

Movie Recommendation System

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ABSTRACT

Nowadays, the recommendation system has made it quite simple to locate the items we require. There are hundreds of thousands of movies that are available to watch for the viewers but seeking a good movie out of these large numbers is very time-consuming and complex process. This is where movie recommendation system comes into play it recommends a user movie based upon their interests and preferences. Our goal with this project is to reduce human work by proposing movies depending upon a person's choice. This project proposes an engine or a system that generates suggestions on the basis of information provided by users. Movies are recommended to the user depending upon their watch history ratings and feed backs and also their psychological profile. The content-based filtering method is proposed by our system. It entails creating systems based on a user's history that is things that have already been rated. We'll be using the tmdb 5000 dataset which we obtained from Kaggle.

Index Terms Movie Recommendation System, Content- based filtering, tmdb 5000 dataset

INTRODUCTION

Recommender systems are information filtering tools that aspire to predict the rating for users and items, predominantly from big data to recommend their likes. Movie recommendation systems provide a mechanism to assist users in classifying users with similar interests. The purpose of a recommendation system basically is to search for content that would be interesting to an individual. Moreover, it involves a number of factors to create personalized lists of useful and interesting content specific to each user/individual. Recommendation systems are Artificial Intelligence based algorithms that skim through all possible options and create a customized list of items that are interesting and relevant to an individual. These results are based on their profile, search/browsing history, what other people with similar traits/demographics are watching, and how likely are you to watch those movies. This is achieved through predictive modeling and heuristics with the data available. Movie Recommendation System or Recommendation System is a type of information filtering system that considers user data such as age, gender, as well as ratings, feedback, and watch history in order to understand the user's preferences and interests and makes recommendations based on these interests. the system then recommends to the user..Content-based and collaborative- based ways to designing a movierecommendation system are both viable options. Collaborative-based recommendation utilizes multiple user's interests to make recommendations to a user. We chose the content-based method because it uses a single user's interest to generate recommendations based on that user's preferences. Our project's main purpose is to make recommendations. When a user logs in or registers, they offer personal information such as their age, gender, preferences, and hobbies. The user's viewing history, ratings, and feedback are also taken into consideration. The user's interests are then taken into account for generating recommendations. The interests of the user are mainly found by reviewing the ratings and feed backs that are given by the users of movies. In the end a list of recommended movies is generated that is presented to the users.

RELATED WORK

Phonexay Vilakone, Doo-Soon Park, Khamphaphone Xinchang and Fei Hao created a movie recommendation system using improved K-clique method. For creating a robust movie recommendation system, they used 6 processes: first the new user needs to sign up to the system and provide some necessary personalization information like gender, age, occupation, etc. This information was used to create experimental data and test data. The experimental data is used to calculate the similarity between users. The similarities in the users are measured with the help of a cosine similarity measure algorithm. After this a cluster of users is created based on their similarities. Then the personalized information of a new user is compared to the personalized information of users in a cluster using cosine similarity measure algorithm. When the group most similar to the new user is found then a list of movies is created where the top ones are highly rated. Then in the final process the new user is recommended with a list of movies.

Nirav Raval and Vijayshri Khedkar wrote a ReviewPaper on Collaborative Filtering Based Movie Recommendation System. This paper looks into 5 different methods for collaborative-based recommender system. They have also looked into a design methodology of movie recommender system using Neural Network. The first method is design of

collaborative filtering using KNN. Here the recommender system relates 2 users based upon their ratings and recommends a movie to the users. It recommends movies to the user via their registration information. Here the ratings of users are taken into the database and the algorithms gives recommendations based upon these ratings. The second method is movie recommender system using alternating least squares (ALS). Here huge amounts of data input is taken as ratings then this data is trained and evaluated and ALS is evaluated which generates recommendations. These recommendations are stored in a SQL database and fetched using spark SQL. The third method is user-based collaborative filtering method. It is a technique of finding users with similar interests and recommending movies with the highest ratings. The first step is finding users with similar interests, this is done by using cosine similarity algorithm. The second step is predicting the rating of a movie which is yet to be rated by users of similar interests. Finally, the new user is recommended a movie based upon prediction. The fourth method is item-based collaborative filtering method. It is similar to user-based but here items with similar ratings are taken from different users. The first step is finding the similarity between different items using the cosine similarity algorithm. In the second step, a movie A which is not yet rated is compared to a similar movie B which is rated and the rating of movie A is predicted and recommended to a user. The fifth method is collaborative filtering method using K- means. First the users with similar interests are created into a cluster using cosine similarity algorithm. Each cluster consists of a centroid. Then the k nearest neighbors is found and the rating of different movies are predicted and ranked from high to low and the users are recommended movies. For design methodology of movie recommender system using Neural Network, they have taken Movie lens 1M dataset. first the dataset is split into training and testing data and the loss is filled using gradient descent. Then bias terms are added for users and movies. Then the neural network is trained and tested to give accurate recommendations of movies to the user.

F. Furtado and A. Singh created a Movie Recommendation System Using Machine Learning. They have created a recommender model by collaborative filtering method and KNN algorithm. The first step is finding users who have similar interests, this is done by using cosine similarity algorithm. Then clusters of users are created with respect to their interests. Each cluster consists of a centroid which is updated every iteration till a saturation point is achieved. The next step is choosing a neighborhood which is also created by checking clusters which have similar interests. Then the next step is predicting the rating of the movies which is not yet rated. If a new user has registered then his login data is used to find the similarity and find recommendations. They have also pointed out the drawbacks in existing models of movie recommender systems based on matrix decomposition and clustering. They have applied that combining collaborative-based filtering with Machine learning highly increases the efficiency of a movie recommender system.

METHODOLOGY

A. Dataset

Having a good training dataset is a huge step towards building a robust movie recommendation system. We have used Tmdb 5000 movie dataset which we have downloaded from kaggle.com. It consists of 5000 movies, ratings, tags, budgets, credits, movie IDs, etc.

	movie_id	title	overview	genres	keywords
0	19995	Avatar	In the 22nd century, a paraplegic Marine is di...	[{"id": 28, "name": "Action"}, {"id": 12, "name": "Sci-Fi"}]	[{"id": 1463, "name": "culture clash"}, {"id": 1464, "name": "culture clash"}]
1	285	Pirates of the Caribbean: At World's End	Captain Barbossa, long believed to be dead, ha...	[{"id": 12, "name": "Adventure"}, {"id": 14, "name": "Action"}]	[{"id": 270, "name": "ocean"}, {"id": 726, "name": "ha..."}]
2	206647	Spectre	A cryptic message from Bond's past sends him o...	[{"id": 28, "name": "Action"}, {"id": 12, "name": "Mystery"}]	[{"id": 470, "name": "spy"}, {"id": 818, "name": "name..."}]
3	49026	The Dark Knight Rises	Following the death of District Attorney Harve...	[{"id": 28, "name": "Action"}, {"id": 80, "name": "Crime"}]	[{"id": 849, "name": "dc comics"}, {"id": 853, "name": "name..."}]
4	49529	John Carter	John Carter is a war-weary, former military ca...	[{"id": 28, "name": "Action"}, {"id": 12, "name": "Sci-Fi"}]	[{"id": 818, "name": "based on novel"}, {"id": 819, "name": "name..."}]

Fig I Uncleaned version of Tmdb 5000 dataset

B. Proposed System

A simple example on how our movie recommendation system work is explained below. If a user named Ram who likes movies named Interstellar, Avatar and Gravity which are all science fiction movies then there is a very high probability that the user Ram will be recommended science fiction movies.

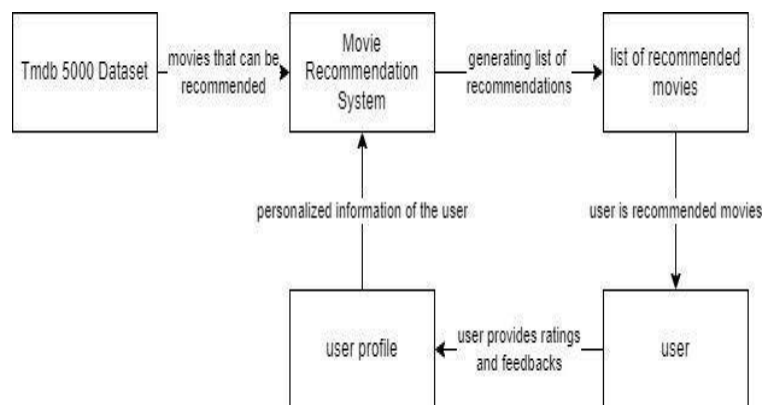


Fig II Overview of purposed system

When the user logs into the movie recommendation system for the first time, their personal information like their age, gender, what kind of movie genre they prefer, their interests and preferences. Then content based algorithm is used to generate a list recommendations which is presented to the user, the user then provides ratings and feedback for these recommendations and then the recommendation system provides even more accurate in generating recommendations for the user. More the user acts on these recommendations the system becomes more accurate in generating a personalized profile of the user.

When the list of recommendations is generated in Jupyter notebook, we use PyCharm software to create a local website where a user can type or select movies to generate recommendations, this software is mostly used by Python developers.

In PyCharm we first open a new project where we create a new python page for creating the website, then we need to import all the necessary libraries that are needed for creation of the local website and we also need to import all the necessary datasets. When all the necessary items are imported and all the coding is done, we successfully create a working local website which a user can use to generate recommendations. One of the most important libraries we have used is Streamlit. It is a highly efficient library that decreases the number of lines of code needed to complete the website.

When the local website is created, we create a login/signup page for the users and then a profile page where the user gives the necessary information like their age, gender, their interests, etc. This information of the user is very crucial for the working of the system as all the recommendations given by the system is highly dependent on this information.

C. Steps Taken

Content-based approach depends upon a single user's history. It takes into account the user's age, ratings and feedbacks to generate a list of recommendations which is presented to the user. When the user rates and provides feedback or acts upon theses recommendations the system becomes more and more accurate in generating precise recommendations. Our system's working mechanism is broken down into the following steps:

- Step 1: user log in or registers into the system.
- Step 2: the system takes the personal information of the userlike age, gender and preferences
- Step 3: Content-based algorithm is applied
- Step 4: list of recommendations is generated and is providedto the user.
- Step 5: the user provides ratings and feed backs for betterrecommendations
- Step 6: more accurate list of recommendations is generatedand provided to the user.

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recommend('The Avengers')

Avengers: Age of Ultron
Captain America: Civil War
Iron Man 3
Captain America: The First Avenger
Iron Man

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Fig III List generated for recommendation

CONCLUSION

Movies are among the most popular forms of entertainment in today's era, and people may watch them whenever and however they want—at home, or in their cars. However, according to the normal supply and demand curve, the most popular English-language films were released 7,547 times in 2019. This movie recommendation system can be used to save time and effort when looking for a decent movie that meets our interest. Regardless of the fact that no recommendation is 100 percent accurate, the collaborative filtering process offers a balanced set of options. Our approach takes into account the user's viewing history and ratings. More specifications such as the movie's genre, directors and producers, actors and actress can be used in the system in the future to provide better accuracy for recommendations.

FURTHER IMPROVEMENT

- [1] Directors, producers and actors can be added as options for people who like particular movies of people.
- [2] Series can also be added as recommendations for people who love to watch series, but the system needs to be trained in the same way as it was trained for recommending movies.
- [3] Better quality of security facilities can be provided to users as the number of users increases.

REFERENCES

- [1] “Yogesh Kumar, Ma. Naveen Kumari- Movie Recommendation System, Punjabi University Regional Centre for IT & Management, 13TH October, 2020”
- [2] “Sadiya Saba, Anusha S Bachihal-Movie Recommendation System Using Machine Learning, New Horizon College of Engineering..
- [3] Jingdong Liu, Won-Ho Choi, and Jun Liu- Personalized-Movie Recommendation Method Based on Deep Learning, Volume 2021, Article ID 6694237, 19 February 2021
- [4] Ala Alluhaidan, Recommender System Using Collaborative Filtering Algorithm, Grand Valley State University, April, 2013.
- [5] Nirav Raval, Vijayshri Khedkar. -A Review Paper on Collaborative Filtering Based Movie Recommendation System, INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 8, ISSUE 12, DECEMBER 2019 ISSN 2277-8616.
- [6] Mohit Soni and Shivam Bansa-Movie Recommendation System, Maharaja Agrasen Institute of Technology, November 13, 2019.
- [7] Ashnita Kashyap, Sunita. B, Sneha Srivastava³, Aishwarya. PH, Anup Jung Shah-A Movie Recommender System: MOVREC using Machine Learning Techniques, Kashyap, Sunita. B, Sneha Srivastava³, Aishwarya. PH, Anup Jung Shah-A Movie Recommender System: MOVREC using Machine Learning Techniques,
- [8] Satya Prakash Sahu, Anand Nautiyal, Mahendra Prasad- Machine Learning Algorithms for Recommender System - a comparative analysis, University of Hyderabad, International Journal of Computer Applications Technology and Research Volume 6-Issue 2, 97-100, 2017, ISSN: -2319-8656, 14 March 2017
- [9] Akansh Surendran, Aditya Kumar Yadav, Aditya Kumar- Movie Recommendation System Using Machine Learning Algorithms, Raj Kumar Goel Institute of Technology, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 07 July 2020
- [10] Ananya Agarwal, S. Srinivasan- Movie Recommendation System, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 07 July 2020
- [11] Pradeep Kumar Singh, Pijush Kanti Dutta Pramanik, Avick Kumar Dey and Prasenjit Choudhury- Recommender systems: an overview, research trends, and future directions, National Institute of Technology, Int. J. Business and S 1
- [12] F. Furtado, A. Singh- Movie Recommendation System Using Machine Learning, Jain University, International Journal of Research in Industrial Engineering, Int. J. Res. Ind. Eng. V 9, No. 1 (2020) 84–98.
- [13] Phonexay Vilakone, Doo-Soon Park, Khamphaphone Xinchangl and Fei Hao- An Efficient movie recommendation algorithm based on improved k-clique, Soonchunhyang University, Vilakone et al. Hum. Cent. Computer. Inf. Sci. (2018) 8:38
- [14] Bela Gipp, Jöran Beel, Christian Hentschel- A Research Paper Recommender System, Fraunhofer Institute for Telecommunications, PaperID: 213, 21 May 2014
- [15] Hulong Wang, Zesheng Shen, Shuzhen Jiang, Guang Sun, Ren-jie Zhang- User-based Collaborative Filtering Algorithm Design and Implementation, Hunan University of Finance and Economics, ICCBD AI 2020 ICCBD AI 2020 doi:10.1088/17426596/1757/1/012168