Movie Recommender System

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Abstract-*Recommendation systems have become popular over past few decades as they deal with the large amount of information. They provide a mechanism to assist users in categorizing users with similar interests. This makes recommender systems an important chunk of websites and e-commerce applications. They have changed the view of people of searching things of interest over internet. They suggest the users the most admissible products from a massive amount of data. This system has advanced widely in the streams of e-commerce and e-business over the web. This paper presents a movie recommender system which would recommend movies to the user based on the user rating. This system uses hybrid approach, i.e. it combines the features of content-based filtering with the collaborative-filtering algorithm. This system generates recommendations using data about users, the available items (database) and earlier transactions stored in the databases. The user can then browse the recommendations easily and find a movie of their choice.*

Keywords- Collaborative filtering, Content-based filtering, Hybrid approach, Movie Database.

I. INTRODUCTION

The rise of the Internet has made it very difficult to effectually extract fruitful information from all the accessible online information. The large amount of data demands mechanisms for efficient information filtering. Recommender systems have become an answer to the need of personalization. Recommender Systems (RSs) are the software tools that provide suggestions for items to be of need to a user [1]. The customer usually gives the recommender system data like the characteristics of the product he is looking for. The recommender system applies one or several recommendation techniques on these data and then recommends products to the customers [2]. They can be described as the tools and techniques offering recommendations of items to a user. Users today are facing with the problematic situations that have enormous options. Recommender systems are now commonly used for both research and commercial purposes, where many methods and techniques have been suggested for providing recommendations. The proposed system for the movie recommendation uses both Collaborative Filtering algorithm (CF) adding some features of Content-Based Filtering algorithm (CBF).

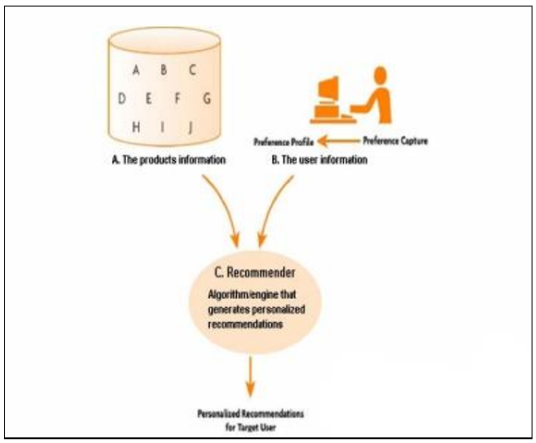

Figure 1: Recommender System

II. RECOMMENDATION APPROACH

A. Content-based approach

Content-based filtering, also called cognitive filtering, recommends items based on a similarity between the content of the items and a user profile. In this approach, systems work with profile of users created at the beginning. A profile stores data about a user and his taste. Taste depends on how the user rates the movies. Generally when a profile is created, recommender system performs analysis and receives initial details about a user to avoid the new-user problem. In the recommendation process, the system compares the items that were already liked by the user with the items he did not rate and those will be recommended to the user [3].Those items that are mostly similar to the positively liked ones, will be recommended to the user.

Strength of this method lies in recommendation delivery even when ratings received are lesser or none at all, as long as there is certain information about each item in the system. Each item however must be characterized along with the features in user's profile. These descriptive features are either acquired or engineered [4].

B. Collaborative approach

Collaborative filtering is the method of extracting information or patterns using techniques which involve collaborations among various agents, viewpoints, data sources,

etc. Collaborative filtering methods have been practiced in different fields of data including: financial data, monitoring and sensing data, or in electronic commerce and web applications, etc. Collaborative filtering is used for predicting the interests of a user by collecting preferences or taste information from many users by means of combination. Collaborative filtering is widely used in e-commerce. Customers can rate books, songs, movies and then receive recommendations about the same in future.

It has become one of the most researched techniques of recommender systems since 1997. Its basic idea is identification of like-minded users along with their cross recommended items; items that like-minded users have liked, but the user on the receiving end is yet to receive [4]. Such users build a group also called as neighborhood. A user gets recommendations for those items that he/she has not rated before, but they were already positively rated by users in his/her neighborhood [3]. One of the advantages it has is that in spite of heavy calculations, it produces highly correct recommendations for a significant number of users in a timely manner. As the method draws on user-user similarity information to decide and pair like-minded users; users who are likely to rate some specific content, it does not need any type of description about the content as it only uses users' ratings for evaluation of their degree of agreement. User-user similarity information includes rating given by both users. Rating differences that figure user like-mindedness are stored in a database to intercept similar users when generating recommendations [4].

Considering the details of methods of collaborative filtering we can distinguish most popular approaches: user-based and item-based.

1. User-based approach: This approach was proposed by the professor of University of Minnesota, in 1990s. In this approach, the users perform the main role. A certain majority of the customers having the same taste form one group. Recommendations given to user are based on opinion of items by other users from the same group, with whom they share common preferences. The items positively rated by the community will be recommended to the user.

Figure 2: User Based Collaborative System

2. Item-based approach: This approach was proposed by the researchers of University of Minnesota in 2001. Considering that the taste of users remains almost constant, similar items build neighborhoods based on acknowledgement of users. Afterwards the system generates recommendations with items in the neighborhood that a user would prefer [3].

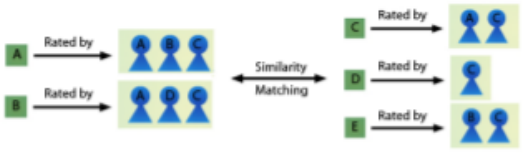

Figure 3: Item Based Collaborative System

C. Advantages and Disadvantages:

1. **User independence** - Content-based recommenders gain ratings given by the active user to create their own profile. Instead, collaborative filtering methods take ratings from other users to find the "nearest neighbors" of the active user, i.e., users that have similar tastes since they rated the same items similarly. Then, only the items that are most liked by the respective neighbors will be recommended [5].

2. **Transparency** - Explanations on how the recommender system works can be given by precisely listing content features that cause an item to occur in the list of recommendations. Those features show whether the recommendations are trustworthy or not. On the contrary, in collaborative systems, the only explanation for an item recommendation is that unknown users with similar tastes liked them [5].

3. **New item** - Content-based recommenders also recommend items not yet rated by any user. As a result, there is no first-rater problem, which affects collaborative recommenders which rely completely on users' preferences to make recommendations. Therefore, until the new item is rated by a considerable number of users, the system cannot recommend it [5].

4. **Limited content analysis** - Content-based techniques restricts the number and type of features associated, automatically or manually, with the objects they recommend. Domain knowledge is often needed, as no content-based recommendation system can give suitable suggestions if the analyzed content does not have enough information to single out items the user likes from items the user does not like. Some representations grab only certain aspects of the content, but there are many others that would influence a user's experience [5].

5. **Over-specialization** - Content-based recommenders have no in-built method to find anything unexpected. The system suggests highly rated items when checked with the user profile, so that the user will be recommended items similar to those already rated. This drawback, also called serendipity problem, highlights the tendency of the content-based systems to produce recommendations with a limited degree of uniqueness [5].

6. **New user** - Enough ratings have to be collected for a content-based recommender system to properly understand user preferences and give suitable recommendations. Therefore, when few ratings are available, as for a new user, the system will not be able to provide reliable recommendations [5].

III. HYBRID SYSTEM

Hybrid recommender systems are based on the combination of Collaborative filtering and Content-based filtering. These overcome the limitations of natal CF approaches. It improves the prediction performance. Importantly, it overcomes the CF problems which are shortage and loss of information. Given two or more basic recommender system techniques, several ways have been proposed for combining them to create a new hybrid system. However, they have increased complexity and are expensive to implement. Usually most of the existing commercial recommender systems are hybrid, such as, Google news recommender system.

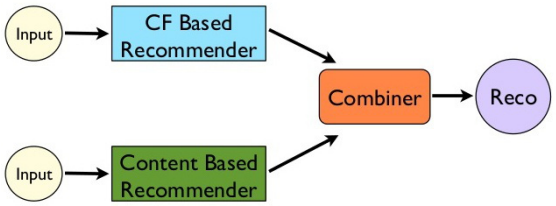

Figure 4: Hybrid Recommender System

IV. PROPOSED SYSTEM

When content-based algorithms is applied to large database of items available, the recommendation provided by the system were not accurate. Poor quality items were also recommended due to their similarity with the user's previously rated item. Similarly, when collaborative algorithm is applied, movie that has not been viewed by any users will not be recommended to anyone which adds to its disadvantages. This problem of collaborative filtering algorithm can be solved by adding the features of content based algorithm to it. The flow of the algorithm is as follows:

1. The admin creates and manages the movie database. The admins adds movie to the database.
2. Every user creates their own account while using the system.
3. There is a list of movie available for the user. Those movies that user has already seen should be rated by them. Along with the ratings, the user should also select the genre he liked in that movie. Based on the genre, the calculation of content based algorithm is done.
4. Based on the user-ratings, the calculation of collaborative algorithm is done
5. Both the outputs are combined for the result.

The flow of content based algorithm is as follows:

1. Initially, weights are 1, and threshold = 2.5
2. For each rated example determine sum of weights for present features
– If sum above threshold, and user did not like item, then divide weights of item features by 2
– If sum below threshold, and user did like item,then multiply weights of item features by 2
3. Recommend items with highest sum

V. RESULT

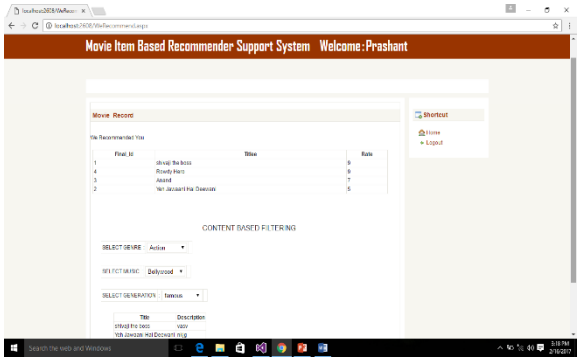

Figure 5: Output of Hybrid System

VI. CONCLUSION

The three recommender systems have their advantages and disadvantages in performing their job. Most of the limitations in each one of the approaches can be complemented by the other. A good recommender system should provide positive and relevant recommendations from time to time and alternative recommendations to break the fatigue of the users seeing the same items in the recommendation list. The synchronization of various profiles

implies the need of huge amount of computational power, network bandwidth etc. Current algorithms and techniques have relatively high memory computational complexity, which leads to long system processing time and data latency. Therefore, new algorithms and techniques that can reduce memory computational complexity, eventually eliminates synchronization problems**.**

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