COLLABORATIVE FILTERING APPROACH OVER HEALTHY DIET RECOMMENDATION SYSTEM

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ABSTRACT

We developed dietary assessment solution which will be a more convenient approach to monitor daily food intake and control eating habits. Food, calorie and nutrition measurement system is very beneficial for people to measure and manage their daily food intake. Content based filtering will make recommendations based on the items that are of user's interest or liked by them in the past. Collaborative filtering algorithm is used to recommend the food that the user may like. The recommended food and food in standard recipes set by user's own situation are in the same cluster, which meets the user's nutritional balance. We highlighted the issue of selection of proper diet that will fulfil everyone's nutritional requirement. Thus we have used collaborative filtering and hybrid approach towards the achieving dietary recommendations goal.

Keywords: Collaborative Filtering, Diet Recommendation.

I. INTRODUCTION

Today, wide changes have occurred in life of all people. Malnutrition, Unhealthy diet, smoking, alcohol consumption, drug abuse, stress and so on, are the presentations of unhealthy life style that they are used as dominant form of lifestyle. Every day, citizens face with new challenges. For instance, emerging new technologies within IT such as the internet and virtual communication networks, lead our world. Hence, due to this unhealthy and hectic lifestyle people are unable to dedicate more time to improve their health and eating habits. The main motive behind this implementation is to provide a solution to the users and provide them with a diet plan at the comfort of their homes. Balanced nutrition is an important aspect of a healthy lifestyle. Along with regular physical exercise, a balanced diet is extremely crucial for a person's health. However, with the ever-increasing pace of today's professions, nutrition and health is often overlooked. Seasonal availability in India is a major issue and this application provides accurate information about the same. Pre-existing conditions of the user will be taken. Healthy diet recommendation system using collaborative filtering approach into consideration and the application will only provides relevant information according to the condition. Our project is considered the dietary requirements of users and the users can create profiles to keep track of their diet.

The previous systems used the k-means clustering algorithm to partition the food set into numerous disjoint subsets, so we have utilized the client based collaborative filtering approach to suggest the food that the client may like. The suggested food in standard plans set by client's own circumstance is in the equivalent bunch, which meets the client's healthful equilibrium. The exploratory outcomes show that the suggested result of this technique is successful, and the achieved rate is nearly about 90 percent.

The developed system that recommends an appropriate nutritional intake to its users based on their diet history and personal preferences. The solution provided that will fulfil the daily dietary requirements of the user by taking various inputs and generating the menu accordingly.

II. OBJECTIVE & GOALS

Our objective of this project is to build a system that will aim to recommend appropriate nutritional intake to its users based on their diet history and personal preferences. Along with this, our system will consider the user's physical activities.

Throughout the day and suggest appropriate diet plan for the same.

III. LITERATURE SURVEY

Zhicai Yuan, Fang Luo[1], This paper considers the user's dietary preferences and nutritional balance needs to meet the user's personalized dietary needs. Firstly, the k-means algorithm is used to divide the food cluster into independent clusters, and then it analyses the user's diet records to find v neighbours whose dietary preferences are close to the target users'. Then, according to the standard recipe, it looks for foods with higher food recommendation values in the "cluster" as recommended foods. After experimental tests, it is verified that the recommended algorithm constructed in this paper can better meet the user's personalized dietary needs.

Hao Jiang, et.al [2], states that to assist individuals with creating smart dieting propensities, we present a customized wellbeing mindful food suggestion framework, calledMarket2Dish. Market2Dish could perceive the fixings in the miniature recordings taken from the market, portray the medical issue of clients from their online media accounts, and eventually suggest clients with the customized sound nourishments. In particular, it utilizes a word-class communication based content order model to gain proficiency with the fine-grained comparability between meagre wellbeing highlights on the web-based media stages and pre-characterized wellbeing ideas, and afterward a classification mindful various levelled memory network based recommender is acquainted with get familiar with the client formula connections for better food suggestions. Besides, it exhibits this framework as an online application for ongoing cooperation's with clients.

Celestine Iwendi et.al [3] proposed that a profound learning answer for well-being base clinical dataset that consequently distinguishes which food should be given to which patient base on the sickness and different highlights like age, sexual orientation, weight, calories, protein, fat, sodium, fiber, cholesterol. This examination system is centered around executing both machine and profound learning calculations. The presentation of different AI and profound learning procedures was conveyed and the outcome demonstrates that LSTM strategy performs in a way that is better than other plan concerning determining exactness, review, accuracy, and F1-measures.

Romeshwar Sookrah et.al[4] introduces that Hypertension is turning into a genuine medical problem in the world. Individuals will in general have a bustling way of life and to receive unfortunate weight control plans. Because of helpless dietary patterns, the pace of Non Communicable Diseases (NCDs, for example, hypertension together with the pace of death brought about by such infections are rising. All together to advance good dieting propensities in Mauritius, the paper proposes a DASH diet recommender framework that suggests solid Mauritian eating regimen plans to hypertensive patients.

Ayob Ainaa et. al[5] introducing Legitimacy of picture helped and picture put together dietary appraisal techniques depends with respect to the exactness of bit size assessment dependent on food pictures. Nonetheless, little is known on the capacity of nourishment experts in evaluating dietary admission dependent on advanced food pictures. This investigation plans to inspect the capacity of sustenance experts in checking on food pictures concerning food thing ID and bit size assessment. 38 nutritionists, dieticians, and nourishment specialists took an interest in this investigation.

Rung-Ching Chen et.al. [6] Diet types have continuously changed and cantered more on wellbeing the board. Taiwan is turning out to be a maturing society where people have sporadic ways of life, long haul undesirable eating regimens, distressing work, furthermore, constant sicknesses, for example, diabetes, hypertension, furthermore, elevated cholesterol. Be that as it may, most dietary recommendation frameworks can't give dietary recommendations for patients with constant infections.

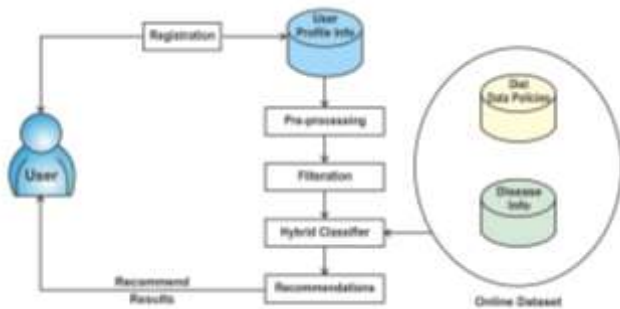## IV. METHODOLOGY USED IN PROPOSED SYSTEM

Fig1. System Architecture

Above figure shows System Architecture of healthy diet recommendation system. In this system consist following steps are data Acquisition and Collection, Data Pre-processing, Information Filtering and Recommending Healthy Diet.

A) Data Acquisition and Collection:

People login into the system and directly enter their health-related information and working lifestyle which is directly stored into the database. This information is acquired to track people's health conditions on regular basis. This health and lifestyle related information acquired through the software is the first-hand material for this system e.g. the height, weight, diseases, allergy conditions, physical activity of users, their habits etc. The data regarding food items and its nutritional value is collected from the dataset provided by USDA agricultural research service food datasets. Generally, the data acquisition module selectively obtains data from the outside web environment, in terms of functionality to provide material and resources for the latter data mining.

B) Data Pre-processing:

Data pre-processing mainly processes and reconstructs the source data acquired in the data acquisition phase and builds the data warehouse of related themes to create a basic platform for the data mining process. It is an important data mining technique used to transform the raw data (inconsistent, incomplete etc.) into an understandable format. Data pre-processing is preparation for data mining and it mainly resolves issues of raw data by methods such as data scrubbing, data integration, data conversion, data reduction etc.

C) Information Filtering:

The information filtering step is the core process of the recommender system frame work to remove unwanted or redundant data, where the data sets are analysed and the data mining algorithms are applied as the information filtering tools using (semi)automated or computerized methods to generate and discover any useful and interesting recommended outputs. We use data mining algorithms like classification techniques, clustering etc. in the data mining process to extract useful information about people's eating habits and to predict the food items to be suggested based on these habits and their health status. First, we analyse the nutritive structure of each kind of food and calculate how much fats, energy, proteins, carbohydrates an individual would require in their daily diet. Then we apply the predefined rules into the algorithms to process the composition data and give out the healthy diet reports.

D) Recommending Healthy:

Diet After the information mining method in the last step, we tend to might get a piece of abundant helpful information. Then we could advocate a healthy diet arrange consistent with the private condition of the users. The recommendations by our recommender system would improve your organic process structure and lift your health standards. On the opposite hand, we tend to conjointly track user's individual preferences. This method might advocate the related diet attempt to fulfil the personalized needs by the exploitation of association rule mining

1. CONTENT BASED FILTERING ALGORITHM

Content based filtering is another approach to make recommendations. This method is used to recommend appropriate items to the users based on the user's preferred profile. This type of filtering is mainly based on keywords. Those keywords were considered as the user's interest. Content based filtering make recommendations based on the items that are of user's interest or liked by them in the past. In the nutshell, this kind of filtering is used to recommend the items based on the ratings of user's interests by comparing with the items in the collection.

Steps:
1. Input: n (the number of Food), D (a set of lift ratios)
2. Output: a set of food ingredient
3. Arbitrarily choose k objects from D as the initial cluster centres;
4. Repeat:
5. Reassign each object to the cluster to which the object is the most similar,
6. Based on the mean value of the objects in the cluster;
7. Update the cluster means i.e., calculate the mean value

2. COLLABORATIVE FILTERING ALGORITHM

Using the food nutrients db, diseases db and season area-wise db, we will be creating a refined database that will serve as a cumulative health nutrition db. At the front end, i.e. the user interface, the input will be the personal details, fed by the user. The output will be in the form of suggested nutrient intake raw materials, as well as the menu generated. Our login module will enable the user to come back to us and/or update their personal details. The user details will take into consideration essentially the user's personal details and their medical history.
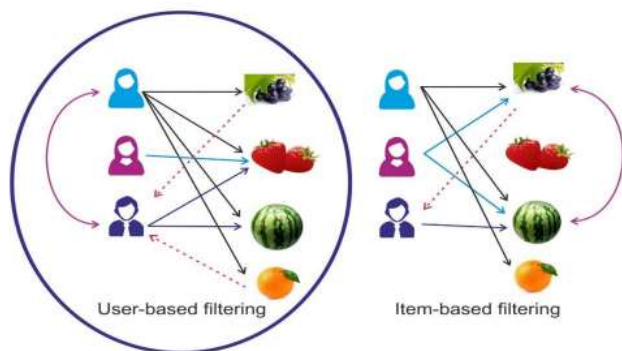

Fig.2 Collaborative Filtering

The research in the field of Recommender systems results in a new approach called hybrid approach. The hybrid approach which combines the two techniques called Collaborative Filtering (CF) and Content-Based Filtering (CBF). This new approach can be implemented by making the predictions of two filtering and then combining them and then applying the functionalities of content based to collaborative method and vice versa or by combining them into a single model. The hybrid approach performs better and also provides accurate recommendations than the pure collaborative and content based method which was revealed by several studies. The common problems such as cold start and the existing problem were overcome by the hybrid approach.

Steps:

1. Get User-Item Rating Data

2. Create User-User Similarity Matrix

3. Look Up Similar Users

4. Generate Candidate Items

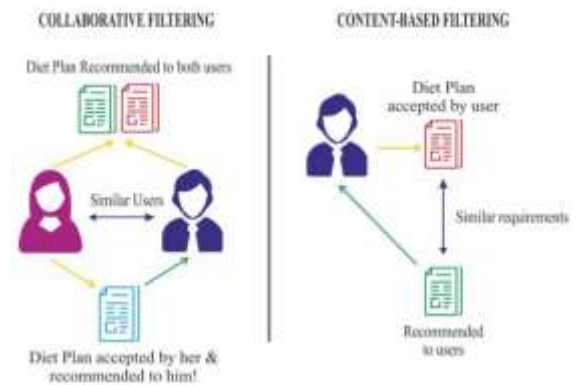5. Rank Candidates

6. Filter Candidates

Fig.3 Collaborative Filtering VS Content-Based Filtering

V. RESULTS AND DISCUSSION

In proposed work provide a user-friendly application that covers aspects like diseases, seasonal availability, and menu generation along with providing nutritional information. The output will be in the form of Suggested Nutrient Intake Raw Materials, as well as the Menu Generated.

A. User Registration

In user registration panel user can register him by providing basic details. The users register already can access the application by using login credentials.

Fig.4 User Registration

B. User Login

In user Login panel user can login him by providing registered Email and Password.
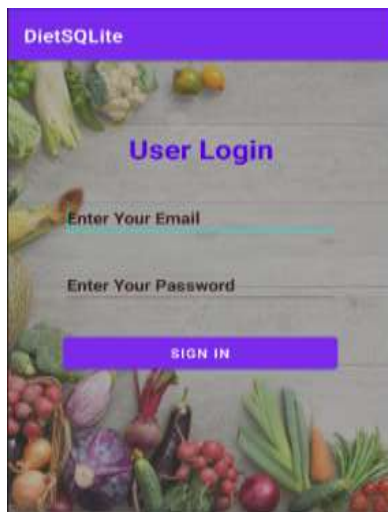

Fig.5 User Login

C. Personal Detail

In Personal Details panel user can register him by providing basic details.

Fig.6 Personal Details

D. BMI Calculator and Diet Plan Recommender

In our system we are calculated BMI by using height and width accordingly result is displayed like user is Underweight/Normal/Overweight/Obese.
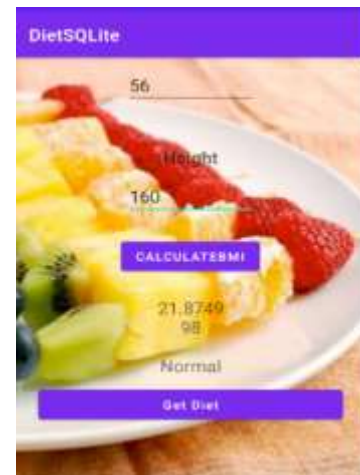By using calculated BMI we Recommended Diet Plan.

Fig. 7 BMI calculator

Fig. 8 Recommended Diet

VI. CONCLUSION & FUTURE SCOPE

Thus we implemented user-friendly application that covered aspects like diseases and menu generation along with providing nutritional information. The output is in the form of Suggested Nutrient Intake Raw Materials, as well as the Menu Generated.

For future work, we will implement this technique on some more sophisticated auto-help tool and to provide a wide range of facilities to the end user.

VII.　REFERENCES

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