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A Survey on Hybrid Recommendation System for Movie dataset

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Abstract: Recommendation System is a subclass of information filtering system. It identifies similarity among users or items. It can be used as information filtering tool in online social network. Collaborative filtering recommendations are based on similarity of users or items, all data should be compared with each other in order to calculate this similarity. Due to large amount of data in dataset, too much time is required for this calculation, and in these systems, scalability problem is observed. It is better to group data, and each data should be compared with data in the same group. Content based filtering recommends items to users according to users history and items he liked in the past.
Keywords: Recommendation system, content based filtering, collaborative filtering, similarity function.

I. INTRODUCTION

Recommendation system is a system, which filters the information for, recommended some items to its users; it filters the data and recommends the items. It is commonly used in movie lens, book-crossing, jester, wiki-lens that uses a collaborative filtering to present information on items and products that are likely to be of interest to the consumers. User's interest in the past is seen and analyzed for the recommendation of any items[1]. While presenting the recommendations, the recommender system uses details of the account of the registered user's profile, behavior, preferences and habit of their whole group of users and comparison of the information to present the recommendations. It much relies on similarity calculation.

A. Types of Recommendation System

Recommendation System can be classified into 3 different categories based on technique used; they are content-based method, collaborative method, and hybrid method.

B. Content-Based Filtering

Content based filtering recommends items to users that are almost alike to the ones that the user wished or desired in the pst. It is done by first building relation between item and its properties in term of Matrix then select the most similar items to the target item by computing similarity based on the features associated with the compared items using various mathematic functions [2].

C. Collaborative Filtering

Collaborative Filtering (CF) is a method of identifying the similar clients and recommending what the common clients prefer. This system recommends items to the active user or the target users with that of the other users with similar preferences in the past. The similarity in preferences of the two users is calculated/evaluated based on the similarity in the rating history of the different users [3].

D. Types of Collaborative Filtering

Collaborative filtering is mainly based on two Types of techniques; they are Memory-Based or User Based Collaborative Filtering and Model- Based or Item Based Collaborative Filtering [3].

1) *Memory-Based or User Based Collaborative Filtering:* The memory based collaborative filtering uses the entire user-item database to generate the recommendations for the users. K-Nearest Neighbour is an algorithm, which is generally used. In neighborhood based algorithms, first step is that a subset of clients are picked focused around their closeness to the dynamic client, and a weighted combo of their appraisals is utilized to generate expectations of items for the dynamic client[3].
2) *Model-Based or Item Based Collaborative Filtering:* The model based collaborative filtering uses the ratings provided to the items to recommend them to the users. Ratings of the items are given preferences. Clustering and rule based techniques are

some of the well known techniques which are used. To deal with the sparse data model based collaborative filtering such as clustering techniques provide more accurate predictions[3].

3) *Hybrid Recommendation Systems:* This recommendation system is based on the combination of the content based filtering system and the collaborative filtering system techniques. Hybrid approaches can be implemented in several ways: by making content-based and collaborative-based predictions separately and then combining them; by adding content-based capabilities to a collaborative-based approach (and vice versa); or by unifying the approaches into one model. Hybrid methods can provide more accurate recommendations than pure approaches. These methods can also be used to overcome some of the common problems in recommendation systems such as cold start and the sparsity problem [4].

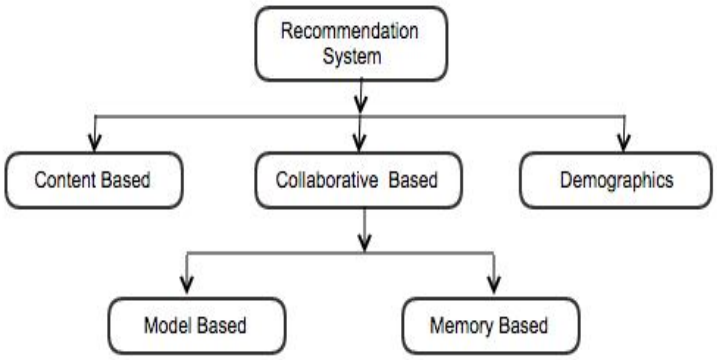

Figure 1.Type of Recommendation System

II. LITERATURE REVIEW

They proposed a hybrid model-based movie recommendation system that utilizes the improved K-means clustering coupled with genetic algorithms (GA) to partition transformed user space. In this way, the original user space becomes much denser and reliable, and used for neighborhood selection instead of searching in the whole user space. By this proposed method it will capable of generating effective estimation of movie ratings for new users via traditional movie recommendation systems[1].Authors provide a combinatorial approach by combining fuzzy c means clustering technique and genetic algorithm based weighted similarity measure to develop a recommender system (RS). The proposed FCMGENSM recommender system provides better similarity metrics and quality than the ones provided by the existing GENSM recommender system but the computation time taken by the proposed RS is more than the existing RS[2]. They proposed a novel modified fuzzy C- means clustering algorithm which is used for hybrid personalized recommender system. It works in two phases. In the first phase opinions from users are collected in form of user item rating matrix. In second phase recommendations are generated online for active users using similarity measures[3].Authors proposed fuzzy weightings for the most common similarity measures for memory-based CRSs. Fuzzy weighting can be considered as a learning mechanism for capturing the preferences of users for ratings. Comparing with genetic algorithm learning, fuzzy weighting is fast, effective and does not require any more space. Experimental results show that fuzzy weighting improves the CRS performance irrespective of the fuzzy weighting variable where the fuzzy-weighted similarity measures outperform their traditional counterparts in terms of PCP, coverage, and mean absolute error[4].Authors gave the review about the Recommender systems using collaborative filtering. It is the most popular and successful method that recommends the item to the target user. These users have the same preferences and are interested in it in the past. Scalability is the major challenge of collaborative filtering. With regard to increasing customers and products gradually, the time consumed for finding nearest neighbor of target user or item increases, and consequently more response time is required [5]. They introduces a new hybrid recommender system by exploiting a combination of collaborative filtering and content-based approaches in a way that resolves the drawbacks of each approach and makes a great improvement in the variety of recommendations in comparison to each individual approach. It introduce a new fuzzy clustering approach based on genetic algorithms and create a two-layer graph. After applying this clustering algorithm to both layers of the graph compute the similarity between web pages and users, and propose recommendations using the content-based, collaborative and hybrid approaches[6].

They proposed fuzzy recommendation system based on collaborative behavior of ants (FARS). It works in two phases. First, user's behaviors are modeled offline and results are used in second phase for online recommendation. The performance is evaluated using log files. The results are promising and provides us with more functional and robust recommendations.

III. PROBLEM IDENTIFICATION

Collaborative filtering approaches often suffer from three problems: cold start, scalability, and sparsity.

A. Cold start: These systems often require a large amount of existing data on a user in order to make accurate recommendations.

B. Scalability: In many of the environments in which these systems make recommendations, there are millions of users and products. Thus, a large amount of computation power is often necessary to calculate recommendations.

C. Sparsity: The number of items sold on major e-commerce sites is extremely large. The most active users will only have rated a small subset of the overall database. Thus, even the most popular items have very few ratings.

A particular type of collaborative filtering algorithm uses matrix factorization, a low-rank matrix approximation technique..Collaborative filtering methods are classified as memory-based and model based collaborative filtering. A well known example of memory-based approaches is user-based algorithm and that of model-based approaches is Kernel-Mapping Recommender.

Table 1: Problem identification and its solution

Problem Identification	Proposed Solution
Cold Start	Content Based characteristics
Sparsity	Clustering
Popularity Bias	Opinion Based Filtering
Gray Sheep	Weighs of content base and collaborative prediction are determined

IV. PROPOSED WORK

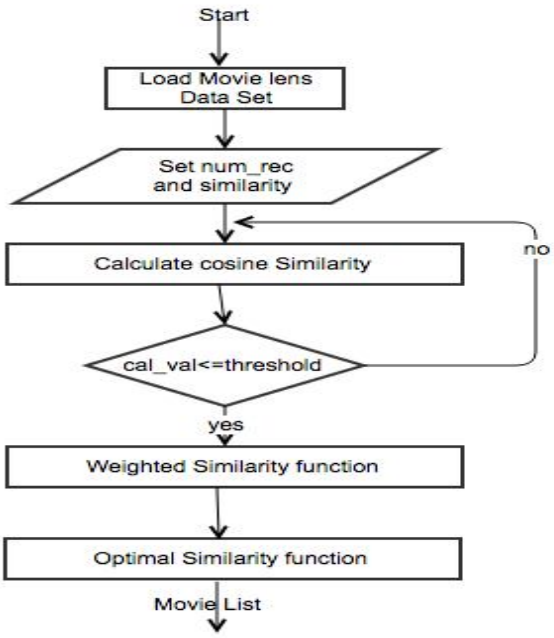

Figure 2: Flow chart of Proposed System

The existing methodology has been implemented on Movielens datasets only. Proposed System will be implemented on the Movielens database. To calculate the similarity between the different items in the given dataset in least time and efficiently and reduce computation time of the recommender system we can use cosine similarity. It takes less execution time than other similarity measures like adjusted based similarity, correlation based similarity. The existing methodology has been implemented on Movielens datasets only. Proposed System will be implemented on the Movielens database. To calculate the similarity between the different items in the given dataset in least time and efficiently and reduce computation time of the recommender system we can use cosine similarity. It takes less execution time than other similarity measures like adjusted based similarity, correlation based similarity.

V. CONCLUSIONS

Recommendation systems are a powerful new technology for extracting additional value for a business from its user databases. These systems help users find items they want to buy from a business. Recommender systems benefit users by enabling them to find items they like. Conversely, they help the business by generating more sales. Recommender systems are rapidly becoming a crucial tool in E-commerce on the Web. Recommender systems are being stressed by the huge volume of user data in existing corporate databases, and will be stressed even more by the increasing volume of user data available on the Web. New technologies are needed that can dramatically improve the quality and scalability of recommender systems.

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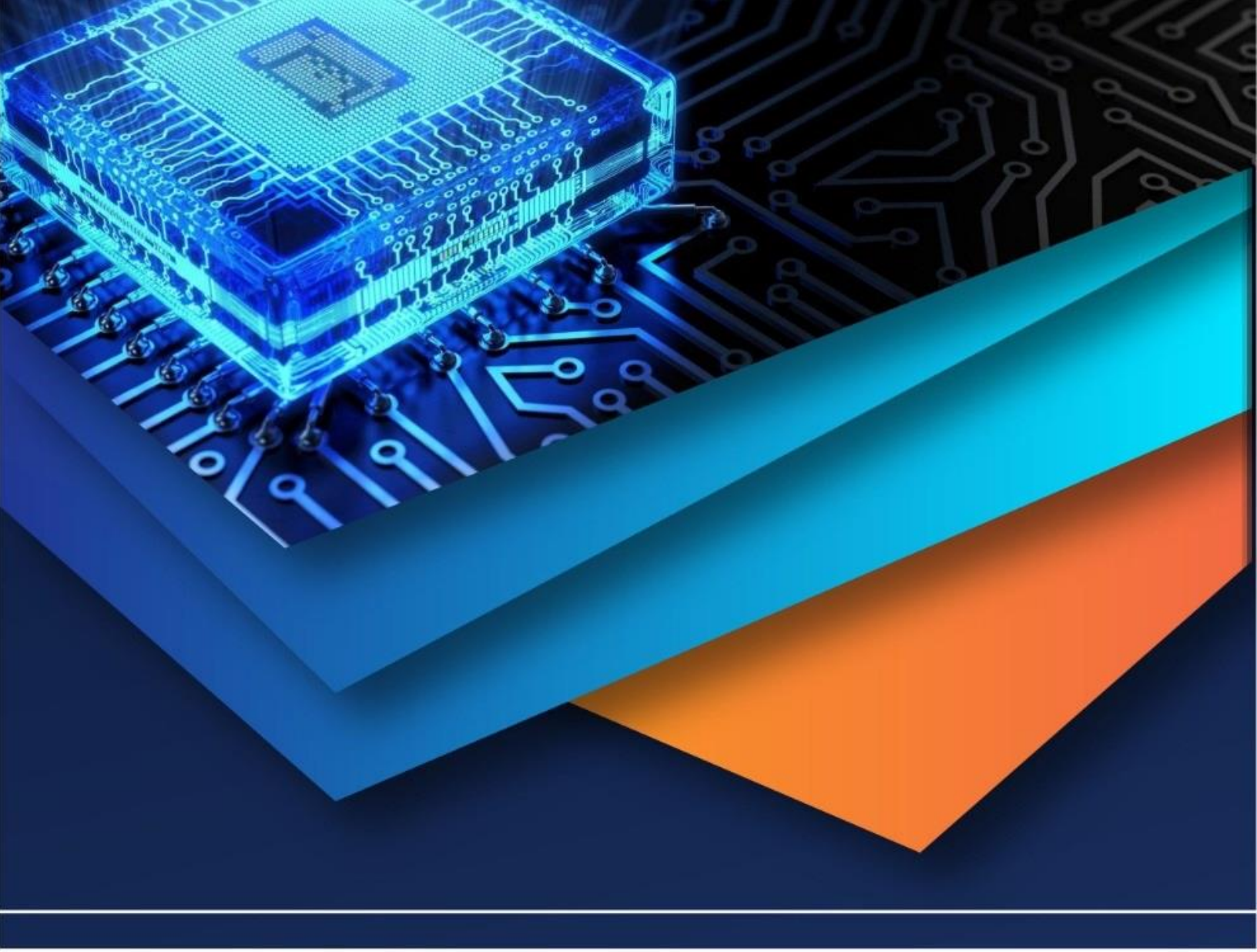

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