

Movie Recommendation Using Machine Learning

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Abstract- The recommendation system plays an essential role in the modern era and used by many prestigious applications. The recommendation system has made the collection of apps, creating a global village, and growth for abundant information. This paper represents the overview of Approaches and techniques generated in the Collaborative Filtering based recommendation system [1]. The recommendation system derived into Collaborative Filtering, Content-based, and hybridbased approaches. This paper classifies collaborative filtering using various approaches like userbased recommendation, item-based recommendation. This survey also tells the road map for research in this area. We extract aspect-based specific ratings from reviews and also recommend reviews to users depends on user similarity and their rating patterns. Finally, validating the proposed movie recommendation system for various evaluation criteria, and also the proposed system shows better result than conventional systems..

Keywords- Content based filtering, Collaborative filtering, Cosine Similarity, Machine Learning.

I. INTRODUCTION

In this age of the Internet, the quantity of data transactions that happen every minute has increased exponentially. The huge amount of data has dramatically increased with the number of users on the Internet. However, not all the data available on the Internet is of use or provides satisfactory results to the users. Data in such huge volumes often turns out to be inconsistent and without proper processing of this information, it gets wasted. In such cases, users have to run their search multiple times before they finally obtain what they were originally looking for. To solve this problem, researchers have come up with recommendation systems.

A recommendation system provides relevant information to the users by taking into account their past preferences. Data is filtered and personally customized as per the user requirements. With more and more data available on the Internet, recommendation systems have become really popular, due to their effectiveness in providing information in a short time-span. Recommender systems have been developed in various areas such as music, movies, news, and products in general. In today's age, a majority of organizations implement recommendation systems for fulfilling customer requirements. LinkedIn, Amazon, and Netflix are just a few to name.

LinkedIn recommends relevant connections of the people the user might know among the millions that are subscribed on the portal. This way, the user does not have to run extensive searches for people manually. Amazon recommendation systems work such that they suggest correlated items that the customers can purchase. If a certain customer prefers buying books from the shopping

portal, Amazon provides suggestions related to any new arrivals in previously preferred categories. In a very similar way, Netflix takes into account the types of shows that a customer watches, and provides recommendations similar to those. By the method in which recommendation systems work, they can be broadly classified into three categories—Content-based, Collaborative and Hybrid approach.

A content-based recommendation system considers the user's past behaviour and identifies patterns in them to recommend to recommend items that are similar to them. Collaborative filtering analyses the user's previous experiences and ratings and correlates it with other users. Based on the ones that have the most similarity, recommendations are made. Both content-based- and collaborative-based filtering have their own limitations. To overcome this, researchers suggested a hybrid approach which would combine the advantages of both the methods. This paper suggests a content-based recommendation system.

II. LITERATURE SURVEY

Sang-Min Choi, et. al. [1] mentioned about the shortcomings of collaborative filtering approach like sparsity problem or the cold-start problem. In order to avoid this issue, the authors have proposed a solution to use category information. The authors have proposed a movie recommendation system which is based on genre correlations. The authors stated that the category information is present for the newly created content. Thus, even if the new content does not have enough ratings or enough views, still it can pop up in the recommendations list with the help of category or genre information.

The proposed solution is unbiased over the highly rated most watched content and new content which is not watched a lot. Hence, even a new movie can be recommended by the recommendation system.

Debashis Das, et. al. [2] wrote about the different types of recommendation systems and their general information. This was a survey paper on recommendation systems. The authors mentioned about Personalized recommendation systems as well as non-personalized systems. User based collaborative filtering and item based collaborative filtering was explained with a very good example. The authors have also mentioned about the merits and demerits of different recommendation systems. Jiang

Zhang, et. al. [3] proposed a collaborative filtering approach for movie recommendation and they named their approach as 'Weighted KM-Slope-VU'. The authors divided the users into clusters of similar users with the help of K-means clustering. Later, they selected a virtual opinion leader from each cluster which represents the all the users in that particular cluster. Now, instead of processing complete user-item rating matrix, the authors processed virtual opinion leader-item matrix which is of small size. Later, this smaller matrix is processed by the unique algorithm proposed by the authors. This way, the time taken to get recommendations is reduced.

S. Rajarajeswari, et. al. [4] discussed about Simple Recommender System, Content-based Recommender System, Collaborative Filtering based Recommender System and finally proposed a solution consisting of Hybrid Recommendation System. The authors have taken into consideration cosine similarity and SVD. Their system gets 30 movie recommendations using cosine similarity. Later, they filter these movies based on SVD and user ratings. The system takes into consideration only the recent movie which the user has watched because the authors have proposed a solution which takes as input only one movie.

V. Subramaniaswamy, et. al. [5] has proposed a solution of personalized movie recommendation which uses collaborative filtering technique. Euclidean distance metric has been used in order to find out the most similar user. The user with least value of Euclidean distance is found. Finally, movie recommendation is based on what that particular user has best rated. The authors have even claimed that the recommendations are varied as per the time so that the system performs better with the changing taste of the user with time.

III. METHODOLOGY

Also referred to as cognitive filtering, recommends items based on a comparison between the content of the items and a user profile. The content of each item is represented as a set of descriptors or terms, typically the words that

occur in a document. The user profile is represented with the same terms and built up by analysing the content of items which have been seen by the user.

Several issues have to be considered when implementing a content-based filtering system. First, terms can either be assigned automatically or manually. When terms are assigned automatically a method has to be chosen that can extract these terms from items. Second, the terms have to be represented such that both the user profile and the items can be compared in a meaningful way. Third, a learning algorithm has to be chosen that is able to learn the user profile based on seen items and can make recommendations based on this user profile.

The information source that content-based filtering systems are mostly used with is text documents. A standard approach for term parsing selects single words from documents. The vector space model and latent semantic indexing are two methods that use these terms to represent documents as vectors in a multi dimensional space.

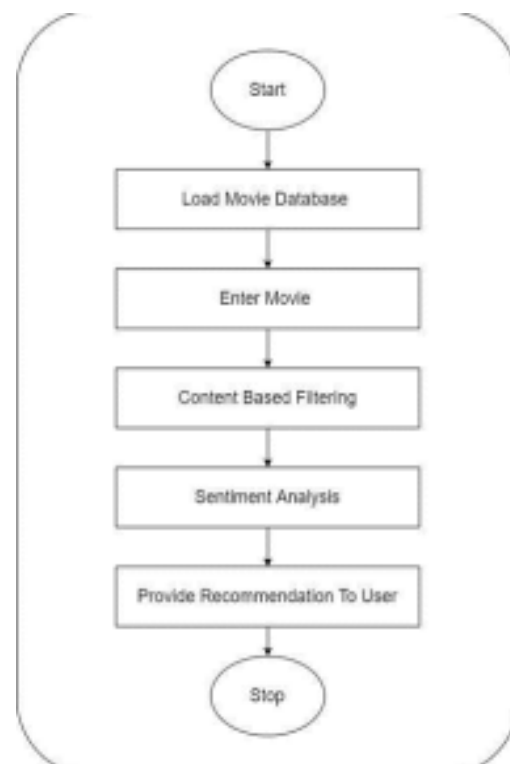


Fig 1. Methodology.

Relevance feedback, genetic algorithms, neural networks, and the Bayesian classifier are among the learning techniques for learning a user profile. The vector space model and latent semantic indexing can both be used by these learning methods to represent documents. Some of the learning methods also represent the user profile as one or more vectors in the same multi dimensional space which makes it easy to compare documents and profiles.

Other learning methods such as the Bayesian classifier and neural networks do not use this space but represent the user profile in their own way.

IV. RESULTS AND DISCUSSION

Enter your favourite movie name: Avengers Movies suggested for you:

- The Avengers 7.4 Science Fiction Action Adventure
- Avengers: Age of Ultron 7.3 Action Adventure Science Fiction
- Captain America: The Winter Soldier 7.6 Action Adventure Science Fiction
- Iron Man 2 6.6 Adventure Action Science Fiction
- The Incredible Hulk 6.1 Science Fiction Action Adventure
- Captain America: Civil War 7.1 Adventure Action Science Fiction
- X-Men 6.8 Adventure Action Science Fiction
- Thor 6.6 Adventure Fantasy Action
- X-Men: Apocalypse 6.4 Science Fiction

V. CONCLUSION

Recommendation engines basically are data filtering tools that make use of algorithms and data to recommend the most relevant items to a particular user.

Recommendation system can be categorized into the following categories:

- **Collaborative filtering:** This type of recommendation system makes predictions of what might interest a person based on the taste of many other users. It assumes that if person X likes Snickers, and person Y likes Snickers and the Milky Way, then person X might like the Milky Way as well.
- **Content-based filtering:** This type of recommendation system focuses on the products themselves and recommends other products that have similar attributes. Content-based filtering relies on the characteristics of the products themselves, so it doesn't rely on other users to interact with the products before making a recommendation.
- **Demographic-based recommender system:** This type of recommendation system categorizes users based on a set of demographic classes. This algorithm requires market research data to fully implement. The main benefit is that it doesn't need a history of user ratings.
- **Knowledge-based Recommender System:** This type of system makes suggestions based on information relating to each user's preferences and needs. Using function knowledge it can draw connections between a customer's need and a suitable product.
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