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Movie Recommendation System

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ABSTRACT - Today the amount of information in the internet growth very rapidly and people need some instruments to find and access appropriate information. One of such tools is called recommendation system. Recommendation systems help to navigate quickly and receive necessary information. Many of us find it difficult to decide which movie to watch and so we decided to make a recommender system for us to better judge which movie we are more likely to love. In this project we are going to use Machine Learning Algorithms to recommend movies to users based on genres and user ratings. Recommendation system attempt to predict the preference or rating that a user would give to an item.

Keywords-*recommendation; machine learning*

I. INTRODUCTION

During the last few decades, with the rise of Youtube, Amazon, Netflix and many other such web services, recommender systems have taken more and more place in our lives. From e- commerce (suggest to buyers articles that could interest them) to online advertisement (suggest to users the right contents, matching their preferences), recommender systems are today unavoidable in our daily online journeys. In a very general way,recommender systems are algorithms aimed at suggesting relevant items to users (items being movies to watch, text to read, products to buy or anything else depending on industries).There is a wide range of products like music, movies, articles and etc. that can be recommended to the customer based on their profiles in internet shops or even social networks, browsing history such as visited links, browsingactivity like number and time of visits and other online behavior. The movies suggestion at Netflix is best example of recommendation system .Recommendation System directs the way to find products, Information according to their interest. Recommendation system uses following technologies torecommend products: Content filtering, Collaborative filtering & Association mining. Content filtering recommends item which is based on Users profile, which he has liked in past. Collaborative based filtering is method to analyse the user's behavior by predicting the users taste to that of similar to otheruser.

II. LITERATURE REVIEW

MOVREC [1] is a movie recommendation system presented by
D.K. Yadav et al. based on collaborative filtering approach.Collaborative filtering makes use of information provided by user. That information is analyzed and a movie is recommendedto the users which are arranged with the movie with highest rating first. The system also has a provision for user to select attributes on which he wants the movie to be recommended.

Luis M Capos et al. [2] has analyzed two traditional recommender systems i.e. content based filtering and collaborative filtering. As both of them have their own drawbacks he proposed a new system which is a combination of Bayesian network and collaborative filtering. The proposed system is optimized for the given problem and provides probability distributions to make useful inferences. A hybrid system has been presented by Harpreet Kaur et al.

[3]. The system uses a mix of content as well as collaborative filtering algorithm. The context of the movies is also considered while recommending. The user - user relationship as well as user - item relationship plays a role in the recommendation. Theuser specific information or item specific information is clubbed to form a cluster by Utkarsh Gupta et al.

[4] using chameleon. This is an efficient technique based on Hierarchical clustering for recommender system. To predict the rating of an item voting system is used. The proposed system has lower error and has better clustering of similar items.

Urszula Kużelewska et al. [5] proposed clustering as a way to deal with recommender systems. Two methods of computing cluster representatives were presented and evaluated. Centroid- based solution and memory-based collaborative filtering methods were used as a basis for comparing effectiveness of the proposed two methods. The

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result was a significant increase in the accuracy of the generated recommendations when compared to just centroid-based method. Costin-Gabriel Chiru et al. [6] proposed Movie Recommender, a system which uses the information known about the user to provide movie recommendations. This system attempts to solvethe problem of unique recommendations which results from ignoring the data specific to the user. The psychological profile of the user, their watching history and the data involving movie scores from other websites is collected. They are based on aggregate similarity calculation. The system is a hybrid model which uses both content based filtering and collaborative filtering.To predict the difficulty level of each case for each trainee Hongli LIn et al. proposed a method called content boosted collaborative filtering (CBCF).The algorithm is divided into two stages, First being the content-based filtering that improves the existing trainee case ratings data and the second being collaborative filtering that provides the final predictions.

III. PROPOSED SYSTEM

The proposed system is based on collaboration filtering approach. The registered user logs in to the system. The user can view movies of different categories. The user can also rate movies as per his/her likings. The rating and searching history of movies for each individual is stored in the database. Each of the modelled products a user has not yet tried is presented to the user profile to determine an approximate rating and highest rated movie become the most highly recommended movie for the user. The notation and definitions required for understanding our approach are introduced.

Let U ={u1, u2,...,uN } be set of distinct users and P = {p1, p2,...,pM} be set of items. So user-item matrix would be R =(ri,j
)N×M where i = 1, 2,...,N and j = 1, 2,...,M. As we know this matrix is very sparse. Using users rating information and extracting user behaviours patterns regarding to related context, Bcx = {ui|ui ∈ U ∧ ui= x ∧ c ∈ {Date, Category}} shows users who have similar behaviour with x in context c. In this relation x ∈ U, i ≤ N and c includes different context values. Users are members of a social network, named G, in which nodes are users and edges are different relations among users, so this network might be a multi-layer social network. Cmx shows each user's community, in the social network. Set of NNx =
{ui|ui ∈ U∧ui= x} includes similar users to use x based on similarity metrics, discussed in further sections.

Here, we are trying to first, predict user x's rating to item m andthen suggest top-K items to him/her.

To follow our purpose, we need to take some steps:

Step 1: Identifying nearest neighbor set for target

user.

Step 2: Finding similarities between users in nearest

neighbor set and target user.

Step 3: Aggregating nearest neighbor set ratings and suggestingtop-K items to user.

Here, assuming that user behavior patterns on weekdays and weekends are different and also user's activity share in different category of items might be different, time in the form of day of week) and item categories are two aspect of context used in thisresearch.

We extract user behaviour patterns in each context types and find similar patterns between users, then form Bcx set for him/her. Also, we have several social relations among users, we've considered trust relations and relation of giving similar ratings to similar items for users who live in similar areas to form social network. In other words, we have a social network which its first layer demonstrates trust relations among users and the second layer contains relations between users who live in similar places and rate similar items, similarly. Running community detection algorithms on this networks gives us Cmx which is x's community in social network. Then we create NNxbased on Cmx and Bcx using below equation.

NNx = {(ui, qi)|(ui, qi) ∈ Bcx ∨ (ui, qi) ∈ Cmx ∨(ui, qi) ∈
BcCmx ∧ ui= x ∧ c ∈ {date, category}}

IV. SYSTEM ARCHITECTURE

The architecture comprises three major parts namely, data acquisition and repository, RS and user interface. As illustrated in Figure 1, the three constituent units work collaboratively. The registration details including user demographics and user ratings of movies are stored in corresponding data structures. The MovieLens datasets are also obtained. In this In this In this implementation, the data repository is housed locally. The RS sub-unit is

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responsible for performing collaborative filtering, user taste generation and computation of Euclidean scores with which movie recommendations are made. Movie preferences and ratings from the end-user are obtained and recommendations made are outputted through the graphical user interface.

Figure 1 RS architecture

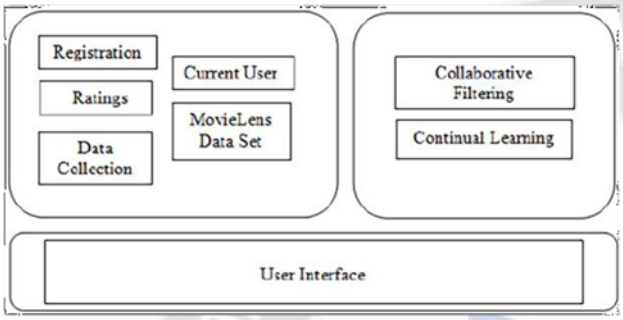
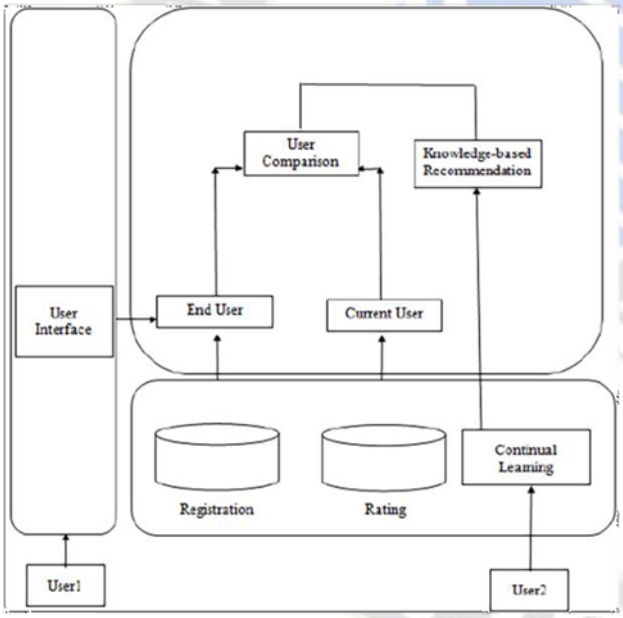


Figure 2 Functionality and implementation of recommender system



INTELLIGENT FUNCTIONALITY:

❖ K-means Clustering(unsupervised Learning)k-means clustering is an algorithm to classify or to group the objects based on attributes/features into K number of group where K is a positive integer. The grouping is done by minimizing the sum of squares of distances between data and the corresponding cluster centroid. The algorithm is repeated until convergence isachieved i.e. until a pass through the training sample causes nonew assignments.

correlate both movies together based on user #1 and #2 behaviour. User #3 watched "Titanic" and did not watch a "Walk to remember", so the recommender system will recommend it for him/her. (To be implemented using better server machine).

VI. CONCLUSION

we have introduced a recommender system for movie recommendation. It allows a user to select his choices from a given set of attributes and then recommend him a movie list based on the cumulative weight of different attributes and usingK-means algorithm. By the nature of our system, it is not an easy task to evaluate the performance since there is no right or wrong recommendation; it is just a matter of opinions. Based on informal evaluations that we carried out over a small set ofusers we got a positive response from them. We would like to have a larger data set that will enable more meaningful results using our system. Additionally we would like to incorporate different machine learning and clustering algorithms and studythe comparative results.

A hybrid approach is taken between context based filtering and collaborative filtering to implement the system. This approach overcomes drawbacks of each individual algorithm andimproves the performance of the system. Techniques like Clustering, Similarity and Classification are used to get better recommendations thus increasing precision and accuracy. In future we can work on hybrid recommender using clustering and similarity for better performance. Our approach can be further extended to other domains to recommend songs, video, venue, news, books, tourism and e-commerce sites, etc.

❖ Item Based Collaborative Filtering

Based on User #1 and #2, they both watched and liked Titanic and a walk to remember. Item-based collaborative filtering will

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