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College Recommendation System using Content-based filtering

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ABSTRACT: After HSC exam many students face the problem of getting best college according to their marks. In fact, many students are spending a lot of money for consultancy. So, we are going to provide a web application which will help students to select a best engineering college according to college placement, location, infrastructure using machine learning. This system can be accessed anytime anywhere, since it is a web application provided only an internet connection. The user had not need to travel a long distance for the admission and his/her time is saved. It is an automated system.

KEYWORDS: Content based filtering, college characteristics, Merit Number, percentage, user-based collaborative filtering, Hybrid approach.

I. INTRODUCTION

This project is to minimize the efforts of the students as well as institutes. Since the process takes a lot of time. By using this web application based prediction system the students can get all the required data within a fraction of seconds and it saves time and money of student.

For this project we use machine learning (ML). Machine learning is part of artificial intelligence (AI) with help of artificial intelligence systems can automatically learn and improve from experience without being explicitly programmed. The main focus of Machine Learning is on the development of programs that can access data easily and use it to learn themselves. Machine learning is faster and more accurate. There are three main types in machine learning: first is Supervised Learning, second is Unsupervised Learning and last is Reinforcement Learning. For this project we use 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. Content Based recommendation algorithms derive from information retrieval and filtering research. For coding we use python. Python is the high level programming language, requires less coding, easy to learn, it supports multiple systems and platforms because of this feature we select python for our project.

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 used to process and predict the item used most and according to the analysis the result is obtained. Recommendation shows the user's similar used item and dissimilar used item by this it is easy to analyse the user's taste.

List of sites using a recommendation system:

1. Movie recommendation [Netflix, Hotstar]
2. Book recommendation [Flipkart, Amazon]
3. Music recommendations [Gana, Youtube]

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4. News recommendation [Times Of India]

In this paper we have focused on discussing recommendation system technique frequently used today life. 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

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

II. 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.

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	?	?	?
U3	2	4	5	1	3

Table 1 example of collaborative filtering

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Prediction: In order to find user u_1 intrigue over item i_2 and other users are measured over item i_2 . 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 .

III. 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.

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.

IV. CONCLUSION

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

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Here we have used two filtering methods Content based filtering and Collaborative filtering method to recommend the college for student.

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