Information Personalized Recommendation Algorithm for Cross-Border E-Commerce Guide Platform Based on Constrained Clustering

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Abstract—The traditional algorithm costs a lot in calculation and storage, Cross-border e-commerce brings more opportunities to international logistics, but challenges are also very severe, but there are also great problems, such as customer satisfaction, return and exchange of goods, parcel loss and so on. This paper explores the matching convergence function of cross-border e-commerce logistics platform based on artificial intelligence and the ecosystem architecture of supply chain system, deeply analyzes the operation mode of four typical cases of cross-border e-commerce platform, further analyzes the risk distribution of cross-border e-commerce platform, and puts forward relevant risk prevention and control measures. Based on the machine learning algorithm Light GBM model as the core, multi-dimensional features are constructed and analyzed based on user behavior data and historical sales data, and the prediction is completed through machine learning modeling. The application of artificial intelligence to live streaming e-commerce is bound to bring revolutionary changes to the development of live streaming e-commerce.

Keywords—Constrained clustering, Artificial intelligence, Cross-border e-commerce shopping guide platform

I. INTRODUCTION

With the rapid development of artificial intelligence technology, intelligence has become a new factor of production. Ai tentacles are gradually extending into the field of cross-border e-commerce, from intelligent information recommendation system, data warehouse to intelligent logistics, constantly promoting the development of cross-border e-commerce. With the significant improvement of computing capacity [1]. Artificial intelligence has shown its important value in financial trade, medicine, diagnosis, transportation, telecommunications and other fields, and also showed its skill in the field of e-commerce. In order to solve the problem of consumers' choice of goods, it is necessary to study an effective personalized recommendation algorithm to help the platform provide personalized product recommendation for consumers' shopping. The reason for this phenomenon is that many logistics enterprises themselves do not know where their needs are, and the idea of these enterprises is very sharp, that is to say, do what they think, there is no specification at all. The development of artificial intelligence, speed up the logistics, capital flow and information flow, trade integration, close the distance between the international trade, facilitate communication between the suppliers, purchasers and final consumers, help cross-border electricity enterprises to choose product or platform through large data and optimizing the allocation of resources, to provide decision aid and reference for leaders, To seize the global market faster and more efficiently [2]. Revenue management, global marketing, logistics path planning and other segmented fields are widely applied to improve user experience and provide strong support for the professional development of e-commerce services [3].

II. PERSONALIZED RECOMMENDATION ALGORITHM BASED ON BIG DATA FOR ARTIFICIAL INTELLIGENCE INFORMATION OF CROSS-BORDER E-COMMERCE GUIDE PLATFORM

A. Design of recommendation algorithm based on big data

Technology used in distributed computing platform, mainly composed of two parts of distributed systems and distributed batch, distributed system HDFS provides mass data storage system, can be thought of as both online and offline consumption form, is through wired or wireless networks to provide sales data to the businessman, combine offline business opportunities and the Internet to collect effective purchasing groups. Logistics also started from the division of labor of enterprises themselves [4]. At present, many companies are also paying attention to this aspect. Wish, an American cross-border e-commerce platform, is also allocating resources through big data analysis according to the number of keyword searches, prices and advertisements on the platform. According to the released data, China's live streaming e-commerce has entered a full-blown outbreak stage. As a new science and technology, the essence of artificial intelligence is the simulation of human thinking process. Countries around the world believe that ARTIFICIAL intelligence is an effective way to reindustrialize and promote economic development. IBM proposed the concept of smart logistics in 2009 and established a "smart supply chain" that generates real-time information through sensors, RFID tags, brakes, GPS and other devices and systems [5]. The average deviation can be calculated by equation (1):

$$\delta_{ij} = \sum_{a \in W_j, i(x)} \frac{I_j - u_i}{N\left[W_{j,i}(x)\right]} (1)$$

On the basis of the above analysis, the user preference degree can be calculated by the following formula:

$$u_{ij} = \frac{1}{\|Z_i\|} \sum_{m \in B_i} \left(u_{im} + \delta_{jm}\right) (2)$$

Work out all high-support item sets whose support exceeds the established threshold in content type data, and calculate the support of content type association rules as follows:

$$T_{AP \to B_P} = \frac{\left| M(A_P \cap B_P) \right|}{\left| M \right|} \text{ (3)}$$

A complete set of cross-border logistics system has been designed to effectively solve the problem of cross-border logistics for customers. Commercial elites make use of their shrewd planning to adjust the production and consumption needs of human society, resulting in wholesale industry and retail industry. So based on the background of this project, we use machine learning to analyze historical data, to provide more accurate data prediction, perfect the errors caused by policy makers subjective judgment should be in the past, the applications of artificial intelligence to cross-border electricity field, not only can give the cross-border electricity in information communication, funds flow and transport of goods and so on brand-new connotation of intelligent, It will also help cross-border e-commerce to play a more important role in foreign trade [6]. The performance test results of the recommended algorithm are shown in Table 1.

TABLE 1. PERFORMANCE TEST RESULTS OF THE RECOMMENDATION ALGORITHM

Algorithm	The proposed algorithm	Bayes algorithm	Random walk algorithm	Network learning algorithm
Accuracy	0.8325	0.3921	0.6132	0.5625
The recall rate	0.1215	0.0091	0.0112	0.0329
The average accuracy	0.0826	0.0319	0.0452	0.0661

B. Application of artificial intelligence technology in the field of livestreaming e-commerce

Artificial intelligence-driven virtual anchors can effectively improve the sociability of livestreaming e-commerce businesses and effectively break through the limitations of time and space of the original Internet celebrities and Kols. With higher plasticity and reuse, they can create more customized and personalized content for brands, exponentially improve productivity and maximize marginal effect [7]. As China's economy enters a special period of transformation and upgrading and slowing growth, cross-border e-commerce, as a new transaction mode, is expected to become a new engine to drive China's foreign trade development. With the fragmentation of Internet information and the increasing maturity of cloud computing technology, active Internet marketing model emerges, gradually getting rid of the status quo of rigid traditional sales model on the Internet, to actively, fully interactive and other diversified forms of in-depth communication with customers. Warehousing operations are performed independently by the relevant warehouse personnel. After receiving the customer's waybill, warehouse personnel need to number the waybill. Input code (the customer needs to add the customer's input code after receiving the customer's shopping address on the overseas website), etc. With the continuous innovation of competition modes between groups, non-core business has become the bottleneck of enterprise development, and outsourcing of this part of business has become the consensus of everyone. Besides manufacturers, wholesale and retailers, enterprises specializing in logistics business undertake it, and third-party logistics providers emerge as The Times require [8]. Because according to the historical data (including sales and user behavior data) to predict possible future potential purchase demand is also selling belongs to the typical timing problems, according to the set of each anchor, personality, hobbies, image, language style, body style, etc., to develop our own AI virtual host image, the personification of the professional operation, After being played by the anchor, fans can continue to be served and a new flow field can be opened. With the introduction of such favorable policies as the comprehensive pilot zone for cross-border e-commerce and the Belt and Road Initiative, there are still great opportunities for the development of cross-border e-commerce in the future. The application and development of artificial intelligence in e-commerce is necessary and conditional, and intellectualization has become an important direction of e-commerce development in recent years [8]. Major e-commerce platforms are actively exploring new marketing modes to catch consumers' eyes and increase consumers' desire to buy. Core services and products of No.1 Chain are shown in Figure 1.
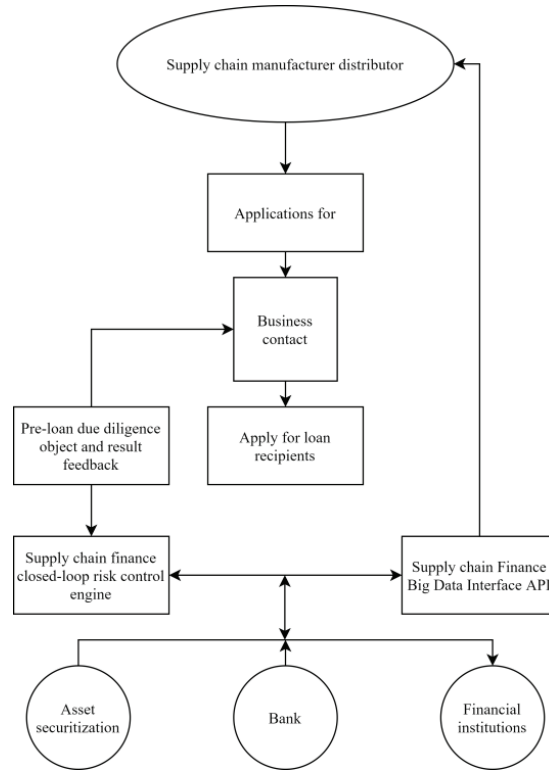

Figure 1. Chain core services and productsr

III. THE SUPPORT OF ARTIFICIAL INTELLIGENCE TO E-COMMERCE PLATFORM STRENGTHENS THE POSITION OF E-COMMERCE LOGISTICS

A. The deep integration of artificial intelligence and logistics has improved supply chain efficiency

Following the technological revolution in the steam era, the technological revolution in the electric power era, and the revolution in computer and information technology, Supply chain management generally has a core node through which to integrate various resources on the chain. In addition to the original existing features, we also built other feature dimensions, such as historical month sales, historical search heat, quarterly sales, a certain model in a certain month, a certain model in a certain month year-on-year, sales difference between adjacent months and other features. A successful virtual anchor needs four aspects of technical architecture: perception and cognition, director system, 3D modeling and 3D material library. Not only should virtual anchor set emotions, but also corresponding body language, including mouth shape and limbs [9]. In recent years, the growth rate of China's traditional foreign trade is much lower than before, and cross-border e-commerce, as a new transaction mode, has gradually become an important channel for China's foreign trade development, and it continues to welcome good news at the policy level. Different from the traditional single data source, e-commerce information retrieval intelligently integrates big data and can quickly and accurately analyze and identify user behaviors. On this basis, massive intelligent retrieval and filtering can be carried out according to the different needs of users. The real commodity market is also adapting to the development background of The Times and launching the business model combining online and offline in time. At this time, high-quality logistics service will undoubtedly become an important support for the current commodity circulation in the market. Light GBM machine learning model is selected as the core of the prediction model. Which can effectively deal with multiple classification and regression problems. For consumers, voice search is more convenient than manual text input. Livestreaming e-commerce platforms can efficiently recommend videos, anchors or commodities to consumers by using voice recognition technology. In addition, with the help of cross-border e-commerce platforms and cross-border e-commerce service enterprises, more and more small and medium-sized trading enterprises have become active participants in cross-border e-commerce, gradually forming a large network of production and service synergy ecology. E-commerce users are divided into new users, high-end users and ordinary users, and an intelligent information recommendation strategy based on user stratification is proposed. In the era of "AI+", with deep learning and other technologies as the core and cloud computing, biometrics and other data as the basis, the application of ARTIFICIAL intelligence in medical care, transportation, security and other fields will be promoted to create greater value. Category management examples are shown in Table 2.

TABLE 2. CATEGORY MANAGEMENT USE CASES

With the column name	Category management
Participants	The administrator
With columns	The administrator manages the categories of goods
Precondition	System administrator who has logged in successfully
Postconditions	The administrator operates the commodity category, adding, editing, querying, adding and hanging the category
Basic flow of events	1. Enter your account and password to log in to the system home page 2. Click "Category Management" menu bar 3. Click Add to add category ID, category name and commodity category 4. Edit, Query, and so on
Other Event streams	1. Cancel the login and forget the login password 2. Cancel category adding, editing, searching, and category adding
Flow of abnormal events	1. The entered account password is incorrect, and the personal information fails to be verified 2. The user account does not exist because the user account information is not entered into the system 3. A message is displayed indicating that the user has no operation rights

B. Software framework is the core of engineering implementation

At present, the basic algorithms of artificial intelligence have been relatively mature, and major manufacturers have been making efforts to build algorithm model tool libraries and package them into software frameworks for developers to use, which can be said that software frameworks are the basis of algorithm engineering implementation. In the data collection and preparation phase, relevant data is first collected, described and examined, and then data quality is confirmed. On the premise of understanding the data, the operation of data selection, cleaning, merging and data formatting is carried out, and the temporary database of data mining is established. Generally speaking, the open source software framework has many commonalities in the aspects of model library construction and call function, but each has its own characteristics at the same time. At present, there are two main categories in the industry: deep learning training software framework and inference software framework. Generally speaking, the open source software framework has many commonalities in the aspects of model library construction and call function, but each has its own characteristics at the same time. At present, there are two main categories in the industry: deep learning training software framework and inference software framework. Establish logistics information data analysis and related management system. The purpose is to analyze and process the receiving time and address of consumers, the convenience of O2O cross-border e-commerce, and select the most appropriate delivery method of goods to consumers. By analyzing the interactive content of consumers in the live

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streaming e-commerce platform, the emotions and behaviors of consumers are analyzed, the positive emotions are guided and the negative emotions are soothed in time, so as to provide more effective services to consumers. Consumers' browsing information and purchase records on third-party cross-border e-commerce platforms are stored in the platform. Many large cross-border e-commerce platforms clearly recognize the importance of consumption-related data, and it is difficult to share user purchase data with cross-border e-commerce enterprises. Figure 2 shows the user scale statistics of China's shopping guide e-commerce industry from 2010 to 2021.
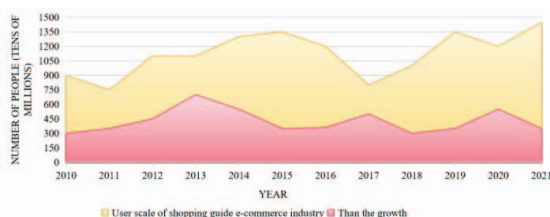

Figure 2. Statistics of user scale of China's shopping guide e-commerce industry from 2010 to 2021

IV. CONCLUSION

With the continuous development of society and technology and the constant transformation of shopping scenes, artificial intelligence will continue to penetrate and shine in all fields of e-commerce in the future. Artificial intelligence will promote the reform of the industry and release its greater potential. Big data technology is implemented in Hadoop platform, and the key processing technology of Hadoop platform is analyzed. The ecological environment for collaborative operation has been created, and the risk prevention and control efforts have been strengthened. AI is increasingly being used in the live streaming e-commerce industry, and major e-commerce companies will continue to improve their AI tools to better meet market demands and build more user-friendly and efficient solutions. Any node in the blockchain can realize self-verification, transmission and management of information without relying on third-party management agencies, which can effectively avoid data tampering by the network platform in the central position and ensure the accuracy of transaction data.

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