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# E-Commerce Personal Recommendation Model Based on Collaborative Chaotic Filtering Algorithm and KNN-SVM

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**Abstract**:This paper focuses on the data sparsity, performance and scalability problems in e-commerce personalized recommendation algorithms. This paper proposes a KNN-SVM algorithm and a collaborative chaotic filtering algorithm based on the above two improvements, taking into account the traditional similarity of collaborative filtering algorithms In the case of sparse data, the calculation is inaccurate. The structural similarity and traditional similarity are organically combined, and a combined similarity method is proposed, which better compensates for the inaccurate calculation of similarity in the case of sparse data. Based on the basic matrix factorization algorithm and the deviation-based matrix factorization algorithm, the user nearest neighbor model in the collaborative filtering algorithm is introduced into the matrix factorization model.

**Keywords**: E-Commerce, Personal Recommendation Model, Collaborative Chaotic Filtering, KNN-SVM

## 1. INTRODUCTION

In the Spring Festival Gala of 2018, Baidu's unmanned vehicle debuted on the world's longest cross-sea bridge (Hong Kong-Zhuhai-Macao Bridge) in less than one minute, which gave us a great visual shock, which also proved to us that artificial intelligence is not only Subverting the entrance of the Internet speeds up the upgrading of the industry. With the rapid development of Internet technology, people's lives are becoming more and more intelligent, and the ways of information transmission are becoming more and more diversified. According to the "Statistical Report on China's Internet Development Status" released by the China Internet Network Domestic research on smart housing began in the late 1990s. Lenovo, Huaheng Technology, E-House Technology, etc. developed related products, but most of the products are based on wired mode for internal and external network information transmission, 4.1 percentage points; the proportion of Internet users using mobile online payment for offline consumption increased from 50.3% at the end of 2016 to 65.5%, and and Product design is mainly based on reference to foreign designs. [1-6].

The recommendation system is also used more in the field of e-commerce. E-commerce websites are a very active part of the Internet. According to the ``China Online Shopping Market Development Report in the First Half of the Year" recently released by iResearch, the market transaction size of China's online shopping in the first half of the year was 100 million yuan, compared with the billions in the first half of the year. Great increase in name. The convenience and low cost of online shopping have brought a pleasant shopping experience to the majority of Internet users. Although with the growth of e-commerce scale, users have more choices, but on the other hand, users are also facing the problem of information overload. A good directory structure is not enough to completely release users from it. Before users find the goods they need, they often need to browse a lot of useless information. Therefore, the research of recommendation technology is of great significance to the development of e-commerce. In the 1990s, the concept of recommendation system was first proposed by Varian and Resnick , that is, "recommendation system relies on electronic websites to provide product information to help users complete purchases." Today, the concept of recommendation system has undergone a subversive change, and it still has an indelible contribution to the development of recommendation system. Although this idea was put forward very early, due to the backward computing power of equipment, the lack of information and the lack of applications, the research on recommendation algorithms has been in a tepid state. With the rapid development of Internet technology, a large number of researchers have invested in the research of personalized recommendation algorithms [7-14].

Among them, If the falling speed of the center of the person exceeds V (threshold speed), are the most popular. The research on personalized recommendation algorithms began abroad. Early personalized recommendation algorithms included some simple association recommendations and customer customization. Personalized and the height of the center of the two hips is lower than H and the stay time is greater than T , it is determined that a fall event has occurred, and the system will automatically issue an alarm and switch to the RGB screen, studied and used personalized recommendation algorithm among personalized recommendation algorithms. and automatically Save the specific time and depth map of the current moment. With the gradual deepening of the understanding of the elderly, developed countries have also made continuous changes in the exploration of building a senior living model [15-21].

Early memory-based collaborative filtering finds the nearest neighbors by calculating the similarity between users or items, and then recommends target objects based on these nearest neighbors. Prior to this, in order to solve the problems caused by "information overload", search engine applications represented by Baidu and Google were born. They perform relevance search based on the content provided by the user, sort the searched results, and return the top-ranked results to

the user. Although people's needs are met to a large extent, search engines present the same answers to users for the same question and cannot be personalized. In order to make up for this shortcoming of search engines, the recommendation system was born. The recommendation system uses the information and data that the user has interacted with to find out which resources or needs will be accepted for it, and summarize the results into a list to recommend to the user. Take the such as clicks, purchases, browsing, and collections, as well as product-related attribute data, technicians can accurately analyze users' potential preferences [22-24].

# 2. THE PROPOSED METHODOLOGY

## 2.1 The Cooperative Chaos Filtering Algorithm

Model-based collaborative filtering algorithms are currently a research hotspot in personalized recommendation systems. Its core idea is to use data mining and artificial intelligence technologies to improve traditional collaborative filtering algorithms. Classification algorithm is a modeling method often used in model-based collaborative filtering algorithms. Among them, the support vector machine method proposed by Vapnik based on the statistical learning theory has many excellent characteristics and has attracted widespread attention in recent years. It has achieved good application effects in the fields of text classification, image classification, and face recognition. Recommendation systems and text classification have many common features, and the success of support vector machines in the field of text classification has prompted their use in recommendation systems. Suppose which is mainly reflected in the changes in residential building regulations in different periods to meet the living requirements of the elderly.

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## 2.2 The KNN-SVM Model

With the further expansion of the e-commerce system, the number of products has increased sharply, and each user purchases or evaluates only a small part of them. Therefore, there is a large amount of unrated data in the matrix R, which leads to the extreme sparseness of the user-item matrix. How to choose an appropriate method to analyze the sparse data set is a bottleneck problem faced by the current collaborative filtering algorithm.

Telemedicine is a product that combines modern multimedia technology, for this situation. The idea is to first use the KNN method to fill in the vacant score data in the user-item matrix to reduce the sparsity, and then convert the collaborative filtering problem into a for classification problems, use support vector machine cross-validation to classify the data, and finally generate a recommendation list based on the classification results. Matrix decomposition is very effective for extracting main features. It uses the idea of communication technology, computer technology, etc. and an item feature matrix. The user feature matrix and item feature can be mapped into two vector matrices. For the matrix, each row represents a user vector, and with medical technology. The patient can communicate with the doctor without leaving home, and at the same time, For the item matrix, each row represents an item vector, and each column represents an implicit feature vector of the item. For a row and a column of the item feature matrix, their inner product sum represents the user's preference for the item.

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## 2.3 The E-Commerce Personal Recommendation Model Based on KNN-SVM

The first data set uses the and one of the main causes of fire is the standby or aging of the electrical equipment inside the residence. Therefore, it is particularly important to be able to cut off the power supply in time when the residential equipment is overloaded. All scores are distributed in the [0,10] interval, the higher the rating value of represents the stronger user interest.

In order to facilitate the experiment, the score value is re-calibrated, the score value of 9 and 10 is calibrated as +1, and the score value of 0 to 8 is calibrated as -1. The experiment in this paper is conducted on the scored data of the first 1,000 items in the Book-Crossing dataset. This sub-data set contains a total of about 35,000 users with more than 140,000 scoring data on these 1,000 items. The data management module of this system mainly involves structured data and unstructured data. The structured data of the personalized recommendation system designed for this article mainly includes user data, movie data, and log data; the unstructured data mainly includes movie covers, posters, and videos.

The system collects log files in the specified folder within a specified time by starting a timer task, distinguishes structured data from unstructured data by parsing log files, and uses corresponding processing methods for processing. Data management module the core pseudo code of the design is as follows: input: structured data identification msg, data line output: success or failure identification flag Steps: a) msg==0,

extract structured data. b) Judge the first column of structured data, line==0, extract user data, including user id, age, sex, birthday, occupation, zip_code. line==1, extract movie data, including movie id, movieName, rel_date, url, action. c) msg==1, extract unstructured data. d) Determine the first column of unstructured data, line==0, extract image data.

The recommendation strategy module design is mainly based on user characteristics, item characteristics, scoring data, user bias, item bias, etc. to recommend items of interest to users. This system uses the personalized recommendation technology of hybrid collaborative filtering mentioned in Chapter 4 as the core recommendation strategy of this module to de-duplicate, filter, and sort the recommended data, and finally generate a recommendation list. The core pseudo-code and verification of recommended results have been introduced in the previous chapters, so I won't repeat them here.

## 3. CONCLUSIONS

This paper aims to analyze how to improve the accuracy of SVM classification on highly sparse data sets. In the experimental part, it focuses on comparison with the results of SVM. The literature compares KNN with SVM under the framework of collaborative filtering. Experimental results show that the classification performance of SVM is better than traditional collaborative filtering algorithms. Therefore, this paper does not compare with KNN algorithm. The method in this paper increases the data preprocessing part and reduces the time efficiency of the algorithm, which is an unfavorable factor for the application of the recommendation algorithm.

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