

Hybrid Approach to Build Anime Recommendation System

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ABSTRACT: A recommendation system is used in industries to making products more personalized, for example Netflix recommends movies to their users. Recommendation system is used in different field too like books, food, clothes, Games etc. a recommendation system can be build using multiple approaches like Content based approach, and collaborative approach

In this paper we are trying to combine both these approaches to build hybrid recommendation system. For our project we are going to recommend anime, an anime is Japanese animated artwork Which is now start to popular in all over the world. For these we are using [MyanimeList] dataset for recommendation system available in kaggle.

KEYWORDS: Content based filtering, item-based collaborative filtering, user-based collaborative filtering, Hybrid approach.

I. INTRODUCTION

A recommendatory system generates choice what people may enjoy. With overwhelming amount of movies or series it is very frustrating for the users to find movies or series based on their current interest. After rapid growth of online media streaming it is very necessary to build a system which can provide users favourite movies/series.

A hybrid recommendation system is combination of content based filtering model and collaborative filtering model. By combination of both these model we reduce or remove the drawbacks which are present in both models.

For example: a content based filtering model recommend items based on attributes of items, in case of movie or Anime it will be genera, tags, producer, language and ratings. It is highly depends attributes of item and if attributes get wrongly collected then it could hamper the recommendation accuracy. On the other hands a collaborative based filtering model depends on user's data and items data, so it will not performs well for new users and item. By combing both these we can achieve better performance.

In this paper we tried to analyse different hybrid approaches for building better anime recommendation system. Which gives you more efficient and accurate output.

II. RECOMMENDER SYSTEMS TECHNIQUES

Recommendation System gives information about the user using different methods and sources to predict the need of the items according to the analysis the system is use to process and predict the item used most and according to the analysis the result is been obtained. Recommendation shows the user's similar used item and dissimilar used item by this it is easy to analyse the user's taste

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List of sites using a recommendation system

1. Movie recommendation [Netflix, Hotstar]
2. Book recommendation [Flipkart, Amazon]
3. Music recommendations [Ganna, Youtube]
4. News recommendation [Times Of India]

In this paper we have focused on discussing recommendation system technique frequently used today mostly in the field the following are the recommendation method's Content based recommendations, Collaborative recommendations, and Hybrid Approaches

1. Content-based filtering

Content based filtering are based on the description of the item of the user's liking or we can say a profile of the user's taste. The basic operation performed by the system is to match the user's basic data like age, gender, location and rated item list on the stored data having similar specification in order to recommend new item's which meets his/her interests.

Content Based recommendation algorithms derive from information retrieval and filtering research. A system is build on the base on user profile and item profile. A user profile contain the information about the user's taste or preference and learn from their behaviour over time while an item profile contains a set of attributes of items and then the calculation is been carried out as mentioned below

Given formula two vectors of attributes, A and B, the cosine similarity, $\cos(\theta)$, is represented using a dot product and magnitude as

$$\cos(\theta) = \frac{A \cdot B}{\|A\| \|B\|} = \frac{\sum_i A_i B_i}{\sqrt{\sum_i A_i^2} \sqrt{\sum_i B_i^2}}$$

Where A_i and B_i are components of vector A and B respectively.

The result of similarity ranges from -1 means exactly opposite, to 1 mean exactly the same, with 0 indicating decorrelating, while in-between values indicate intermediate similarity or dissimilarity.

2. Collaborative filtering

It recommends anime to user based on other people intrigue. It can be classified in two groups model based and memory based. Memory based method is measure similarities between neighbours in memory. To generate a recommendation, database of sections will be stacked in memory.

Opposite to memory based is model based method in which model is used to calculate recommendation. Here model is generated offline and recommendation is done online It is used to filter an item based on other people interest.

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A collaborative filtering system consists of n users denoted as $U = [u_1, u_2, u_3, \dots, u_m]$ and m items as $I = [i_1, i_2, i_3, \dots, i_n]$ which together forms $n \times m$ rating matrix R as shown in Table 1. Each user choose item of their choice and review these items as rating score. This rating database is used to find similarity between users.

	I1	I2	I3	I4	I5
U1	5	?	4	1	3
U2	5	2	5	?	?
U3	2	4	?	1	3

Table 1 example of collaborative filtering

Prediction: In order to find user u_1 intrigue over item i_2 and other users are measured over item2. Recommendation: After prediction of u_1 likeliness for all unseen items, it recommends all high rated items to U_1 . A rating value is measured using different machine learning algorithm. The rating for target item i for active user a can be predicted by using a simple weighted average as:

$$p_{a,i} = \frac{\sum_{j \in K} r_{a,j} w_{i,j}}{\sum_{j \in K} |w_{i,j}|}$$

where K is the neighbourhood of most similar items rated by active user a , and $w(i,j)$ is the similarity between items i and j .

3. Hybrid filtering

Hybrid filtering is formed by combining both content-based filtering and collaborative filtering to get more accurate results. There are different approaches to achieve hybrid recommendation. They are as following:

- **Weighted hybridization**
A weighed hybridization combines both content based and collaborative filtering by computing weighted sum of their prediction score by combining them linearly. The newly combined weight is used to produce single recommendation.
- **Switching hybridization:**
In this hybrid system multiple recommendation techniques like content based, item based collaborative or user based collaborative filtering are used based on best possible result the switching is made between different approaches, if one approach is better than the other then that one is tried and so on.
- **Mixed hybridization:**
If we wanted to recommend using multiple filtering approach simultaneously then we can use mixed hybridization system. Using this approach we can solve the cold start problem of newly arrived item/product, as content based filtering can recommend using description of item but it can not solve 'new user' problem because both collaborative based and content based filtering needs some users preference to calculate recommendation.

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- Feature combination:
In this approach feature of multiple filtering algorithms are used in single recommendation algorithm. Collaborative based filtered information is considered as new data set and content based collaborative filter use this data set as feature to recommend the final recommendation.
- Cascade:
Unlike other approaches, cascade hybridization uses stage refinement process. In this one recommendation approach is applied to generate coarse ranking of items or product and another recommendation approach used to refine those ranked item.

III. CONCLUSION

Recommendation system is used to recommend things to users according to their interest and previous data which has been used by the user. In this paper we have used many filtering method to do the recommendation work of anime and to suggest the user the best anime to watch around the categories

Here we have used three filtering methods Content based filtering, Collaborative filtering and Hybrid filtering methods and by performing all the three filtering methods the hybrid filtering method was more quick and accurate in showing the anime list which the user would get in the recommended.

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