

Recommendation System for Video Streaming Websites Based on User Feedback

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Abstract: Now a days world business organizations are mostly focused in e-commerce for enlightening their business as well as supporting their users. In the modern era, vast amount of information is generated from the internet which is open to the users. Recommendation system is midway between internet and user which expects user interests. This paper primarily focusing on developing the recommendation system for video streaming sites. The recommendation engine mainly works on content based, collaborative based filtering algorithms. But both has limitations in their own way. The content-based filtering has a shortcoming that, it restricts recommendations of the items that are of same category. Whereas in the collaborative-based filtering algorithm, it doesn't recommend items based on the user's past behavior. So, this system is developed using a hybrid algorithm to overcome the problems of above two algorithms by retrieving feedback from the users and calculating semantic factor from the feedback to improve the efficiency of the recommendation system. So that lets companies can better understand the user, make available personalized stores, and increases the satisfaction of the customer and their loyalty.

Keywords : Content-based filtering, Collaborative based filtering, e-commerce, Recommendation system.

I. INTRODUCTION

The growth of Internet has reformed everyone's regular life. Individuals spend most of their time in the internet, like electricity bill payment, checking weather report, online food ordering, and other entertainment activities. By utilizing World Wide Web, large number of population who are more than 1.9 billion surrounded by the world have to acquire information globally from the resources like internet. 75% of the content that nations watch which follows a recommendation was stated by Netflix[9]. Definitely, there is a more demand for video recommendation in the era of information explosion. Video streaming websites such as Netflix, Hulu, Movielens, etc. provide bulky amounts of videos online, so that many users can attract for numerous purposes such as news broadcasting and entertainment. Internet users have so many possibilities to choose. But, they want assistance in exploring the possibilities. Recommendation system offer such kind of assistance by providing custom-made sites of videos to users which are

created based on the activity of the user on site. Recommendation systems have the ability to change, how the websites can communicate with users and allow companies to capitalize their profit based on the information they gathered on each consumer's preferences. The recommendation system can be used in various domains. Mathew et al proposed recommendation system for book to the buyers [1]. In this system, the quality of books are suggested based upon the ratings specified by existing customers. Jain et al developed recommendation system for journals using content based filtering technique [2]. This system recommends the journals which are close to their domain. But it is fully dependent on the user input like abstract, title, keywords. Vipul et al proposed product recommendation system based on collaborative filtering technique [3]. This system recommends the products founded on like-minded users. i.e. when multiple users infer same ratings on the product then they have similar likings. But this technique has a drawback of cold start problem for a new item and a new user. Even though the new item is most relevant to the user, it is not recommended to the user. This is because it is difficult to extract ratings as it is new item. According to the Alan et al this problem can be overcome by getting the user preferences about the item that they are collaborated through social networks [7]. Also this system can't recommend the items to the users with uncommon taste. Because, it is very difficult to find the like-minded user. Various techniques like content based, collaborative based, demographic based, and knowledge based filtering techniques for recommendation system. But these are having limitations in their own way when applied separately will give poor recommendations. To get better recommendations multiple techniques together can be used. Tran et al proposed a new hybrid technique which combines collaborative filtering and knowledge based techniques. But a problem with this technique is, getting difficult with knowledge engineering for knowledge-based systems [6]. It was concluded that the combination of semantic in recommendation methods which can give better recommendation was stated by Shaik et al [4,5].

II. RECOMMENDATION SYSTEM TECHNIQUES

These days, recommendation system is used mostly in almost all E-commerce websites, supporting lots of users. Few e-commerce sites like Movielens, Hulu and Netflix for movies, Amazon and Flipcart for clothes, books, etc. The outcome of the recommender system is helpful for both users as well as business organizations. This system can be categorized into three types based on how the system is recommended to the user.

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A. Content Based Filtering Technique

This can also be called as cognitive filtering. This technique recommends products to the user based upon user's interest, i.e.

by picking up the item with the same content. From Fig. 1, user 'A' likes comedy movies but that user will never know except the user wants to give it a try autonomously. Because this technique recommend the movies which are similar to comedy movies. The model can only make recommendations based on existing interests of the user. In other words, the model has limited ability to expand on the users' existing interests.

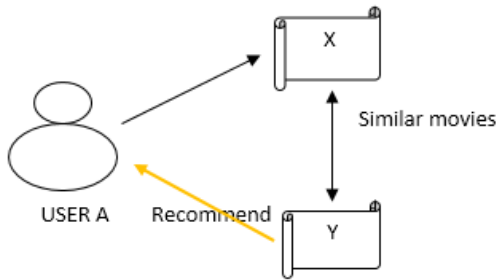


Fig. 1. Content based filtering technique.

B. Collaborative Based Filtering Technique

It is based upon history of movie ratings given by the user. By looking at the items in common, this algorithm predict the rate of a movie for a user who hasn't watched it yet, based on the similar users' rates. From Fig.2 user 'A' likes comedy movies, dystopian movies and horror movies a lot. User 'B' also enjoys comedy movies and dystopian movies but never watched horror movies. The collaborative filter will recommend horror movies to user B. This can be done based on the same taste that the two users have. In this technique, the quality of the recommendations depends on the size of the previous rating dataset. It also generates gray sheep problem and privacy issues.

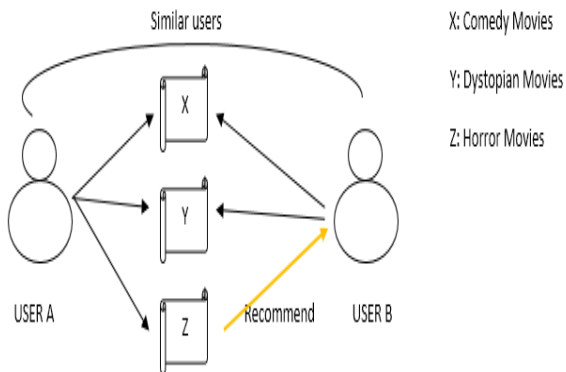


Fig. 2. Collaborative based filtering technique.

C. Hybrid Approach

In order to get better performance, two or more methods must be integrated. In recent years huge data is collected from the web resource. Therefore it is unattainable to recommend the products based only on collaborative or content based

recommendation system. That's why, many users would like to surf e-commerce web sites where incorporating these methods. All most all e-commerce web sites are using hybrid recommendation system only.

III. PROPOSED APPROACH

A new adaptive hybrid technique has been proposed which combines both content and collaborative filtering techniques to make better recommendations based on user feedback. The movie being recommended to the user could be a rating which is extracted from the semantic analysis of the user feedback. The following Fig.3 shows the workflow of the recommendation system.

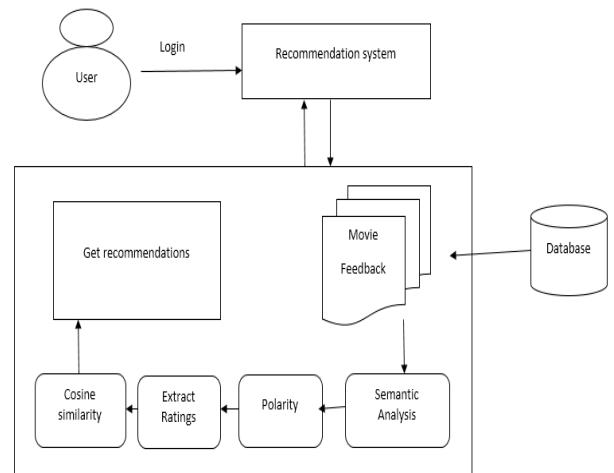


Fig. 3. Workflow diagram.

A. Collection of Datasets

The dataset used in this work is IMDB movie feedback dataset. IMDB stands for internet movie database. Dataset consists of reviews from the users. It consists of attributes such as user ID, movie ID, feedback. IMDB dataset consists of 25000 reviews and 2500 userID's 1001 movieID's used for the recommendation system. Here user reviews are in the form of comments.

B. Semantic Analysis

Since user reviews are raw text, we need to extract user feelings emotions must be extracted. Semantic analysis is the procedure where computationally recognizing and classifying feelings, moods, or expressions in a piece of text, especially to find the attitude of the user towards a movie, or product, etc. is positive, neutral, or negative. Usually, sentiment analysis gives finest results on text having feelings, moods, or expressions expressed by the users. It finally draw the meaning of the sentence in a context-free form by means of an independent sentence.

C. Polarity

In this step, polarity is calculated for each user review by using natural language processing tools. This factor states that, whether a statement is positive, neutral, or negative.

For each review which is given by the user, polarity is assigned in the range -1 to +1. This value is different for different statements. The polarity range for positive statements is from >0.00 to 1.0. The polarity for neutral statements is 0.00. And polarity range for negative statements is from -1.0 to 0.00. 4.

D. Extract Ratings

In this step the ratings are extracted from the calculated value of polarity. Since the polarity is in range of -1 to +1, in the following way the ratings are drawn from polarity.

- Rating 1 is assigned for all negative values.
- Rating 2 is assigned for range of polarity 0.1 to 0.3
- Rating 3 is assigned for range of polarity 0.3 to 0.4
- Rating 4 is assigned for range of polarity 0.4 to 0.5
- Rating 5 is assigned when polarity is greater than 0.5.

Once the ratings has been extracted, the next step is to find the correlation between user and movies. The following table I shows the relation between user and movie.

Table- I: Correlation Table

User/Movie	Movie1	Movie2	Movie3
User1	5	0	5
User2	0	5	3
User3	4	3	2

E. Cosine Similarity

Based on the correlation table cosine similarity is calculated which determines, how similar the users/product are. It is the normalized dot product between the two users. The geometric formula of the dot product as derived from following Equ.(1) are part of a sentence, as in

$$A.B = \|A\| \|B\| \cos(\theta) \tag{1}$$

The algorithm calculates cosine similarity of rows i.e. users or columns i.e. movies and recommends the items that which are alike. If the cos(angle) is '0', then the users are not similar to each other. If the cos(angle) is '1', then the users are mostly similar to each other. Table II shows the cosine similarity between users to user. Formula for Cosine similarity as derived from following Equ.(2)

$$sim(A, B) = \cos(\theta) = \frac{A.B}{\|A\| \|B\|} \tag{2}$$

Table- II: Cosine Similarity Matrix

User/User	User1	User2	User3
User1	1.0	0.7	0.5
User2	0.7	1.0	0.3
User3	0.5	0.3	1.0

F. Generate Recommendations

Finally, to generate the recommendations to the user, we need to find top similar users for the particular user to whom need to recommend based on the cosine similarity matrix. Once the top similar users are retrieved, find out the movies which were rated by those top users. These movies are sorted according to the ratings and then recommend these movies to the user. The following Table III shows the top similar users for user ID '1' and Table IV shows top recommendations for

that user.

Table- III: Similar Users of User ID '1'

User ID	Similar Users
1	1365
1	2415
1	1349
1	358
1	2257

Table- IV: Movie Suggestions for user ID '1'

User ID	Movies Recommended
1	974
1	468
1	59
1	568
1	662
1	10
1	811
1	983
1	121
1	640

IV. RESULTS AND DISCUSSIONS

Fig 4 shows the experimental results of the recommendation system. User ID is accepted as an input to the system. And it suggests movies which were rated by similar users for the user ID. And Fig 5 also shows recommendations of top 10 movies to the new user.

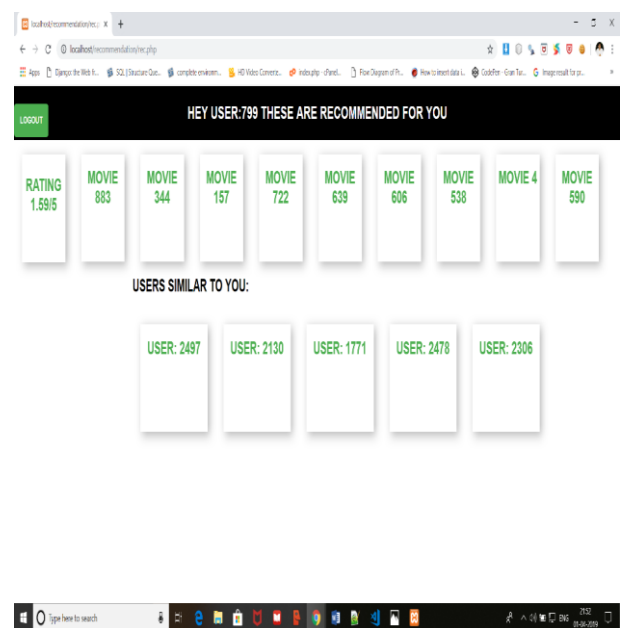


Fig. 4. Sample form of getting recommendations

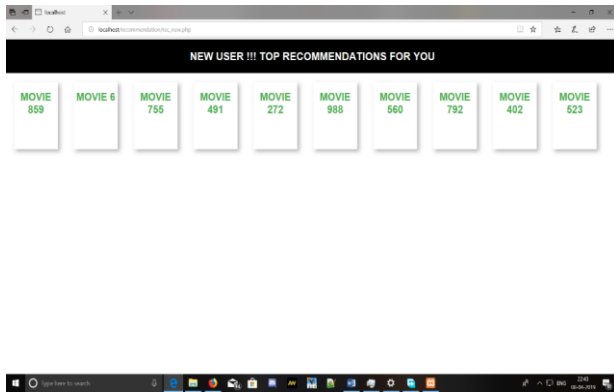


Fig. 5. Sample form getting recommendations for a new user

V. CONCLUSION

Now a days, internet has becoming an apparent for all the world organizations in which video streaming and e-commerce plays an important role. A new hybrid model has been built based on the technique with semantic analysis of user review. The results showed that it will help users to better satisfy their needs with less effort less work and less spending time.

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