

Movie Recommender system using Sentiment Analysis

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Abstract - In Today's era, Recommendation systems are the most important intelligent systems that play in giving the information to the users. Previously approaches in recommendation systems (RS) include Content-based-filtering and collaborative filtering. Thus, these approaches have certain limitations as like the necessity of the user history as they visit. So as to make back the effect of such dependencies, this research paper provides a hybrid RS are those which mixes both Collaborative filtering, Content based filtering with sentiment analysis of movies. In this research paper, we developed a recommender system based on the sentiment of the user to suggest the movie to the user based on their view history.

Keywords: *Recommendation Systems, KNN algorithm, Collaborative filtering, Item-based collaborative filtering, Content based filtering.*

I. INTRODUCTION

In today's Era, Internet has widely become an often face the matter of excessive available information. Recommendation systems [1.] are mainly designed for user to make the choices based on their previous choices. These are mostly seen in e-commerce applications and knowledge management systems like entertainment, online-shopping and tourism.

Movie Recommendation Systems helps us to see looking for our preferred movies and also reduce the time to find our favorable movies. The first important thing is to see the movies that we have watched and visited in our past based on that RS suggests us some recommendation movie. Now-a-days, with increase in amount of online data [2.], RS are very beneficial for taking decisions in several activities of day-to-day life. RS are mainly classified into two categories: Content-based filtering (CBF) and Collaborative filtering (CF).

While designing and working of the movie recommender system as designed based on the sentiment of the user and their feedback on the particular movie [3.]. Our system will suggest the best movie to the user based on their previously watched movie and the rating of the user. The sentiment of the user is recorded in the form of good and bad. If user likes the movie they can give Good smiley and if the experience is not good they can Give Sad reaction, based on that recommendation of movie is given to the user.

II. RELATED WORK

There are so many techniques that have been already studied about the recommender system. Some of them are based on amount of weighting of the data and other as based on user interest. There are so many algorithms already developed for this that will reduce the time of the user and difficulty level.

It requires a lot of prior knowledge on the basis of rating of the movie given by user. It mainly uses movie datasets for evaluation and testing purpose [4.]. But the algorithm, system designed are not working efficiently, but the study is in process to resolve this issue and make the system more perfect and accurate.

- Collaborative Filtering System
- Content based System
- Hybrid System

A. Collaborative Filtering System

Collaborative filtering is mostly used in the prediction of recommender system based on the 2 formula narrow and the general. Now, the meaning of the narrow means predictions that have to be developed or evaluated based on the automation prediction [5.] that helps user to select the preferences based on the other user. Let us take an example suppose Mohan likes a product X and gives his opinion at the same time Ram also likes the product and give positive feedback on it then, so Mohan will have the other feedback on other product based on others review. CF is mostly used in the various data like financial data, mineral exploration etc. These are also classified into two more categories:-

- Memory Based approaches
- Model Based approaches

B. Content-based Filtering

CBF formally known as Content Based Filtering works with a motive to use the feature of the dataset and recommend [12.] the suggestion same as the item that are close and parallel to the user likes and dislikes based on their past action and their rating on the particular items.

Content based filtering also suggests the values or movies that will be watched or retied in the past. It automatically see our reviews on the particular item for the dataset that we have given and recommend us the item that are similar to that.

Our system suggests the user a movie that is based on the interest of the user and the genres that the user has already watched. From the large dataset user can give their rating on the particular movie that has been viewed by the used suggest the same on their interest.

C. KNN Algorithm

It is one of the most important algorithm that will be used for the recommender system. The full name of this algorithm is K nearest neighbour [7.]. The work of the motive of nearest neighbor as if the most of the items that are close to the item that it belongs to will be put or comes under the same cluster in which the distance of the item is shortest to the neighbor items. As example suggest that the distance of T item is close to B cluster and are also identical to it so it belongs to cluster B family.

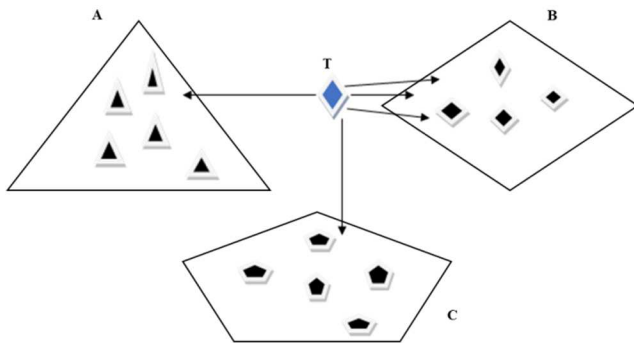


Fig.1 ..KNN algorithm Example

D. Collaborating Filtering Algorithm

The main objective of this algorithm is defined only on two work one is project based and another one is known as user based. But the algorithm that is mostly used for this purpose is known as user based that is highly effective for the recommendation purpose of the user.

The main role of this algorithm is to predict the user need based on the other user interest and suggest the similar items to the user. This algorithm [8.] is very helpful in our recommender system to identify the movies for the user on their interest.

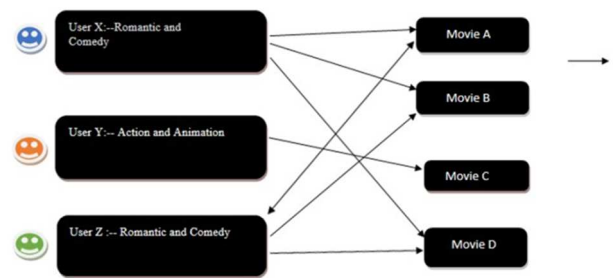


Fig 2. User CF Algorithm Example

For Better understanding of this algorithm we have to give one example on this

Let us suppose the user X likes the movie that is Romantic and Comedy and he mostly watch the movie (A,B,D).Secondly for the user Z also likes the same movie of Romantic and Comedy but he wants to see only Movie(B,D).Here we see that the User X and User Z interest are same but we can suggest user Z the movie A because it was watched by user X and both the user have parallel interest.

In the same user Y likes to watch only movie C but it is Action and Animation but didn't liked by User X and Z so this will not recommended to user X and Z [9.].

III. RESEARCH METHEDOLOGY

A. KNN Collaborative Filtering Algorithm

The filtering algorithm of KNN that will also known as Collaborative filtering[9.] algorithm we have used both the algorithm in same and used on the KNN algo to identify the neighbor of the item of shortest distance . The most common work done by the use of this algorithm is for the formulating of the neighbor and recommend or predict the calculated score.

a) Calculating Similarity between Users

The closeness between the agent is evaluated by calculating the value of an items evaluated predicted by the two users on their recommendation it predict the similarity [10.].

Each user who wants to predict movie will assign a N-dim vector to show the item score, In case of understanding we have given an example, to formulate the closeness of X1 and X3, first of all we have to decide out list of movies and they will be labelled as {M1, M2, M4, M5} and then after the parallel scores of these movies. The finded score vector of the X1 is {1,3,4,2}, and the vector score of X3 is {2,4,1,5}. The closeness of X1 and X3 is evaluated by the cosine parallel formula.

<u>X/M</u>	<u>M1</u>	<u>M2</u>	<u>M3</u>	<u>M4</u>	<u>M5</u>
<u>X1</u>	1	3	3	4	2
<u>X2</u>	3	1	4		
<u>X3</u>	2	4		1	5
<u>X4</u>	2		2		

Fig. 3. users' similarity evaluation

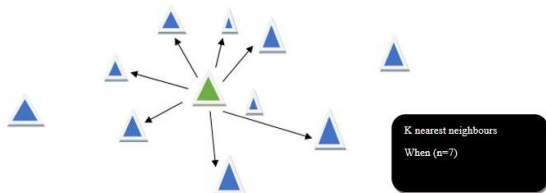
The correspondence of m or m' will be defined as $\text{sim}(m, m')$, Formula that will be likely to used for the correspondence is only one that is Cosine similarity.

Cosine parallel is used to calculate the similarity between two user as on their angle of the cosine [13.] between the two users as a vector.

$$\text{sim}(x, y) = \cos(\vec{X}, \vec{Y}) = \frac{\vec{X} \cdot \vec{Y}}{|\vec{X}| \cdot |\vec{Y}|} = \frac{\sum_{s \in S_{xy}} r_{x,s} r_{y,s}}{\sqrt{\sum_{s \in S_{xy}} (r_{x,s})^2} \sqrt{\sum_{s \in S_{xy}} (r_{y,s})^2}}$$

b) KNN Selection of Nearest Neighbour

Now as to evaluate the of similarity in the form of $\text{sim}(u, u')$ of the users, then the given KNN algorithm takes the number of the users as they matches with the neighbour of U , it will be given as u' , Now we have to select to initialize the K value for the selection of the neighbor this will identify as K of the most similar neighbors in the form of the value of a neighbor like as a user.



c) Predict Score Calculation

Now we have discovered the K nearest neighbor so after determining this, after this we have to calculate the score of the item close to their neighbour. The main formula used for calculating the score prediction is given as follow:-

$$r_{u,i} = \bar{r}_u + k \sum_{u' \in U} \text{sim}(u, u') * (r_{u',i} - \bar{r}_{u'})$$

$$(k = 1 / \sum |\text{sim}(u, u')|)$$

The steps that are given below will be used for the prediction purpose only of the score [6.].

Step 1: Generate user as the 2D matrix of the score in the form of $R_{m \times n}$.

Step 2: Use the formula of Cosine Similarity that will helps to identify the similarity of the users who wants to watch the movie then, it will generate the matrix that is similar to the user view.

Step 3: As the result obtained in step 2, we have to find a N number of the score that which shows the maximum amount, that will be identical to the K with the neighbours that is u .

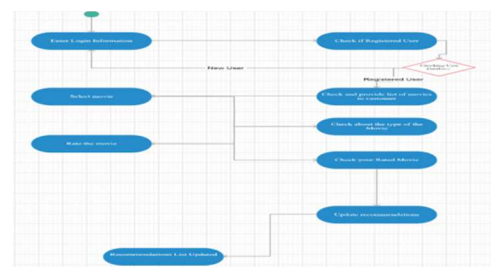
Step 4: Apply predict score formula and evaluate the value of i for the target u .

So KNN collaborative filtering [11.] algorithm helps to predict the movies for the user. It is also based on that that this project will be used to recommend the movie based on the user sentiment. It can also suggests the user the preferences based on the user login details into the server of our prototype and it can recommend the movies as we see in the Netflix and Amazon Prime video that will suggests the user the movie based on their previous search.

IV. SYSTEM DESIGNING OF THE SYSTEM

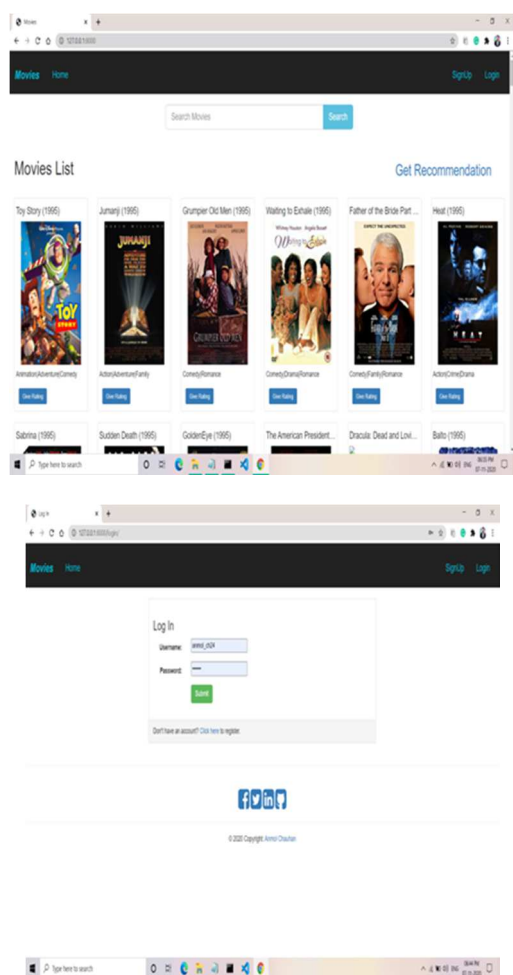
A. Architecture Diagram

This architecture diagram shows that how our project work while running it on the server .It will recommend the movie to the user who wants to watch based on the preferences of their past.



V. EFFECTS OF THE OPERATION ON OUR SYSTEM

Our system working will suggest the user login system that have to collect the user's all the kinds of behavioral characteristics and that are stored in the database [14.] of the user in the mode of the login module of the user. Then after logging in to the system, the system will automatically gives the suggestion to the user of the movie based on their recommendation.



VI. CONCLUSION

For the given information, movie recommender system is very useful in our life to reduce our time and difficulty for searching a particular movie as the user wants. This research paper will be designed for the movie recommendation based on the sentiment analysis of the user and we have used many ML algorithm in this paper like Collaborative filtering

[15.] Algorithm with KNN algorithm. I have evaluated and test the working of our system based on large dataset that has to be used for the movie recommendation for the user, it works very efficiently. This paper will suggest and gives a basic ideas of the movie recommender system using the sentiment of the user.

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