Optimization Framework of Personalized Disaster Movie Recommender System Based on Slope One Algorithm

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Abstract

People's entertainments are increasing in Internet background. Movie is one of the major activities. Watching movies via Internet has gradually become popular. This paper illustrates an overview of Slope One algorithm, explains the connotation of personalized recommender, and proposed a method of optimization framework of personalized disaster movie recommender system based on Slope One algorithm. This paper discusses the architecture and functions of disaster movie recommender system, as well as establishment of disaster movie data resource library etc., aimed at promoting the development of disaster movie recommender system and improving its efficiency.

Keywords: Slope One Algorithm, Personalized Recommender, Disaster Movie Recommender System.

1. BACKGROUND

1.1 Introduction

The information era in Internet background has changed people's social lifestyles, enriched people's entertainments and improved people's quality of life, while movies are the most accessible activities in Internet (Luo and Zhang, 2017). In this context, more and more attention is paid to the movie recommender system. The recommender system alleviates the movie search problem brought by the search engine. When searching for movies by the search engine, keywords must be entered in order to find the movies. However, the keywords may be forgotten or too long to find the corresponding movies (Zhao and Yin, 2015). The movie recommender system changed this problem. The most common way for optimization of the movie recommender system is to use Slope One algorithm to form the recommender system framework and speed up its operation. The Slope One algorithm provides a new idea for construction of framework of the movie recommender system. Moreover, The Slope One algorithm has some common points with the personalized recommender in the movie recommender system, emphasizing on the preference of users during operation, so as to formulate customized recommenders based on their preferences. With the development of Internet technologies, personalized recommender has its own technologies, which has more theoretical basis in applications and attracts more users (Guo and Yang, 2015). At present, the research literature about Slope One algorithm and movie recommender system mainly include: one, movie recommender system construction method; two, movie recommender system usage method. The proposed literatures are significant for the study of movie recommender system, and provide the direction and ideas.

1.2. Purpose

This paper analyzes the Slope One algorithm and personalized recommender and their functions in promoting the disaster movie recommender system. Disaster movies are a major category, and there is a large audience, so it is necessary to set up a disaster movie recommender system (Huang and Song, 2015). By studying the basic connotation of Slope One algorithm and personality recommender, we can find the optimal solution for the framework design of disaster movie recommender system. The disaster movie recommender system is an important invention and provides convenience for users. By collecting the personalized information of users and analyzing their preference on disaster movies, the system recommends disaster movies based on their preferences.
2. OVERVIEW OF SLOPE ONE ALGORITHM

The Slope One algorithm was first proposed in the 21st century and is mainly used to calculate the Item-Based classical algorithm (Ma, 2015). The main idea and base of Slope One algorithm is simple linear regression equation and a single free parameter. Slope One algorithm is different from traditional algorithms. In traditional algorithms, one item is scored by another item. The free parameter of Slope One algorithm is the average score of the two items, and even in some instances, the results of Slope One algorithm is more accurate than linear regression (He and Li, 2015). The computing speed of Slope One algorithm is higher, and the computing memory occupied by it is less. The main idea of Slope One algorithm is to use the average to reduce the numerical differences between individuals (Hu and Zhou, 2015). So the Slope One algorithm has the advantages of easy operation and high efficiency, and more accurate than other algorithms. Slope One algorithm gradually formed unique computing features with the development. First, it is easy to operate. It does not require hard-to-understand algorithm formulas. The operation flow chart can be easily analyzed by computer technicians and easy to use (Chai and Liu, 2015). Second, even if an additional item is added during calculation, Slope One algorithm has high stability compared with other algorithms. The new item will not affect the operation results. The result is not affected and is still normal. Third, Slope One algorithm has high searching speed and presents the retrieval results accurately. However, there is still a drawback in this application. For application of Slope One algorithm in this case, the shared computer memory is relatively more than normal operation. Fourth, there is no privilege requirement for the Slope One algorithm during operation. Even the beginners can calculate using it. This reflects from the side that, Slope One algorithm has low privilege and is suitable for beginners. The easy usage method has led to the popularity of Slope One algorithm (Jia, 2015). Fifth, Slope One algorithm also features high accuracy. As a result of its features, the results of Slope One algorithm are more accurate than other algorithms. In summary, Slope One algorithm has above five advantages (Wang and Cheng, 2014). With the connotation and features of Slope One algorithm, it is easy to find that it is helpful for computing. For its simple and easy-to-operate features, it can be easily controlled by beginners in the computing process, increasing the ability of beginners. So beginners can master the use of Slope One algorithm skillfully to promote its development.

3. BASIC CONNOTATION OF PERSONALIZED RECOMMENDER

Personalized recommender is an important method in marketing, developing targeted sales plans for users based on the customers’ interests and history of purchases, so as to promote users to make purchases (Chen and Zhu, 2014). In addition, the personalized recommender can be used in the disaster movie recommender system, so as to recommend the movie information and movie services for users according to their interests. The personalized recommender emphasizes on surveys on users, and the personality characteristics and preferences of the user are analyzed according to their original behaviors (Sun and Wu, 2013). The personalized recommender has injected new vitality into the development of movie recommender, and gradually formed its features. First, the personalized recommender in disaster movie software can collect the user's information, and collect the user's preference by his/her browsing history and movie comments. And when the user re-uses it, it will push a movie similar to that which was viewed last time (Li and Xiao, 2013). Second, collect and sort the user’s information according to the history. Develop a planned movie recommendation for users to choose. The personalized recommender gradually develops into a recommender system, so as to promote its development. The recommender system is based on personalized recommender, and there are some modules with features of the recommender system, namely the user module, the recommender module and the algorithm module, which constitute the recommender system. During the construction of the recommender system, we shall know the importance of the recommender module in the development of the recommender system, master and understand its algorithm, so as to combine the algorithm with the system perfectly. We should strengthen the collection, analysis and collation of information during this process, to make the recommender system more suitable for the practical applications and promote the development of the industry (Wang and Lou, 2011).

4. METHOD OF OPTIMIZATION FRAMEWORK OF PERSONALIZED DISASTER MOVIE RECOMMENDER SYSTEM BASED ON SLOPE ONE ALGORITHM

4.1 Set architecture of recommender system

To design a personalized disaster movie recommender system based on Slope One algorithm, the architecture of the recommender system should be designed first to lay a good foundation, so that the disaster movie recommender system can operate stably. With Slope One algorithm, we know that the B/S three-tier architecture is often used for construction of the movie recommender system, so as to ensure the accurate operation of the system (Qian and Yang, 2011). MVC development mode is adopted for construction of the movie recommender
system. The disaster movie recommender system is divided into three levels. Figure 1 shows the disaster movie recommender system construction process.

![Figure 1. Disaster Movie Recommender System Construction Process](image)

First, the interface layer. The users access the software use port through the interface layer, to guide users to understand the content of the recommender system. Second, the data service layer. The user demand and feedback result are processed at this level. So that the recommender system focus on integration of information, so as to find out the personality characteristics of the users and organize them. Finally, the information is reflected through the information interface. The user will analyze the result data accurately so as to find the disaster movie that he/she is interested in exactly, and achieves the purpose of disaster movie recommender system. During this process, the evaluation system is expanded combining with the Slope One algorithm, to master the students’ movie watching time using the formula and thus adjust the movie recommender system. TOPb recommender provides users with movie watching time of v. The prediction accuracy of TOP is determined by the accuracy and return rate. \( t(e) \) denotes the time \( v \) between selection by the user. We understand that \( f(d) \) denote the user’s real behavior in the test. The accuracy of the recommender results is taking it into the formula \( TOPb = \frac{\sum_{e \in U} |t(e)| \cdot nt(e)|}{\sum_{e \in U} |t(e)|} \). then the test results can be defined as \( TOPa = \frac{\sum_{e \in U} |t(e)| \cdot nt(e)|}{\sum_{e \in U} |t(e)|} \). It can be analyzed through the test results, and then the scores of movies are summed up, so that it presents more consistent with the user’s values and aesthetics.

4.2 Functions of disaster movie recommender system

To design the framework of personalized disaster movie recommender system, the functions of each module in disaster movie recommender system should be determined so as to carry out better movie recommender activities. First, the user module is the basic module. Before using the recommender system, the user should register user information through the user system so as to better perform movie recommender activities. Figure 2 shows the movie user registration flow chart. When the user uses the disaster movie recommender system for the first time, the service system will require the user to register by using the server.

![Figure 2. Movie User registration Flow Chart](image)
The users should register the information in order, and accurately fill in their personal information and preferences, to lay a good foundation for the operation of the movie recommender system. The users may enter the registration page through the information management channel, improve their personal information and establish the information files. During operation of the disaster movie recommender system, the personal information browsing records are processed to obtain their preference, so as to better carry out movie recommender activities. Second, the movie information management module. The movie recommender system will not recommend freely during operation. An administrator shall be set to control the recommender system. Therefore, the movie information management plays an important role in disaster movie recommender system. Administrators have the highest privilege in the movie recommender system, and can add and/or delete movies. As new movies are added, the administrator can read the background information to predict the popularity of the movie, and then arrange a reasonable new movie. When there are excellent movies, the administrator can promote the new movie with their privilege. Second, the recommender technology is the key for operating of the recommender system. The recommender technology will understand the personalized user demand based on the user's registration information and recorded movie watching time etc. Moreover, the recommender technology may recommend movies that they may be interested in according to their interests and hobbies. At the same time, the recommender technology can calculate the new added movie using the algorithm to understand the relevance with other movies, and then develop the occupied promotion region. The use of recommender technologies can reduce cold start by new users and promote the development of recommender movie system.

Finally, a data analysis module is established, which is the most important part of disaster movie recommender system. The data analysis module will generate logs via analyzing the user's hobbies, so as to obtain the user's operation. In addition, the data analysis module can obtain different movie analysis data, and the movie arrangement can be adjusted accordingly.

### 4.3 Disaster movie data resource library

The disaster movie data resource library is the most basic part of disaster movie recommender system. The construction of disaster movie data resource library should follow the flowchart in Figure 3 disaster movie data resource library.

![Figure 3. Disaster Movie Data Resource Library](image)

The disaster movie data resource library contains User Information table, Film Score table and Film Classification table. Of which the User Information table is the most important part of the data resource library. The User Information table contains the user's information, such as name, age, gender and so on. The Film Score table refers to the user’s comment after watching movies based on their subjective initiative. Finally, the Film Classification table. There are similar movies and different movies, which are analyzed using the algorithms base on common features of users. The movie analysis table also includes the calculation of movie scores. The score prediction is
usually calculated by using the root-mean-square error and the average absolute error. In the test data, \( l \) denote the user, \( i \) denote the movie, \( k_i \) denote the actual score of movie \( i \) by user \( l \). \( k_l \) is the score predicted by Slope One algorithm. Then \( REY \) is defined as \( REY = \frac{\sum | lih(h_l-h)|^2}{|h_l|} \), where \( h \) denotes the score of the movie by the user. \(|h_l|\) is the number of reviews given by the user. \( AWE \) is the prediction error calculated using absolute values, and the formula is \( AWE = \frac{\sum | lih(h_l-h)|}{|h_l|} \). The formula \( AWE \) and \( REY \) is important for scoring of movies, which are used to obtain the review of films and recommend disaster movies for users based on the retrieval results. The movie data resource library is important in the movie recommender system, which contains rich movie resources for film screening, so as to improve recommendation efficiency and provide users with a better experience.

5. BRIEF CONCLUSION

A personalized disaster movie recommender system based on Slope One algorithm is designed using the rich movie resource library and key algorithms to promote the construction of a disastrous movie recommender system and improve the disastrous movies recommendation efficiency, increasing the recognition and promoting the development of disaster movie recommender system.

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