Fitness Recommendation System Using AI

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Abstract

Currently, remaining fit and healthy is essential to one's life. Consumers are favouring healthier lifestyles, which may be attained by eating well and exercising occasionally. People are unable to use recreational spaces like gyms, public parks, or even go on walking because of lockdowns and the widespread stay-at-home trend. Our project, "B-Fit: A Fitness and Health Recommendation System," therefore endeavours to provide our clients with access to a variety of workout videos and personalised material depending on their tastes in order to ease their worries. On the same site, the user has access to their diet chart, which is based on their weight and height and is used for calculating their Body Mass Index (BMI). By classifying the user as healthy or unhealthy in accordance with their age, weight, height, RBC, WBC, haemoglobin, platelets, sugar, etc. in their blood parameters, the user is additionally supplied with recommendation for healthy foods.

Key Words: Fitness, Recommendation, BMI, User Interests, collaborative filtering

1. INTRODUCTION

When searching for goods or services or constantly requiring to access information for everyday tasks like making hotel reservations, purchasing a new gadget, or checking the weather, the Internet and its related technologies have become a vital instrument. Compared to recent reports, individuals access the Internet approximately six hours a day on average. Amidst this development, there is a growing desire to use the Internet to help people adopt healthier lifestyles. Example of this involve downloading smartphone apps or searching and sharing information about fitness routines and wellness procedures. While many people who want to lead an active lifestyle choose to use gyms and leisure centres, not everyone can afford them due to many reasons such as limited funds, hectic schedules, or frequent travel. It's challenging to predict the quality of the eligible nutritious food as well. We are able to assess how well someone is doing by applying classification algorithms to variables from the Healthy Food database, such as age, weight, haemoglobin, which arterial pressure, type of blood, sugar, platelets, RBC, and WBC.

the World Wide Web exercise videos are getting becoming increasingly common in recent years as an alternative way to keep people active from the comfort of their homes or wherever they are, taking advantage of the growing need for internet resources that encourage exercising. These films have various benefits.

The main objective includes:

- Food recommendations based on the BMI of the user. -Video r within the fitness arena to encourage an active lifestyle.

-Workout video recommendation platform, leveraging a wealth of categorised video labels and the Youtube-8M labelled data set.

"-This project aims towards creating a recommended model that extends the concepts of content-based and collaborative filtering by adding mechanisms that provide end users various and meaningful workout video recommendations. "-using blood test parameters to categorise a user as healthy or unhealthy and using the factor in the blood test that the user is lacking to forecast what foods are healthy.

The project's scope is convenience, as it offers round-the-clock access to an abundance of fitness resources from any location with an Internet connection. They don't demand that you work out at a time or day that is set by outside forces. By carefully exploring and utilising the available resources, a multitude of workouts from a variety of instructors can be found. They can be done in a more private and individualised setting and are reasonably priced.

2.LITERATURE SURVEY

[1] Ezin, E., Kim, E., Palomares Carrascosa, I. In their paper “Fitness that fits” proposed a model for workout video recommendation, using the Youtube-8M labelled dataset and its rich variety of categorized video labels, thereby enabling fitness workout video recommendations predicated on the users’ preferences and their recent viewing behavior. YouTube provides millions of users with access to a wealth of video resources to support them in practicing their preferred work- outs anywhere and anytime. As a result of classification and supervised machine learning processes on data originating from YouTube videos, Youtube-8M incorporates labels associated to the videos, thereby describing the topic(s) to which they belong, including a number of fitness activity types: this amount of labelled video data has an untangled potential to investigate and enhance existing recommendation approaches on large volumes of video related to specific domains such as fitness.

[2] Butti Gouthami and Malige Gangappa presented 'Nutrition Diet Recommendation System Using User's Interest,' in which they discussed nutrition recommendations based on BMI calculations, with a focus on daily diet plans and nutrition needs. We get suggestions, food nutrition, deficiencies, and a tracking history of the user's food habits based on his food preferences and consumption. With the help of the USDA dataset and grocery data, content-based filtering and collaborative filtering methods are used to provide users with a choice of his food recommendation for daily nutrition. A healthy food pyramid combines plant foods with a moderate amount of animal products. Vegetables, grains, fruits, oils and sweets, dairy, meat, and beans are all examples. In general, people are unaware of the major causes of deficiency or excess of various vital substances such as calcium. People can live a healthier lifestyle with the help of technology. The goal of this project is to create a system that will

recommend appropriate nutrition intake to its users based on their BMI and grocery data preferences. BMI is used to calculate weight status categories such as underweight, healthy weight, overweight, and obese. Grocery data includes seasonal foods, foods of interest to the user, plant foods, and animal products. This project will assist users with daily diet recommendations, BMI range, healthy food selection, eating behaviour, health problems, and changing user behaviour.

[3] The YouTube Video Recommendation System was proposed by James Davidson, Benjamin Lieblad, and Junning Liu. They talk about YouTube's video recommendation system, which is used by the world's most popular online video community. Based on their activity on the site, the system recommends personalised sets of videos to users. They talk about some of the system's unique challenges and how they deal with them.They also go over the experimentation and evaluation framework that was used to test and tune new algorithms.

Bernard's, [4] In their survey work, the authors conclude that the field of social Recommenders Systems (RS) built on implicit social networks appears particularly promising, propose a social filtering formalism, and find that one must test and try a full repertoire of candidate RS, fine-tune parameters, and select the best RS for the performance indicator he/she cares about. The authors investigate the efficiency of social recommender networks by combining the social graph and the co-rating graph, and they consider several variations by varying the graph topology and edge weights. They conclude from experiments on the help dataset that social networks can improve the recommendations produced by collaborative filtering algorithms when a user makes more than one recommendation.We consider our recommendation system to be social in this work because it a) applies to the social network of the application's users and b) can incorporate social graph-based information to improve the recommendation process. According to the literature review, most works use existing datasets from music or movie rating networks to experimentally evaluate the proposed models or algorithms, but none of them proposed

3. EXISTING METHOD

A recommender system will assist us in following user preferences and requirements and will allow us to adjust diet and exercise video recommendations. Similar work is done in 'Fitness that Fits,' a prototype platform for workout video recommendation that relies on Youtube-8M video data describing fitness activities based on a hybrid approach incorporating basic principles from content-based and neighborhood-based collaborative filtering systems to provide end users with fitness videos based on their profile. Their approach is based on (a) a dataset filtered from the original YouTube-8M labelled video dataset and based on Highly viewed, Fitness-related, Videos with machine-generated annotations of 'Beauty and Fitness' narrowed down to 16 labels, associated with highly viewed and popular types of fitness activities. In this system, they consider user preferences and their watching history to model a recommender system. After gathering this information, a

diverse recommendation is made to the user to increase user engagement, that is recommendation of videos that the user might not have seen, and the user might watch. Another existing system is CoCare. It recommends videos about physical activity based on a user profile, his/her context.

The main challenge of CoCARE is the small set of videos to be recommended, because the selection of the videos is done manually by health experts. Several healthrecommender systems have this same problem. Today there are many videos which are available on the Internet related to physical activity. These could not be included in the database of CoCARE; because these do not have enough information to be categorized and profiled. Another existing system that uses user interest to make diet recommendations is one that uses USDA database nutrition factor information for each individual food item. The values needed to calculate BMI (body mass index) must be provided as an input for the final diet recommendations to be calculated. The user's diet recommendation is calculated using the second input, which is based on the food ingestedthat day. Initially, the deficit nutrition is calculated based on the food consumed for that day, and the input nutrients dataset is sorted based on the BMI value, and the deficit foodwill be filled from the sorted grocery dataset. Food recommendations are based on the obesity parameter. Dietary recommendations are derived based on obesity. Another existing system that uses user interest to make diet recommendations is one that uses USDA database nutrition factor information for each individual food item. The values required to calculate BMI (body mass index) must be provided as an input for the final diet recommendations to be calculated. The user's diet recommendation is calculated using the second input, which is based on the food consumed that day.

4. PROPOSED SYSTEM

Extending the existing module by taking users' implicit and explicit preferences, including ratings given to videos by a community of users. One of the primary objectives of the proposed system is to provide users with recommended videos that are both relevant (based on their current preferences) and diverse. Diversity in workout recommendations may not only aid in the discovery of "new" types of workouts which the user may enjoy, but also promotes variety in such recommendations to avoid boredom. Two types of user data are used to model their current preferences: the user profile and recent user behaviour.

4.1 DATASET

We have a dataset of open-source YouTube videos with its id's and 12 different labels for our system. YouTube-8M is a large-scale labeled video dataset which, as of June 2018, consists of over 6 million of YouTube video instances (which add up to 350,000 hours of video), namely video IDs with high-quality annotations generated by machine learning techniques, describing a highly diverse vocabulary of over 3.8K different entities (labels). We remark that despite the considerable volume of real labeled video data available, the proposed model uses a small and synthesized dataset that has been achieved through using YouTube Data API v3 provided by google developers. The food dataset particular to Indian cuisine is still not open source and has to be developed over time with the addition of more users and access to a variety of food information.

4.2 RECOMMENDER SYSTEM

Collaborative Filtering, also known as User-User Filtering, is a technique that uses the recommendations of other users to recommend items to the input user. It seeks out users who share the same preferences and opinions as the input and then recommends items that they have liked to the input.

There are several methods for finding similar users (including some that use Machine Learning), and the one we'll use here is based on the Pearson Correlation Function. We read the data, which included video titles, ratings, and BMI. The recommendation is based on the likes and ratings of the users' neighbours. Each user has given different videos multiple ratings. The method for developing a User-Based Recommendation System select a user with the videos the user has watched

- Based on his rating to videos, find the top X neighbors
- Get the watched video record of the user for each neighbor
- Calculate a similarity score using some formula

To determine the similarity of users to input users, we will compare all users to our specified user and find the one that is most similar. We'll use the Pearson Correlation Coefficient to determine how similar each user is to the input. It is used to determine the strength of a linear relationship between two variables. The formula for calculating this coefficient between sets X and Y with N values is shown in the image below.

4.3 WHY PEARSON CORRELATION?

Pearson correlation is not affected by scaling, which means that multiplying all elements by a nonzero constant or adding any constant to all elements has no effect. If you have two vectors X and Y, for example, Pearson (X, Y) == Pearson (X, 2 * Y + 3). This is an important property in recommendation systems because, for example, two users may rate two series of items completely differently in absolute terms, but they will be similar users (i.e., with similar ideas) with similar rates on different scales.

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

Fig -1: Pearson Correlation Equation

The formula returns values ranging from r = -1 to r = 1, with 1 indicating a direct correlation between the two entities (a perfect positive correlation) and -1 indicating a perfect negative correlation. In our case, a 1 indicates that the two users have similar tastes, whereas a -1 indicates the inverse. We apply selected user ratings to all videos. As part of content-based filtering, we recommend videos based on the similarity between items that are videos in this case by taking the weighted average of the ratings of the movies and using the Pearson Correlation as the weight. We use the ML algorithm (KNN in our case) to calculate the similarity between the videos and recommend

5. DESIGN AND IMPLEMENTATION

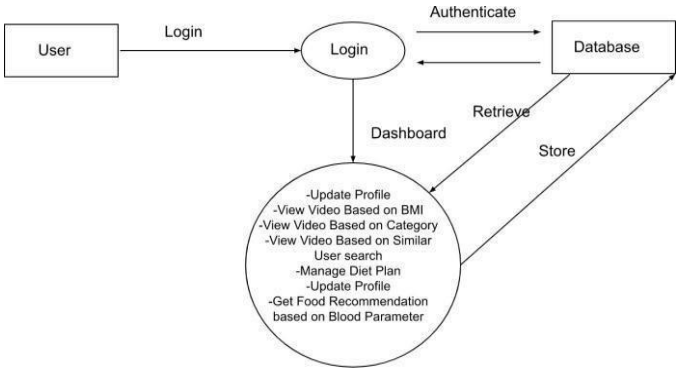


Fig -2: User DFD

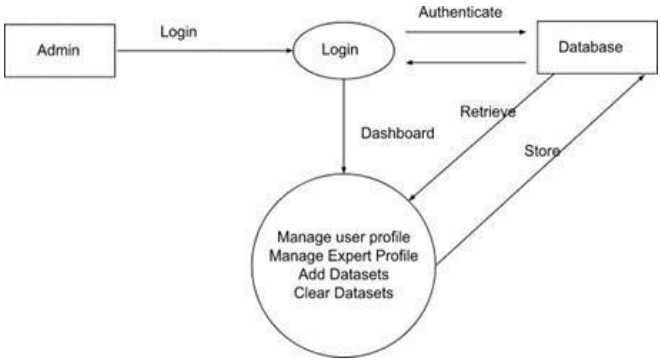


Fig -3: Admin DFD

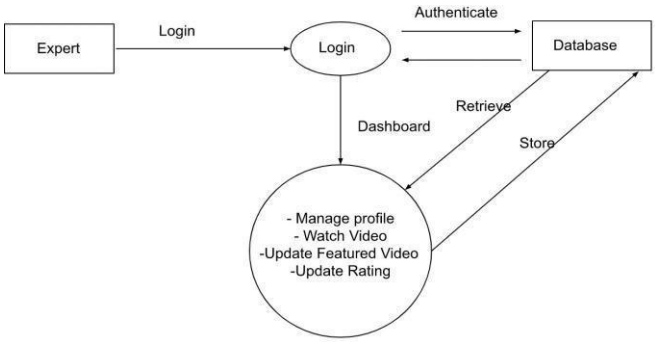


Fig -4: Expert DFD

When it comes to conveying how information data flows through systems (and how that data is transformed in the process), data flow diagrams (DFDs) are the method of choice for the implementation,

- We have used HTML, CSS, JS and Bootstrap for the frontend of the application.
- For the backend, XAMPP server has been used with PHP and MYSQL.
- For the ML model, we have used Python and Anaconda environments with the help of VS code.

Input - User information like Name, Age, Height, Weight etc. Output - Video and diet recommendations based on User information like height, age, weight, gender, preferences etc. The user enters his/her information in the user profile page and according to that we store the informationin the database. Once a user updates the information, based on the BMI calculated, the labeled videos are recommendedin one module. Another module is dedicated for the users to rate the videos based on their liking to increase the social capabilities of our project. The rating given by the

along with BMI of the users to recommend videos to the users of similar tastes. The users can also view expert recommended videos to help them determine whether or not the video is genuine. A food recommendation prototype has also been added, which will be improved further with the addition of the diverse dataset. In addition, a user's blood parameters can be classified as healthy or unhealthy, and we use the KNN/Naive Bayes algorithm to classify the user as healthy or unhealthy and then recommend a food diet based on the factor that is classified as unhealthy.

The admin module grants the admin privileges such as viewing users, managing experts, food, and video datasets. The experts are added to rate the videos that are deemed authentic in the expert's opinion. The expert has the ability to rate and add information.

6. TESTING AND RESULTS

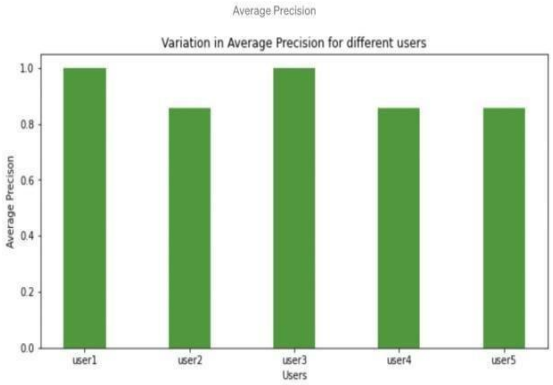
6.1 PRECISION

Precision is concerned about how many recommendations are relevant among the provided recommendations.

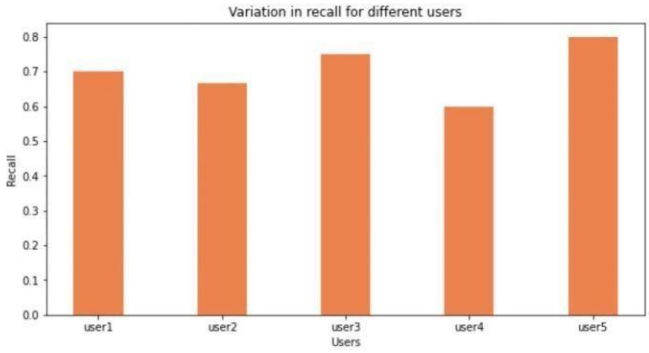
Here are several methods for finding similar users (including some that use Machine Learning), and the one we'll use here is based on the Pearson Correlation Function. We read the data, which included video titles, ratings, and BMI. The recommendation is based on the likes and ratings of the users' neighbours. Each user has given different videos multiple ratings. The method for developing a User-Based

Recommendation System

$$\text{AP@N} = \frac{1}{m}\sum_{k=1}^{N}(P(k) \text{ if } k^{th} \text{ item was relevant}) = \frac{1}{m}\sum_{k=1}^{N} P(k) \cdot rel(k),$$



Recall @ k is given by = $\frac{\text{\# of our recommendations that are relevant}}{\text{\# of all the possible relevant items}}$



Recall is concerned about how many recommendationsare

Chart -2: Recall

6.2 AVERAGE PRECISION@K

AP@K is the sum of precision@K for different values of K divided by the total number of relevant items in the top K results.

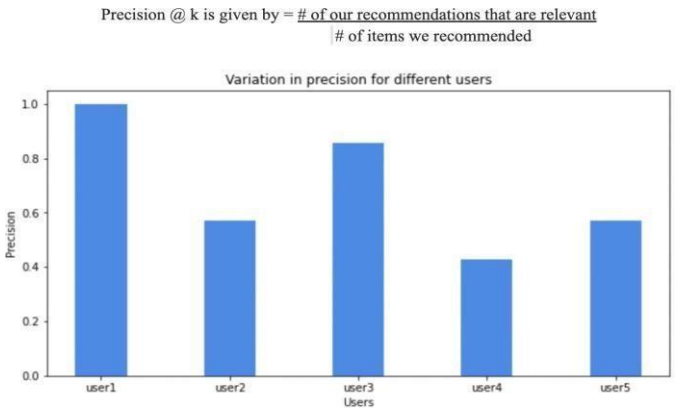


Chart -3: Average precision @ k

6.3 MEAN AVERAGE PRECISION @ K

The mean average precision@K measures the average precision@K averaged over all queries. The mean average precision @K is given by taking the average of AP@K by the total number of recommendations. In our sample case, we got the value as 0.91428 Average precision metric says that the higher the value, the more relevant recommendations have been made.

7. CONCLUSION

B-Fit: A Fitness and Health Recommendation System, aims at bringing access to our users a wide range of fitness videos and personalized content based on the user preferences. Video recommendation within the fitness domain to support an active lifestyle. It is a platform for workout video recommendation, which benefits from the Youtube-8M
labeled dataset and which has a rich variety of categorized video labels. The main objective of this project is a recommended model that extends principles from contentbased and collaborative filtering by introducing mechanisms to provide end users with meaningful and diverse workoutvideo recommendations. Classifying a user as healthy or unhealthy based on blood test parameters and predicting healthy food based on the factor of the blood test that they are lacking. The scope of the project is that they are convenient, providing 24/7 access to a wealth of fitness resources from anywhere with an Internet connection. They do not require commitment to work out at an externally imposed day or time. With a careful search and use of the resources available, they provide a wealth of workouts from a diversity of instructors. They are cost-effective and can be undertaken in a more individual and private space.

8. FUTURE ENHANCEMENTS

We can provide composite video recommendations by providing smaller videos while providing diversity in recommendations. We can significantly improve the accuracy and diversity of the recommended videos with the availability of more profound datasets for e.g., datasets regarding Indian cuisine. Further enhancement can also be done by introducing advance features such as Activity Tracking, a sensor-based system measuring human movements in terms of calorie, steps taken, cycling activity etc. which helps improve the lifestyle by keeping its users aware about their health.

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