

Sports Physical Training and Diet Plan

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ABSTRACT— In today's modern world people all around the globe are becoming more interested in their health and lifestyle. But just avoiding junk food and doing exercise is not enough, we require a balanced diet. Sports are an integral part of human life and there is great importance of sports in all spheres of life. Calories are nothing but the unit of energy required by a body. Machine learning nowadays can help us to achieve our desired health by its continuous learning recommendations. The diet recommendation and physical training project is designed to help users achieve their health and fitness goals by providing personalized diet recommendations. The application collects user data, such as weight, height, age, BMI to generate a customized meal plan that is tailored to their specific needs. The app's interface is intuitive and easy to use, allowing users to track their progress and make adjustments to their meal plan as needed. The app also provides a wide range of healthy food recommendations and nutritional information to help users make informed decisions about their diet. Random forest algorithm is used to recommend user required diet. With its comprehensive approach to diet and training, our project is for anyone looking to improve their health and wellbeing.

Keywords: Machine Learning, Random Forest Algorithm, Recommendation System, Diet Plan, BMI, Calories, Sports Activity, Physical Training.

I. INTRODUCTON

Welcome to our personalized diet recommendation and exercise application powered by machine learning. Our website is designed to help you achieve your health and fitness goals by providing tailored diet and exercise recommendations based on your individual needs and preferences. Using cutting-edge machine learning algorithms, our application analyses your personal data, including your age, gender, weight, height, fitness level, and

dietary preferences, to generate personalized recommendations for optimal nutrition and physical activity. Our diet recommendation system takes into account your unique nutritional needs and dietary restrictions, recommending meals and snacks that are both delicious and healthy. Our exercise recommendation system provides customized workout plans based on your fitness level and goals, helping you to stay motivated and achieve maximum results. Whether you're looking to lose weight, build muscle, or simply improve your overall health and wellness, our application has everything you need to succeed. With advanced analytics you'll be able to monitor your progress, stay motivated, and achieve your goals faster than ever before.

1.1 PROBLEM STATEMENT

Despite the abundance of information available on healthy eating and exercise, many individuals struggle to achieve their health and fitness goals due to a lack of personalized guidance and support. In addition, with busy schedules and conflicting priorities, it can be challenging to find the time and motivation to prioritize healthy habits. Our diet recommendation and exercise web application using machine learning aims to address these challenges by providing personalized recommendations and support to help individuals achieve their health and fitness goals. By leveraging machine learning algorithms to analyse individual data, our application offers tailored recommendations that are specific to each user's needs and preferences, making it easier to adhere to healthy habits and achieve desired outcomes. Our main motive is to build a web application which is used to help various sports persons as well as other people by recommending a healthy diet plan and particular exercise that is necessary for the particular sport.

II. LITERATURE SURVEY:

There has been a growing body of research exploring the use of machine learning algorithms to develop personalized diet and exercise recommendations. Here are some key findings from recent studies:

1. A study published in the journal BMC Medical Informatics and Decision. Making used machine learning algorithms to predict individualized energy needs based on factors such as age, sex, weight, and height. The algorithm was found to accurately predict energy needs and could be used to develop personalized diet recommendations.
2. Another study published in the Journal of Medical Internet Research explored the use of machine learning algorithms to develop personalized physical activity recommendations. The study found that the use of machine learning led to more accurate and personalized recommendations, which could lead to increased physical activity levels among participants.
3. A study published in the International Journal of Environmental Research and Public Health developed a personalized nutrition recommendation system using machine learning algorithms. The system was found to provide effective and personalized recommendations for individuals with different dietary preferences and restrictions.
4. A systematic review published in the journal Nutrients found that the use of machine learning algorithms for diet and exercise recommendations could lead to improvements in health outcomes, such as weight loss and improved glycemic control.

Overall, these studies suggest that the use of machine learning algorithms can improve the accuracy and effectiveness of personalized diet and exercise recommendations, leading to improved health outcomes.

III. EXISTING SYSTEM

There are a variety of existing diet recommendation and exercise applications that utilize machine learning algorithms to provide personalized recommendations to users. Here are a few examples:

1. MyFitnessPal - This popular application uses machine learning algorithms to provide personalized nutrition and exercise recommendations based on user data, including age, sex, weight, and height. It also offers a food diary feature that allows users to track their daily food intake and monitor their progress towards their health goals.

2. Fitbit - Fitbit offers a range of wearable fitness devices that track physical activity, sleep, and other health metrics. The accompanying mobile application uses machine learning algorithms to analyse user data and provide personalized exercise recommendations and fitness goals.
3. Noom-Noom is a mobile application that provides personalized weight loss coaching using machine learning algorithms. It offers a customized meal plan and exercise recommendations based on user preferences and goals, as well as daily coaching and support.
4. Food-visor – Food-visor is a mobile application that uses machine learning algorithms to analyse food images and provide personalized nutrition recommendations. It offers a food diary feature that allows users to track their food intake and monitor their progress towards their health goals.

Overall, these existing systems provide personalized diet and exercise recommendations using machine learning algorithms to help users achieve their health and fitness goals. However, there is still room for improvement in terms of the accuracy and effectiveness of these recommendations.

IV. PROPOSED SYSTEM

Our system is built under Machine learning environment and is mainly divided into two main parts:

- i. Diet recommendations
- ii. Physical training recommendations

I. DIET RECOMMENDATION

We have divided the dataset in 3 categories:

1. Breakfast_data
2. Lunch_data
3. Dinner_data

Algorithms Used:

K-means: Using machine learning algorithms like K-means is used for recommendation of diet according to BMI and random forest algorithm for classification of breakfast, lunch and dinner.

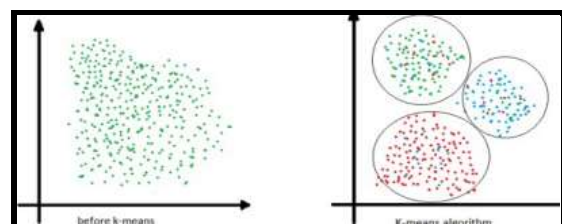


Fig (5.1) : K-means

Random Forest: Random Forest algorithm is a supervised classification algorithm. We can see it

from its name, which is to create a forest by some way and make it random. There is a direct relationship between the number of trees in the forest and the results it can get: the larger the number of trees, the more accurate the result. But one thing to note is that creating the forest is not the same as constructing the decision with information gain or gain index approach. The decision tree is a decision support tool. It uses a tree-like graph to show the possible consequences. If you input a training dataset with targets and features into the decision tree, it will formulate some set of rules. These rules can be used to perform predictions.

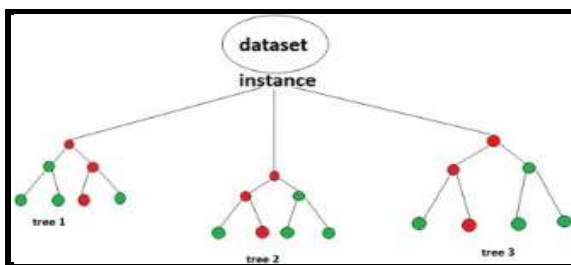


Fig (5.2) : Random Forest

II. PHYSICAL TRAINING RECOMMENDATION:-

- After recommending a healthy diet it is also necessary that one should follow a proper physical training schedule and plan to maintain the fitness of their body.
- So in this system we take input as age, gender, particular sports name and BMI according to which we further recommend the necessary exercise needed for that particular sport.

The main exercises mainly consist of :

- Pull ups : In addition to working your back, pull-ups strengthen and sculpt your shoulders, forearms, and chest (pecs). When properly performed, they also engage your abs, including your deep transverse abdominis, making them a great exercise for targeting many of the major muscles in the body.
- Push ups : Push-ups increase upper-body strength. Push-ups are a great way to strengthen and tone your upper-body muscles. This includes your chest, triceps, and shoulders. You rely on these muscles for many activities, from picking things up to pushing a shopping cart.
- Squats : Squats burn calories and might help you lose weight. They also lower your chances of injuring your knees and ankles. As you exercise, the movement strengthens your tendons, bones, and ligaments around the leg muscles.

V. SYSTEM ARCHITECTURE:

1. User's will enter the necessary information like their age, gender, weight and height on the website.
2. The information will then go through the ML model in following manner:
 - 2.1 K-Means is used for clustering to cluster the food according to calories.
 - 2.2 Random Forest Classifier is used to classify the food items and predict the food items based on input
3. After analysing all the data the system will respond by showing user's BMI and their current state (Overweight, Underweight, Healthy)
4. The System will then recommend diet to the users into three categories (breakfast, lunch, dinner) based on input
5. The Users can choose from multiple recommended items and make their diet plan.
6. After selecting food items the system will calculate selected food calories and show user's comparison between how many calories they chose against how much they need to consume daily.
7. Accordingly then the User's will make its diet plan.
8. For Sports training we will collect users BMI based on that exercise will be recommended
9. Physical training exercises are recommended using dataset and ML algorithms

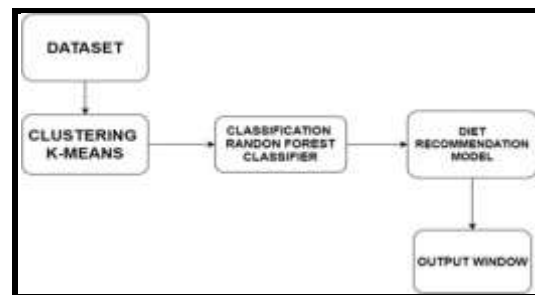


Fig (5.3) : System Architecture

VI. RESULT:

We have created a website which recommends Physical training exercises and the food items in which we have implemented BMI by taking input age, gender, and how much activities user's do regularly. For training of the system, the initial process involves the segregation of food items depending upon the meal for which they are consumed i.e. Breakfast, Lunch and Dinner. The clustering of various nutrients depending upon which are essential for weight loss, weight gain and health is performed. After the clustering is performed, using Random Forest classifier, the nearest food items are predicted which best suited for the appropriate diet. Our diet recommendation system allows users to basically get the desired healthy diet on the basis of BMI to get balanced diet plans.



Fig (6.1) : Home Page



Fig (6.2): GUI of Body Fat Calculator



Fig (6.3) : Taking User Inputs for diet



Fig (6.4) : Taking User Inputs for physical training

(Information Technology) industries. We have made use of these technologies and created a website for people who are concerned about their diet and body and want to lead a healthy life. The importance of nutritional guidance and Physical Exercises is increasing day by day to lead a healthy and fit life and by accepting the user's preferences and a user's profile in the system a healthy diet plan and Physical Training Exercises are generated.

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VII. CONCLUSION

The emerging technologies like machine learning and artificial intelligence are playing an important part in the development of the IT