will be recommended to users on the official website. (3) The formulation of an intelligent recommendation strategy for offline big data marketing: the marketing department, based on the relevant theories of user behavior information, formulates an intelligent recommendation strategy for offline big data marketing, which is used to clarify the business rules of courses and classes that recommend offline prediction to users online on the official website. (4) Only provide offline big data marketing intelligent recommendation service to registered users: only provide offline big data marketing intelligent recommendation service to registered users who log in to the online course selection system on the official website with their mobile phone number, and do not provide offline big data marketing intelligent recommendation service to unregistered browsing users. Figure 2 presents the demand for secondary marketing business of offline big data.

4. Marketing Business Needs to Realize the Overall Design of IT System Architecture

4.1. Origin of Big Data Marketing Intelligent Recommendation System Project of Education Company H. The online course selection system on the official website of Education Company H has been in operation for many years. The online course selection system on the official website is now implemented with the B/s technology architecture. The R & D and realization of the user experiential course purchase business requirements of the online course selection system on the official website requires the use of the internet technology and big data technology. It greatly changes the technical architecture of the original online course selection system on the official website. After discussion between the IT R & D department and the marketing department, it was decided to establish a big data marketing intelligent recommendation system project in the form of a subsystem of the online course selection system on the official website to meet the business requirements related to the user experience course purchase of the online course selection system on the official website. The big data marketing intelligent recommendation system and the online course selection system on the official website work together to realize the user experience course purchase. The specific collaborative work content is shown in the figure below.

Figure 3 shows the collaborative work between the big data marketing intelligent recommendation system and the online course selection system on the official website. The description is as follows: (1) the online course selection system on the official website collects user behavior information and sends the user behavior information to the big data marketing intelligent recommendation system. (2) The big data marketing intelligent recommendation system realizes the user experience class purchase business requirements proposed by the marketing department, calculates the online real-time marketing intelligent recommendation and offline big data marketing intelligent recommendation, and stores the calculated recommendation results in the recommendation result information index of the ES search engine. (3) The big data marketing intelligent recommendation system provides
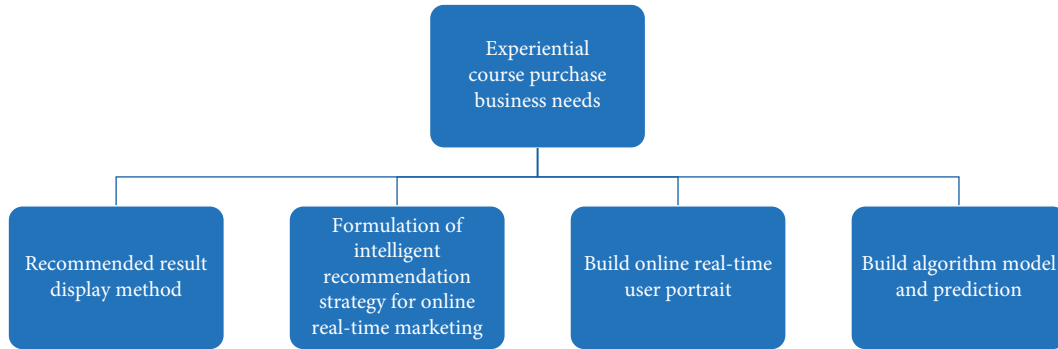
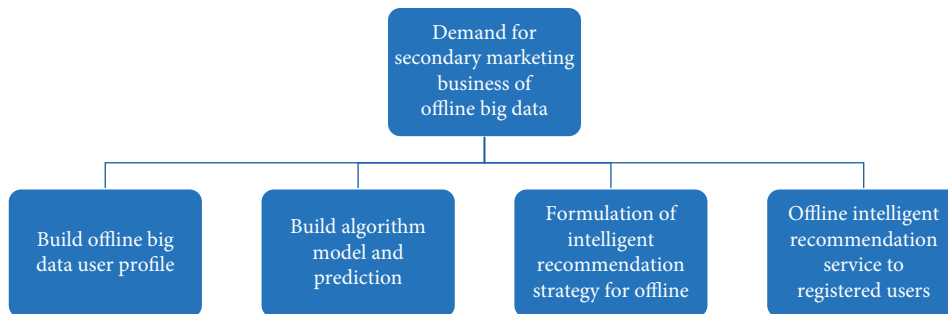FIGURE 1: Online real-time experiential course purchase business requirements.

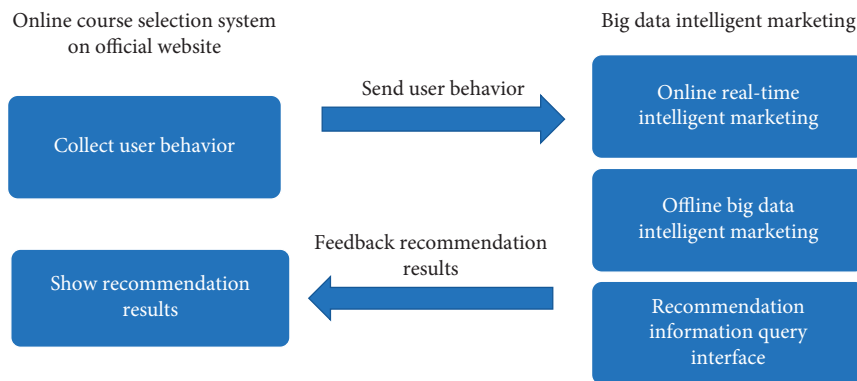FIGURE 2: Demand for secondary marketing business of offline big data.

FIGURE 3: Collaborative work between big data marketing intelligent recommendation system and online course selection system on official website.

a recommendation information query service interface and recommendation information query service for the online course selection system on the official website. (4) The "guess what you like" display area is added to the web page of the online course selection system on the official website. When the "guess you like" display area of the online course selection system on the official website is displayed in the browser, call the recommendation information query service interface provided by the big data marketing intelligent recommendation system to obtain the recommendation information, and display the course information recommended for online users on the official website in the "guess you like" display area.

In the big data marketing intelligent recommendation system, to use IT technology to realize the marketing business needs, we first need to divide the functional modules to realize the business needs and specify the IT technology required by the functional modules. At the same time, we need to design and explain how each functional module cooperates with each other to complete the business needs, which is the problem to be solved in the overall design stage of IT system architecture.

4.2. Overall Design of Big Data Marketing Intelligent Recommendation System Architecture of Education Company H. The marketing business requirements of the online course selection system on the official website are mainly composed of the following two core business requirements: online real-time marketing intelligent recommendation and offline big

data marketing intelligent recommendation. The IT R & D department established the big data marketing intelligent recommendation system project after analyzing the feasibility of the demand realization of the marketing business demand of the online course selection system on the official website. Recommend courses on the official website and use the intelligent data system to recommend courses and provide users with big data service. The IT R & D department has carried out the overall design of the IT architecture of the big data marketing intelligent recommendation system.

According to the requirements of the online marketing recommendation system, the intelligent computing module can realize the two core functions of the online marketing recommendation system: (1) according to the requirements of the online marketing recommendation strategy, the intelligent computing module can realize the two core functions of the online marketing recommendation system and realize the real-time prediction of the business needs of online user preference courses. (2) Offline big data marketing intelligent recommendation calculation unit: according to the requirements of offline big data marketing intelligent recommendation strategy specification, excavate the causal law between user behavior and user course purchase in marketing activity business opportunities, and use this causal law to predict the courses that users who have participated in marketing activities but have not purchased courses may buy. At the same time, there are several functional modules to assist in the realization of marketing business needs, such as the following: each marketing activity business opportunity management system database, data extraction and synchronization program, ES data search engine, big data buffer middle layer, internet web service interface, etc. Online real-time marketing intelligent recommendation calculation unit, offline big data marketing intelligent recommendation calculation unit, and other functional modules are combined to form the overall architecture of big data marketing intelligent recommendation system, and they work together to meet the needs of marketing business. The following is a brief description of the functional design of each functional module cooperating with each other to realize business requirements. Table 1 presents the overall design of the big data marketing intelligent recommendation system architecture of Education Company H.

4.2.1. Design of Intelligent Recommendation Function for Online Real-Time Marketing. Online real-time marketing intelligent recommendation solves the business problem of recommending user-preferred courses and classes for online users on the official website in real time. In the overall architecture design of the big data marketing intelligent recommendation system, several functional modules are divided to realize the business requirements of online real-time marketing intelligent recommendation. The divided functional modules and how to cooperate with each other to complete the functional design of business requirements are briefly described as follows: (1) the official website online user behavior information receiving service interface: is used to receive the user behavior information sent by the official website online users to view the course details and forward the user behavior information directly to the "big data buffer layer." The user behavior information receiving service interface is implemented by the springcloud microservice technology. (2) Big data buffer layer: it is used to receive the online user behavior information on the official website forwarded by the "user behavior information receiving service interface," cache the user behavior information and wait for the "online real-time marketing intelligent recommendation computing unit" to read. The significance of the big data buffer layer is to smoothly transfer the user behavior data to the "online real-time marketing intelligent recommendation computing unit" during the peak access of the official website to prevent the computing unit from a system crash because of an excessive amount of calculation. The big data buffer layer is implemented by the flume and Ka & a technology. (3) Online marketing intelligent recommendation calculation unit: read the user behavior information in the "big data buffer layer," analyze the online user behavior, calculate and obtain the course classes and recommended scores recommended to online users according to the recommendation rules in the "online real-time marketing intelligent recommendation strategy specification," and store the calculated recommendation results and recommended scores in the "ES search engine." The online marketing intelligent recommendation computing unit is implemented by the storm real-time computing framework. (4) ES search engine: mainly used to store online real-time recommendation result information. The ES search engine is implemented by the Elasticsearch search framework. The use of Elasticsearch search engine technology to provide the storage and query of recommendation results is mainly because Elasticsearch has very fast and stable data writing and data query characteristics, which can solve the performance problems of a large number of recommendation result information data writing and data query during the peak of official website access.

4.2.2. Design of Intelligent Recommendation Function for Offline Big Data Marketing. The business problem of offline big data marketing intelligent recommendation is to mine the causal law between users' participation in marketing activities and users' purchase of courses and use this causal law to offline predict the courses that users who have participated in online or offline marketing activities but have not purchased courses may buy. In the overall architecture design of the big data marketing intelligent recommendation system, several functional modules are divided to realize the business requirements of offline big data marketing intelligent recommendation. The divided functional modules and how to cooperate with each other to complete the functional design of business requirements are briefly described as follows: mining the causal law of users' participation in marketing activities and users' purchase of courses in the business opportunity data of marketing activities. When the user enters the official website, recommend the courses that

TABLE 1: The overall design of the big data marketing intelligent recommendation system architecture.

The overall design of intelligent recommendation system architecture
Design of intelligent recommendation function for online real-time marketing
Design of intelligent recommendation function for offline big data marketing
Function design of replacing offline recommended courses with similar courses on the official website

may be purchased by the user predicted offline to the user on the official website. (1) Collect and extract marketing activity opportunity data from each marketing activity opportunity management system database. The marketing activity business opportunity management system database includes the following: CRM telephone customer service business opportunity management system database, OTS online evaluation business opportunity management system database, offline customer service consulting business opportunity management system database, offline marketing activity business opportunity management system database, course product database, and order database of online course selection system on the official website. The purpose of collecting and extracting marketing activity data is to analyze the causal law between user behavior and the user class purchase. Hence, data collection is divided into two steps: collecting "cause" data and collecting "result" data, which is as follows: the first step is to collect "cause" data. Extract the marketing activity business opportunity data from the CRM telephone customer service business opportunity management system database, OTS online evaluation business opportunity management system database, offline customer service consulting business opportunity management system database, and offline marketing activity business opportunity management system database. There is information about the user's intention to purchase courses in the business opportunity data of marketing activities, such as the user's call to the CRM call center, telephone consultation regarding IELTS-related courses, leaving information about the user's intention to purchase IELTS courses, etc. The second step is to collect "fruit" data. Extract the user's historical order information from the course purchase order database of the online course selection system on the official website. In the first and second steps above, the business opportunity data of marketing activities collected and extracted will be stored in the "big data storage system." At the same time, the time of data collection and extraction is 2 a.m. every day, because the business is relatively idle at this time. (2) Big data storage system: used to store the original marketing activity opportunity data in the collected marketing activity opportunity management system. (3) Big data user portrait: it consists of two types of user portraits: user portraits of purchased courses and user portraits of nonpurchased courses. Use Spark SQL and hive technology to extract, clean, and convert the original marketing activity business opportunity data stored in the big data storage system, and build the user portraits of purchased courses and nonpurchased courses. Analyze the data of user portraits of purchased courses, and use the big data machine learning algorithm to find the causal law between the user behavior and user purchase courses. This causal law is used to predict the course classes that users in

the user portrait of nonpurchased courses may buy. (4) User preference course recommendation: it uses big data machine learning technology to predict the course products that users may buy. Using big data machine learning technology, train the algorithm model on the data of the user portraits of the purchased courses and find out the causal law between the user behavior and user purchase courses. The trained algorithm model is used to predict which courses and classes the users in the user portrait of nonpurchased courses may buy and the probability of possible purchase. If the course classes in the recommendation results of offline prediction have expired in the online course selection system on the official website and are no longer sold, replace the expired course classes with the similar course classes being sold in the online course selection system on the official website.

4.2.3. Function Design of Replacing Offline Recommended Courses with Online Similar Courses on the Official Website. The result of online real-time marketing intelligent recommendation is calculated based on the class data of the courses being sold. The results of offline big data marketing intelligent recommendation are calculated based on the historical business opportunity data of marketing activities and the historical data of the user course purchase. Therefore, the course classes in the offline big data recommendation results may have expired and will not be sold in the online course selection system on the official website. Therefore, before recommending offline predicted recommendation results to online users on the official website, it is necessary to replace the courses in the recommendation results with similar courses on the official website. By simulating the user behavior of the official website, convert the course class information in the offline big data recommendation results into user behavior information, take the converted user behavior information as the request parameter of the service interface, and call the online user behavior information receiving service interface of the official website to hand over the replacement of similar courses to the online real-time marketing intelligent recommendation module. The online real-time marketing intelligent recommendation module will convert the offline recommended course classes into similar course classes being sold online on the official website, and store the recommendation results after replacing the course class information in the ES search engine.

5. Conclusion and Prospect

With the advent of the internet big data era, information technology is developing by leaps and bounds, and the traditional enterprise operation and marketing mode is also

changing. The traditional market survey and prediction model has been replaced by information technology. By collecting user behavior and other information on Web pages or apps, we can understand users better than through questionnaires and interviews. The traditional commodity sales model gradually changes from the mode of users looking for commodities to the mode of products looking for users. It uses big data machine learning technology to predict users' preferred commodities and timely recommends commodities to users. The internet and big data are rapidly and quietly changing the world, the marketing mode of modern enterprises, and people's lifestyle. Education Company H, moving with the times and keeping up with the pace of the internet big data era, has developed a big data marketing intelligent recommendation system using the internet big data technology to support the online course selection system on the official website and realized user experience course purchase. After analysis and research, the conclusions drawn are as follows: (1) use the big data real-time computing technology to recommend user-preferred courses to users in real time to reduce the workload of user course screening. Firstly, collect the user behavior of users viewing the detailed information of courses and classes on the official website. Then, analyze the user behavior and predict the course class of user preference. Finally, the online real-time recommendation of the predicted user preference courses and classes to users improves the online marketing conversion rate of the official website. (2) Use the big data machine learning technology to integrate the business opportunity data of various marketing activities and realize secondary marketing on the official website. Firstly, collect the business opportunity data of various marketing activities from the business opportunity management database of various marketing activities. Then, use the big data machine learning technology to analyze the causal law between users' participation in marketing activities and users' purchase of courses. Finally, using the causal law obtained from the analysis, for users who have participated in marketing activities but have not purchased courses, offline predict the courses and classes that users may buy. When users log in to the official website, the system will recommend courses and courses that can be predicted offline to users at the first time. This way can realize the secondary marketing to users and improve the online marketing conversion rate of the official website.

In the future, more recommendation algorithm models will be implemented to improve the recommendation business and improve the accuracy of recommendation. The big data marketing intelligent recommendation system delivered in phase I realizes the real-time marketing recommendation strategy, which is mixed with the decision-making information from the perspective of enterprise marketing, such as recommended accommodation classes and VIP classes. It has not been able to completely solve the real purchase needs of users from the perspective of users' individual characteristics. In essence, the big data marketing intelligent recommendation system should look at and solve problems from the perspective of users' individual characteristics and provide users with courses that they really want to buy, and the marketing mode has shifted from traditional marketing products to marketing users. At present, only the decision tree algorithm is used for offline recommendation business. There are many similar algorithms in the field of machine learning, which can be used together to select the best algorithm model most suitable for business and improve the accuracy of recommendation. In the future, collaborative filtering or classification-related machine learning algorithms will be used to classify similar populations and recommend similar courses to similar populations; In the future, association rules and related algorithms will be used to analyze the historical data of course purchase, find the associated courses that are often purchased together, recommend the associated courses to users, and so on.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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