LEVERAGING COLLABORATIVE FILTERING AND ASSOCIATION MINING FOR ONLINE PRODUCT RECOMMENDATION SYSTEM

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Abstract

Recommendation engines are used to offer recommendations for products to purchase or events to attend. They lead consumers toward products that meet their needs by condensing the quantity of the informational database. Many ways have been developed for item recommendation, such as content mining, collaborative, and association methods. This research addresses the problem of data sparsity by combining association rule mining and collaborative-based filtering to increase performance. The results are shown, and the recommended recommendation algorithms perform better than the current ones and solve issues with scalability and data sparsity.

Keywords *– Collaborative filtering, Association rule mining.*

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Introduction

A recommendation system is a type of information filtering that predicts user ratings and preferences in order to assist users in making purchases that are in line with their interests and needs. The best example of a recommendation system is Amazon.com's suggested reading list for books. A recommendation system points users in the direction of products and information based on their areas of interest. Product recommendations are made using the following technologies: content filtering, collaborative filtering, and association mining. Content filtering suggests products based on the user's past preferences and his profile. By projecting the user's preferences to those of other users, collaborative based filtering analyses the user's activity. Finding connections and correlations between things in a big database is what association mining does. A condition of the type X Y, where X and Y are two sets of things, is an association rule. It indicates that it discovers a relationship between

X and Y, i.e., it discovers opportunities to purchase Y things when we purchase X. A user who is very active can only rate a small number of items that are present in the database. Data sparsity problem refers to the situation when a popular item can only be rated by a small. Number of consumers. It is sometimes referred to as the "new user difficulty" because it can be challenging to propose any items when a user is brand-new because they haven't given any of the items a rating yet. As a result, making recommendations is challenging.

Since the internet's potential has been accepted and understood, a vast quantity of information is now accessible online. The World Wide Web isa significant research area for this reason. Sarwar, et al. introduced and examined the effects of various similarity

algorithms, demonstrated the experimental findings using the prediction MAE graph, and also argued that the size of the neighborhood influences the accuracy of the forecast. In the initial step of collaborative filtering, Hongwu Ye proposed a method for locating the nearest neighbor through a self-organizing map that creates a group of the nearest neighbors. The use of association mining fills up empty space. As a result, they suggested combining SOM and association mining to deal with the problem of data sparsity. By combining item categorization with an item-based collaborative approach, Hengsong Tan et al. established a novel method to deal with the problem of data sparsity. This method categorizes an object based on its features and then generates predictions for those for which ratings are not available.

Literature Overview

Enhanced User Similarity Combination-Based Collaborative Filtering Method

Recommender systems are frequently employed in electronic commerce to assist customers in making well-informed decisions. Even though the recommender system has access to a wide variety of algorithms, collaborative filtering continues to be one of the most often used and successful recommendation methods. Similarity computation is at the core of the collaborative filtering issue. To improve the accuracy and quality of recommendations, we proposed an improved similarity model that includes three similarity effect variables to lower the variance of the calculation. Our proposed method has two advantages over the traditional similarity measure: it makes full use of rating data and solves the problem of co-rated items. The trials to validate the efficacy of the proposed method included four datasets. The results show that the proposed approach can successfully enhance the recommender system's preferences and is appropriate for sparse data.

In this paper we utilize Association rules, the Digital Library's recommendation system based on user profiles.

Due to the widespread usage of management systems, information data is growing swiftly. On the one hand, people have access to a wealth of informational resources. Conversely, finding the appropriate information becomes harder and more time-consuming. With their extensive book holdings and avid readers, university libraries offer book recommendations as one of their services. This research proposes a user-profile-based approach that creates a model using association rules for lending library books. The result shows that a novel association rule method can be effectively used to library recommender systems.

Academic work on recommendations based on collaborative filtering and association rule mining

Recommendation engines are technologies that help customers find the proper products on e-commerce websites. The rapid advancement of internet technology has led to an increase in the number of websites selling books online, intensifying competition amongst them. This study suggests an online book recommendation system for textbook-reading pupils. This article's main objective is to develop a system for recommending the finest books to students according to their publisher and budget. The integration of association rule mining, user-based collaborative filtering, and classification forms the foundation of this.

A Team-Based Method for Online Customized Suggestion Engine

Collaborative filtering (CF) is an important and popular technology for recommender systems. Nevertheless, problems including a lack of data, poor suggestions, and significant prediction errors plague current CF

techniques. One unique feature of the method is that typicality-based CF finds users' "neighbors" based on user typicality degrees in user groups (rather than the co-rated items of users, or frequently used objects, similar to classical CF).As far as we know, no prior studies have looked into CF suggestion by combining object typicality. Furthermore, it has the ability to produce more accurate forecasts with fewer big-error predictions.

Methodology

A recommender system can be useful for people who don't have the personal expertise needed to evaluate the range of possibilities that a website presents. It provides information to customers to help them choose the products they should purchase. The suggested approach is different from current recommender systems, which just consider user ratings when suggesting products. When an item does not have ratings, it does not suggest it.

Impediments

- E-commerce websites employ recommendation systems as tools to assist consumers in locating the appropriate products inside the database.
- The result shows that the new association rule algorithm is suitable for usage as a recommender system for library books.

The proposed method combines collaborative filtering with association mining. When necessary, association mining is used to find commonalities between objects that will help fill in the gaps left by collaborative filtering. the method by which suggestions are generated. Next, to predict the association between the target item and the target user, item-based collaborative filtering is applied. Therefore, integrating the two methods can assist recommender systems in addressing the issues of cold start and data sparsity.

Advantages

The proposed method combines collaborative filtering with association mining.

In order for the algorithm to suggest products, similar products are compared using collaborative filtering, and where necessary, association mining is utilized to fill in the missing ratings.

The collaborative filtering and association mining architecture of an online book recommendation system is displayed in the above diagram. The online book recommendation system combines the methods of collaborative filtering and association mining. When necessary, association mining is used to find commonalities between objects that will help the system generate recommendations by filling in the blanks left by collaborative filtering. Next, to predict the association between the target item and the target user, item-based collaborative filtering is applied. Therefore, integrating the two methods can assist recommender systems in addressing the issues of cold start and data sparsity.

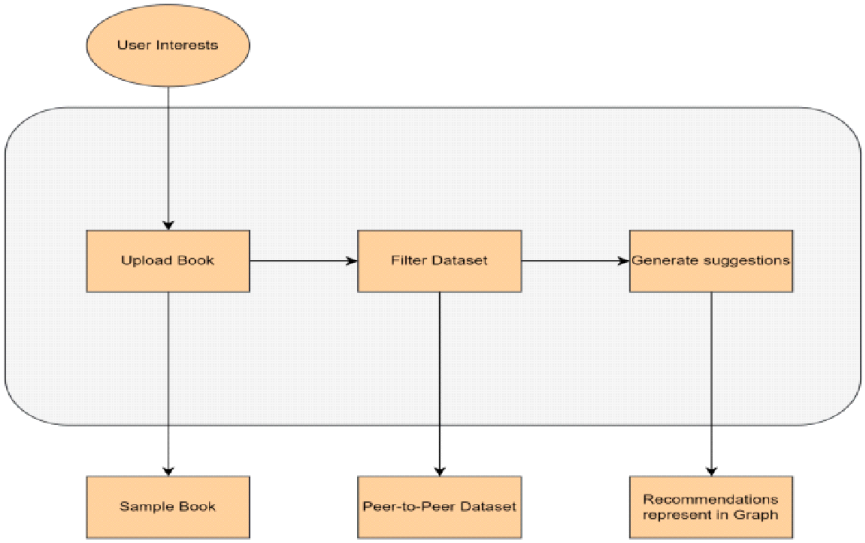
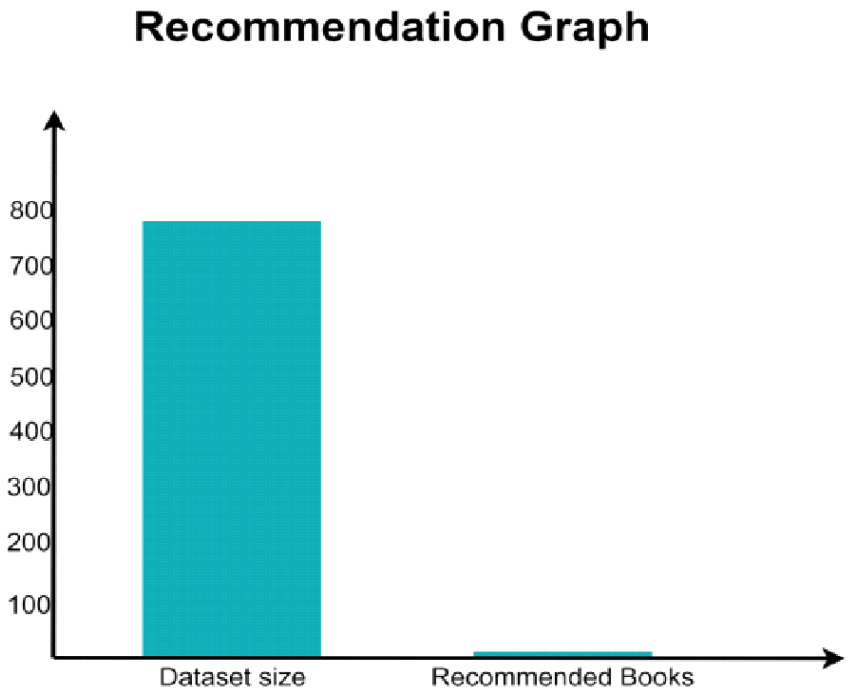


Fig 1: System Architecture

Image 1: System Architecture



Observations :

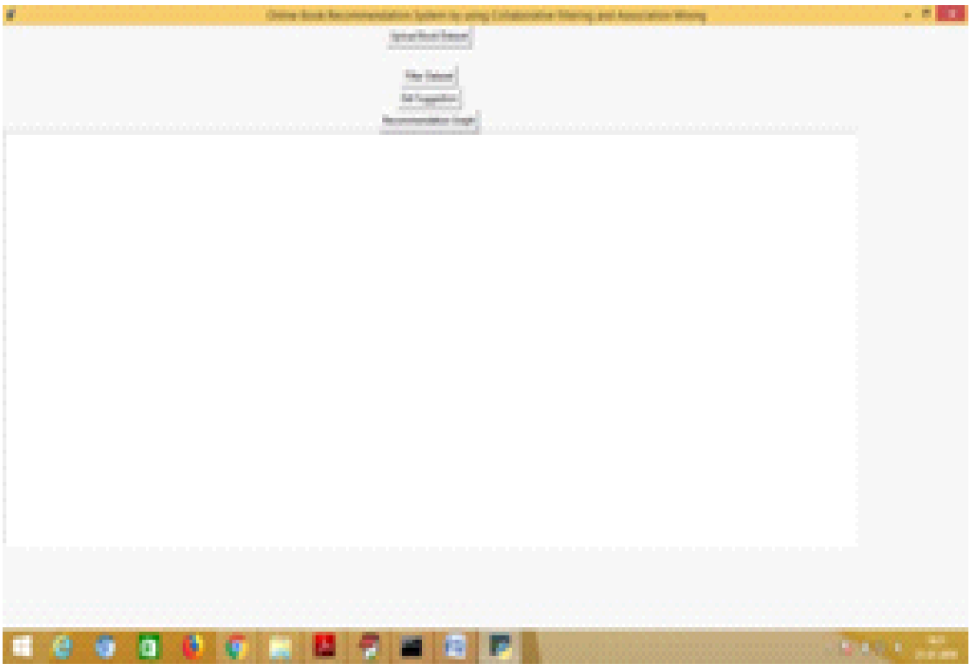


Image 2: Home screen

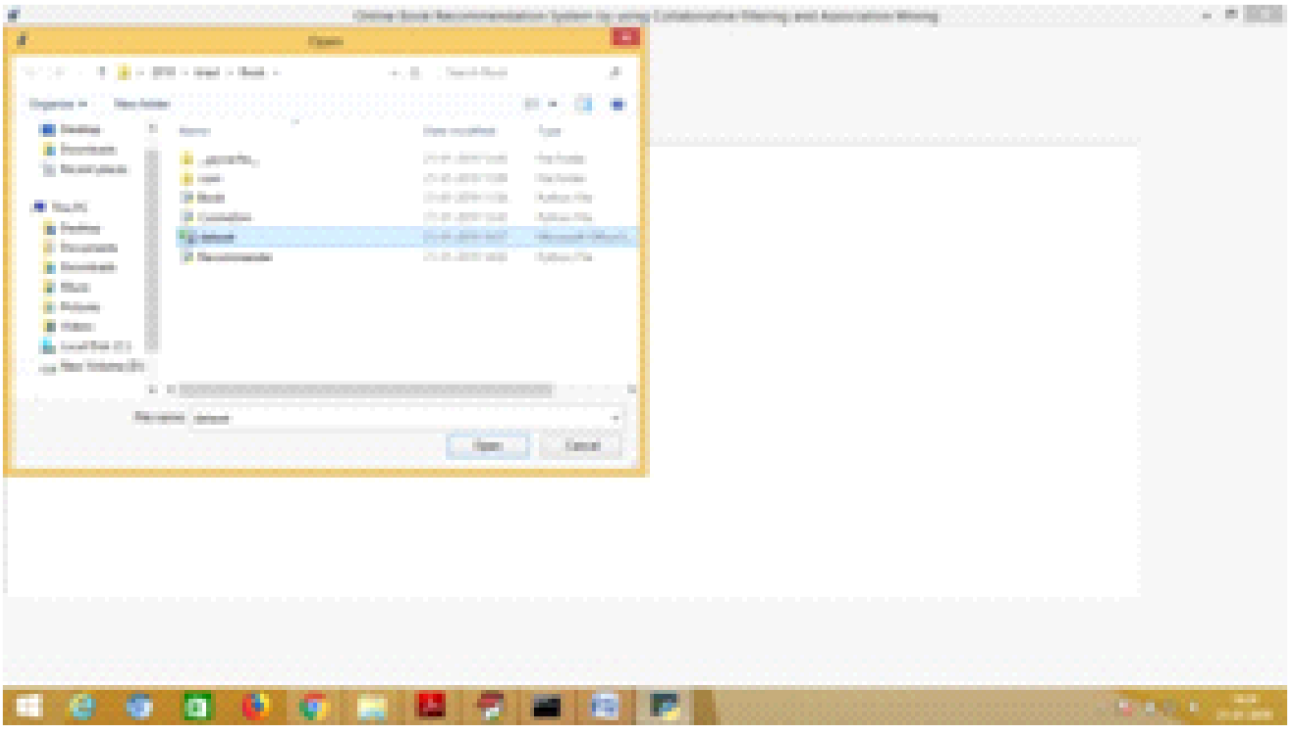


Image 3: Upload book dataset

Image 4: Book data set loaded

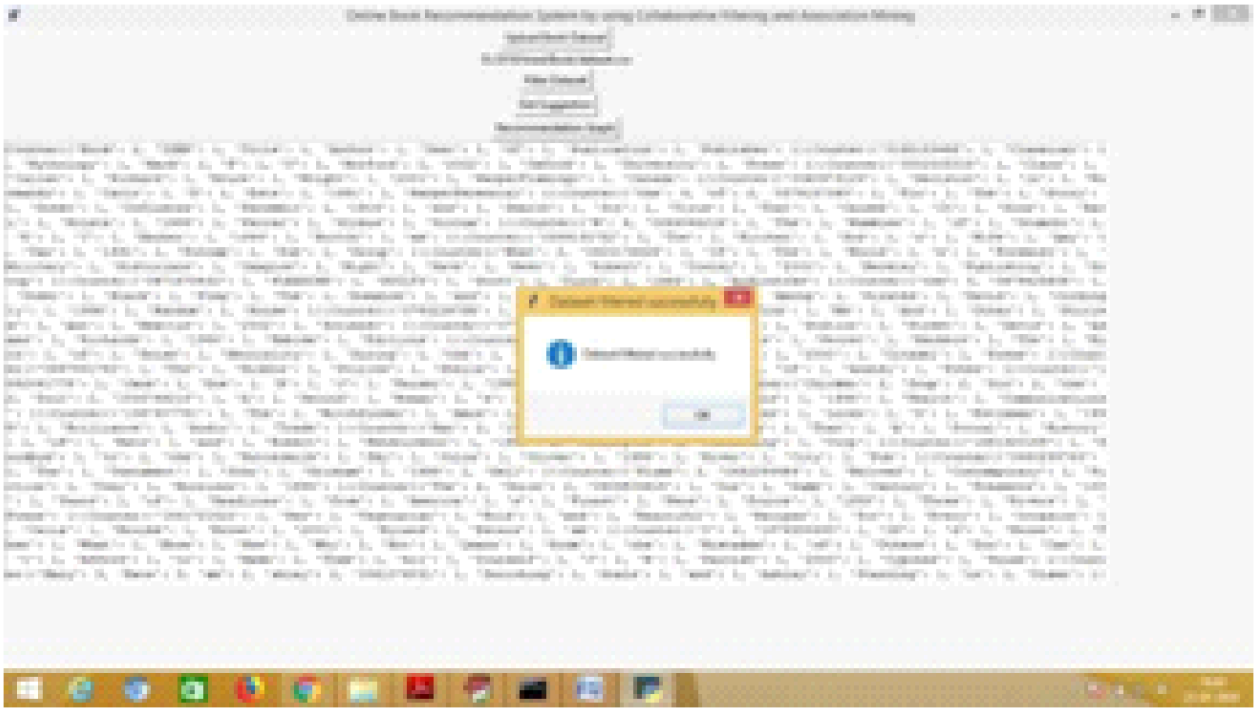


Image 5: Filter dataset

Image 6: Get suggestion

Image 7: Result

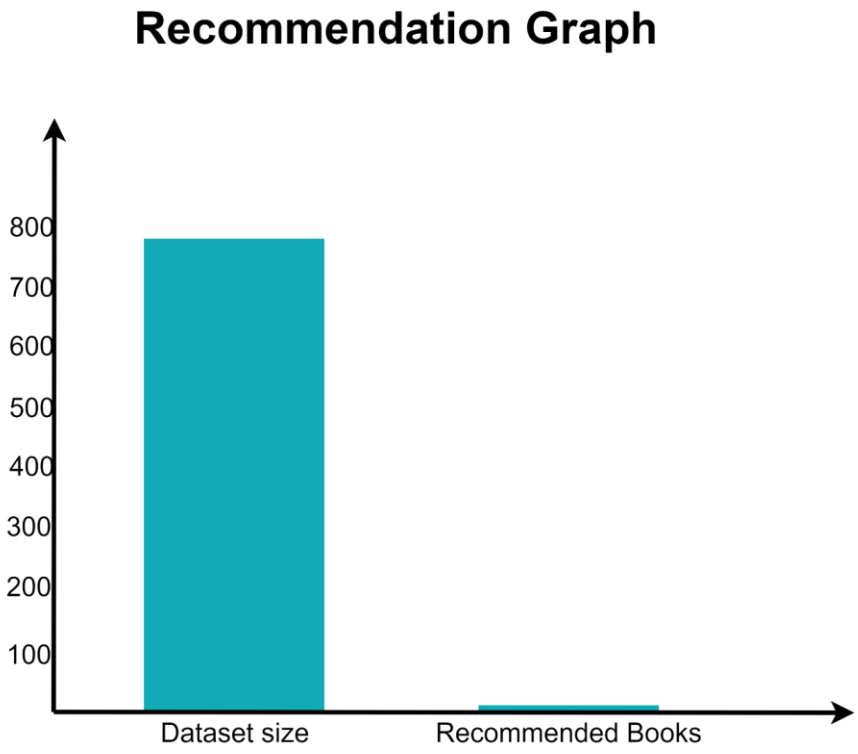


Image 8: The recommended graph

Summary

The increasing demand for online information has led to the development of new techniques for ranking and presenting content of user interest. This paper uses item-based collaborative filtering. In order to produce ratings Thanks to item-based collaborative filtering, the problem of data sparsity can be resolved and insightful recommendations can be generated. Ultimately, the results of the similarity calculation show good accuracy.

Future Work

A product recommendation system's job is to predict a customer's interests and make recommendations to them based on those findings. A recommendation system that uses

filtering can consider multiple aspects, such as the content and quality of the books. Future upgrades will also enable us to boost the speed and accuracy of the recommendation system.

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