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Diet Recommendation System using ML

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ABSTRACT— This research paper aims at finding efficient ways of implementing a recommendation system for people round the world who have become additional inquisitive about their health and fashion. However simply avoiding food and doing exercise isn't enough, we tend to need a diet. A diet supported our height, weight and age will lead a healthy life. Combined with physical activity, your diet will assist you to succeed in and maintain a healthy weight, scale back your risk of chronic diseases (like cardiopathy and cancer), and promote your overall health. A diet is one that provides your body the nutrients it must perform properly. Calories within the food is that the live of the quantity of energy hold on in this food. Our body uses calories for primarily everything like respiratory, walking, running etc. on the average someone wants 2000 calories per day however specifically intake of calories depends upon a personality's physical aspects like weight, height, age and gender. So, your food decisions on a daily basis have an effect on your health — however you're feeling nowadays, tomorrow, and within the future. Thus, a planned system recommends a diet arrange supported your physical aspects and your finish goal.

KEYWORDS— k-means, Random Forest, Diet, Nutrients

I. INTRODUCTION

The fast-food consumption rate is alarmingly high and this consequently has led to the intake of unhealthy food. This leads to various health issues such as obesity, diabetes, an increase in blood pressure etc. Hence it has become very essential for people to have a good balanced nutritional healthy diet. But in this fast-paced generation not everyone has the time and money to spend on a personal dietitian and nutritionist who will look upon and take care of their health by advising them a healthy diet plan according to the individual personal information.

What should I eat ? When should I eat ? How often should I eat ? How much should I eat ? These are some of the questions which arise in the minds of the people. A healthy and balanced diet is a key element in everyone's life. A balanced diet is one which contains sufficient amounts of all the nutrients namely carbohydrates, fats, proteins, vitamins, minerals, sugar etc which are necessary for keeping a person in perfect health.

A recommendation system for patients/dieticians is a system that watches a user (patient/dietician) in a tailored approach towards remarkable or acceptable diets or food intake in a broad variety of possible options, and that produces the desired output. A patient/dietician recommendation system is carefully implemented with the goal

of encouraging patients to adopt nutritional supplements, diets, and foods that are better suited to their health needs, taste, and dietary preferences.

II. LITERATURE SURVEY

A. Background

The project focuses on the study to consider various important aspects of the user's lifestyle and make sure that these factors are incorporated while the system works on a solution to build and recommend a healthy and nutritious diet for the user.

A good nutritious healthy diet and a moderate amount of physical activity can help in maintaining a healthy weight. But the benefits of good nutrition have a lot more to do than just managing the weight.

Being fit is all about the 70/30 rule. Here's how it goes, for a person to stay healthy he/she must focus 70 percent on his dietary intake and 30 percent on his physical activity/exercise

B. Literature Survey

A Diet recommendation system is required to analyze a large amount of user's data which helps to derive insights and assist the prediction of diet. The recommendation system mainly enhances robustness, extends protection against many diseases and improves the quality of living of an individual. So, to automatically suggest the foods based on their health conditions and the level of sugar, blood pressure, protein, fat, cholesterol, age etc.

Several works have been done for different diet or food recommendation systems according to nutrients in food. These systems are used for food recommendations, menu recommendations, health recommendations for particular diseases. Most of these recommendation systems fetches users' preferences from different websites users' ratings. Prediction accuracy is achieved by existing systems closely match the recommendations with users' preferences. However, the authors did not consider the nutrition to balance the diet of the system's user according to his needs. The authors did not take the nutritional values and the balance in the diet into account. Moreover, chances of identical recommendation are also found because the preference of the user may not change every time. Some systems use the data mining technology of predicting and searching feasible patterns to help nutritionists develop

personalized, comprehensive nutrition programs for users.

Decision tree analysis is used to search the matching pairs between customers' physical states and their proper diet programs.

III. PROPOSED SYSTEM

A. Overview

The system uses Machine Learning Environment, where it takes the user data from website input fields and accordingly give the recommendation of Diet plan to work on. We have divided the dataset into 3 categories: 1.Breakfast data 2.Lunch data 3.Dinner data Then training of model takes place. Machine learning training model is a process in which a machine learning (ML) algorithm is fed with sufficient training data to learn from. the algorithms used in this system are, 1.k-Means 2.Random Forest According to the user's choice healthy diet, weight gain or weight loss the model as per the data and choice selected will generate the result for the user.

B. k-means Clustering Algorithm

K-Means clustering is one of the unsupervised algorithms where the available input data does not have a labeled response. Clustering is a type of unsupervised learning wherein data points are grouped into different sets based on their degree of similarity. K-Means performs the division of objects into clusters that share similarities and are dissimilar to the objects belonging to another cluster. The term 'K' is a number. You need to tell the system how many clusters you need to create. For example, K = 2 refers to two clusters. There is a way of finding out what is the best or optimum value of K for a given data.

Working of k-means clustering algorithm :

- 1] Determine the value "K", the value "K" represents the number of clusters.
- 2] Randomly select 3 distinct centroid (new data points as cluster initialization).
- 3] Measure the distance (euclidean distance) between each point and the centroid.
- 4] Assign the each point to the nearest cluster.
- 5] Calculate the mean of each cluster as new centroid.
- 6] Repeat step 3-5 with the new center of cluster until lowest variance.

C. Random Forest Algorithm

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of ensemble learning, which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model. As the name suggests Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset. Instead of relying on one decision tree, the random forest takes the prediction from each tree and based on the majority votes of

predictions, and it predicts the final output.

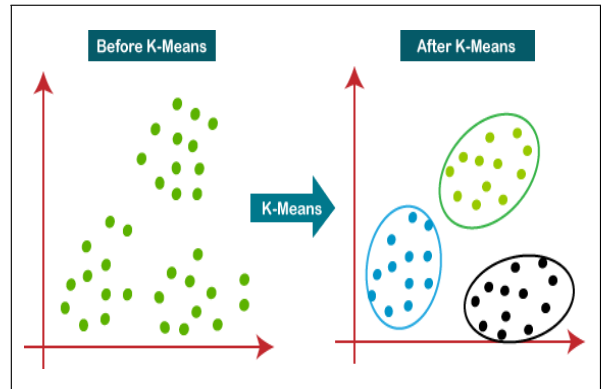


Fig. 1. k-means Clustering Algorithm

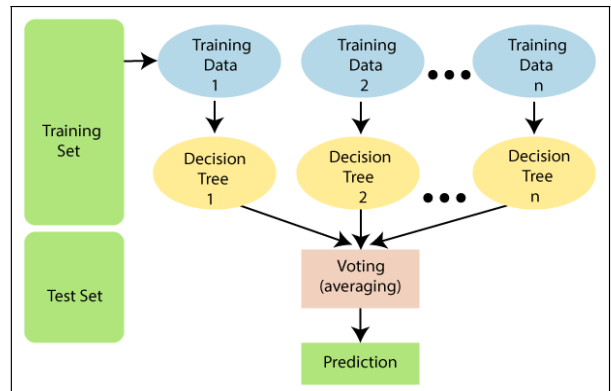


Fig. 2. Random Forest Algorithm

IV. DESIGN AND IMPLEMENTATION

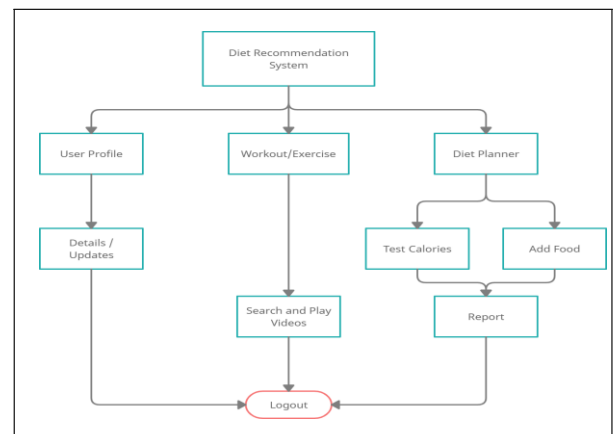


Fig. 3. System Architecture

The system we have designed uses machine learning environment where it takes inputs from user like age, weight, height. Then we train the ML model to get accurate results.

Working flow of the system

- 1] User will enter the login details and get logged in.
- 2] User will input the necessary information like their age, weight, height on the website.
- 3] The data will then go through the ML model in order given below :
 - 3.1 K-Means is used for clustering to cluster the food according to calories
 - 3.2 Random Forest classification algorithm is used to classify the food items and predict the food items based on user's data.
- 4] After analysis and calculation of all the data the system will show user's BMI and their current state (Overweight, Underweight, Healthy).
- 5] The System will then recommend diet and suggested exercises to the user.

classify the food items and predict the food items based on user's data.

- 4] After analysis and calculation of all the data the system will show user's BMI and their current state (Overweight, Underweight, Healthy).
- 5] The System will then recommend diet and suggested exercises to the user.

III. CONCLUSION

In this project, we used two algorithms namely k-means clustering and Random Forest classifier to recommend diet to user who want to make their lifestyle fit and healthy. Good food helps to uplift the immune system by preventing diseases and infections, enrich body growth, promotes good mental health, increases body look and promotes healthy long life. A personalized healthy diet recommender system that considers an individual's daily energy requirement in order to maintain a healthy weight and reduce the risk of chronic diseases has been developed by considering the food preferences of the user. Standard metrics were also used to evaluate the performance of the system, with the results showing that the system is efficient in diet recommendation. The system could be used by paediatricians in their hospitals to assist them in diet recommendation for patients and also in different homes to suggest varieties of meals to users.

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