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Survey Paper On AI-Based Dietician

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Abstract— **The awareness of good lifestyle is increasing among people these days. People tend to follow various diets and exercises. But consulting a dietician is something that everyone cannot afford. Also, consulting a dietician could be time-consuming. This research proposes an expert system method to recommend a personalized diet plan. The system consists of a recommender module that uses machine algorithms to recommend personalized diet plans based on factors such as age, gender, height, weight, allergies, and personal preferences. It first calculates the BMI and the BMR, recommends a diet plan and if the user is not satisfied with the current diet plan, it generates an alternative diet plan.**

I. INTRODUCTION

As people around the world take the lead in a healthy lifestyle, their diet plays a major role. Healthy eating is important for good health and nutrition. A healthy lifestyle can be achieved by maintaining a healthy diet and considering meeting all the essential nutrients the body needs.

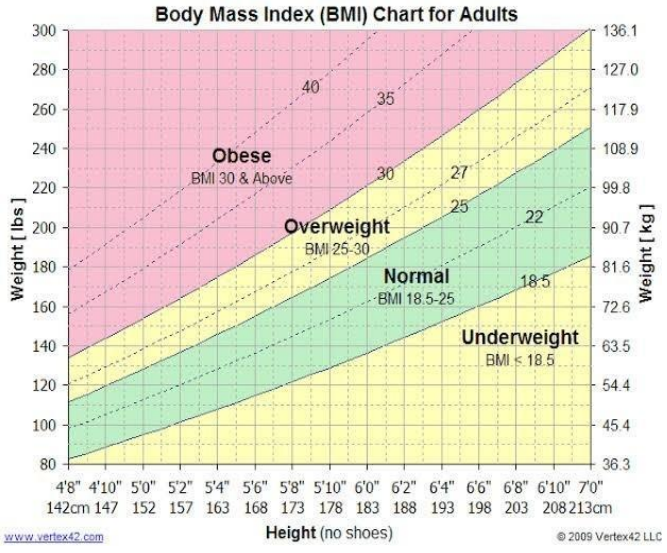

Figure 1:Body Mass Index chart for adults

Body Mass Index(BMI) is calculated using the height of a person and the weight of a person. BMI is given as the weight of a person(in kgs) divided by the height of a person(in meters) squared.

Figure 1 shows the Body Mass Index of adults and their categorization as Obese(BMI>30), Overweight(BMI between 25-30), Normal(BMI between 18.5-25), and Underweight(BMI<18.5) based on their Body Mass Index.

There are many benefits to planning ahead in a diet that not only saves time but also improves a person's health. A proper diet helps to maintain a healthy weight. To lose weight, or just to improve your diet, dieting is a simple step to help you reach your goals.

Calories are a measure of a diet's energy content. Calories are consumed when you walk, think, or breathe. Generally, a person's calorie requirement may depend on their gender, age, and physical activity. On average, a person may need 2000 calories a day to maintain his weight. In addition, men need more calories than women. Also, people who engage in a lot of physical activity require more calories compared to people who do not. So the practice of consulting a dietitian is growing.

We know that not everyone can get access to a dietician or can afford the fees. Therefore, we propose the system of AI-Based Dieticians. This enables the users to access diet plans specific to their body traits free of cost and at any time without having to visit with a dietician.

We inquire about the users regarding their age, gender, height, weight, allergies, and personal preferences and process the inputs given by the user using several machine learning models and choose the most accurate one to display the user-specific diet plan.

II. LITERATURE SURVEY

Romeshwar Sukla at [1] proposed a DASH diet recommendation system. It uses techniques such as content-based filtering along with machine learning algorithms to hypertensive patients based on factors such as age, user preferences of food, allergies, smoking level, alcohol level, blood pressure level and dietary intake.

Dietary Approaches to Stop Hypertension (DASH) is a diet plan for lowering or controlling high blood pressure. The DASH diet emphasizes low-sodium and high-potency foods rich in potassium, magnesium and calcium — nutrients that help lower blood pressure.The DASH diet includes menus with lots of vegetables, fruits and dairy products, as well as grains, fish, poultry, and nuts. Provides limited portions of red meat, sweets and sugary drinks.

Gergely Kov´asnai at [2] discussed developing an expert system for diet recommendation using a case-based approach. Based on this approach, an expert system is to be constructed which is intended to be employed in a health record management system. The approach is based on ripple down rules(RDR), however, a special representation is also needed for patient attributes and rule actions.

Case-based learning (CBL) is an established method used in all fields where students apply their knowledge to real-world situations, which develops higher levels of awareness.

Wahidah Husain in [3] proposed the application of data mining techniques in a personalized diet recommendation system for cancer patients. The system focuses on calculating the daily diet required by a patient in terms of nutrition values corresponding to their personal health condition. Consequently, the system proposes for each patient a daily diet program that includes a selection of dishes to try for breakfast, lunch, and dinner.

Ashvini Kale in [4] presented a research study on automated menu planning algorithms for children. It is a food recommendation system by the dietary management system using ID3 for the Indian food database. The proposed system of food recommendation for children is based on factors such as food preferences, availability of food, medical information, disease information, personal information, and a child's level of activity, for the Indian cuisine database. This recommendation helps to select the food from the database such that the deficiencies will not happen anytime soon, and a balanced nutrition plan will be given to the child.

Case-based Reasoning (CBR) is a data mining method for problem-solving. CBR uses the information of conditions of concrete problems that they have experienced before, known as cases, instead of relying solely on general information of The root of the problem, either making organizations or common the relationship between adjectives and conclusions[5].

Jen-Hao Hsiao at [6] has discussed the feedback for the diet plan from the users. In this case, the user can choose to modify the menu according to his/her desire, and the Meal Planner then recalculates a Pareto optimal solution based on the updated constraints. This interactive diet planning mechanism is therefore expected to provide the user with a more customized meal plan.

Jong-Hun Kim in [7] has presented a detailed approach to diet recommendation services. Firstly, the method that considers the general constraint in the diets given by medical specialists. Secondly, the method prescribes the diet through a nutritionist and compares it with a reference table of nutrition. It also calculates the calorie intake and prescribes a diet plan accordingly.

Sakshi Singh at [8] has discussed the use of AHP which utilizes the utilization of sample comparison matrices. Thomas L. Saaty proposed a principal size of total numbers. AHP helps as it checks the consistency of a Decision Maker's reactions.

Fuzzy approach allows for multiple possible truth values to be processed through the same variable. It attempts to solve problems with an open, imprecise spectrum of data and heuristics that makes it possible to obtain accurate conclusions.

III. PROPOSED SYSTEM

Figure 2 shows the components of the proposed system .This Section describes the proposed system along with the crucial factors that are considered for AI Based dietician. This system generates a diet plan for user's based on their preferences. Different Components of the system are :

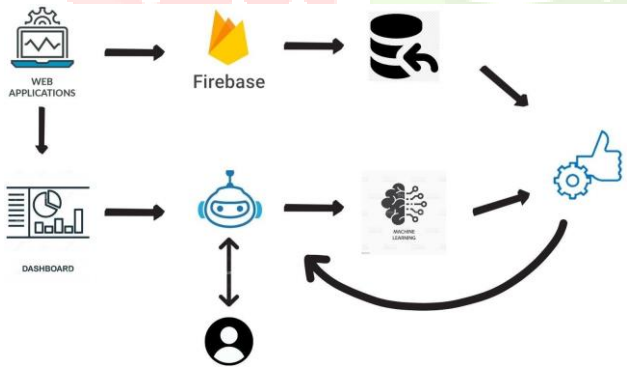

Figure 2: Flow of proposed system

A. Web Application

This Application runs as a web application which looks and helps the user to interact better with the system, Provide information to the system as input and take the recommended diet plan as output.For storing of this information given by user and authentication of the user this system uses Firebase which is a cloud based database .

B. User Database

User Database consists of all the information and preferences given by the user. For example personal details,Veg/Non-veg,Food preferences, Allergic to any particular food item.System uses this data for recommendation purpose.

Information stored in the user database will be retrieved by the recommender module during the diet plan preparation.

SL NO	INPUT PARAMETER
1	User Name
2.	Age
3.	Gender
4.	Height
5.	Weight
6.	Allergies
7.	E-Mail id
8.	Food preferences

Table 1: Information provided by user

Table 1 shows all details the system collects from the user.

C. Dashboard

Once the user logs in they will be directed to the dashboard. Dashboard is like a color palette to the application. It consists of many options which the user can use like:

1) User Profile: User profile displays all the information which was previously provided by the user during the registration . There are a few things which the user can change in the dashboard like food preferences and weight of the person etc.

2) Diet plan: This option in the dashboard shows the output of our machine learning model. From all the data in the dataset, it processes and displays the recommended diet plan , here the user will also have an option to change the diet plan if he doesn't like it.

3) Exercise: This part of the dashboard consists of all the exercises. Based on the user's interest it gives exercise plans, for example, If the user wants to work on his legs it will display all the leg workout exercises.

D. AI Bot

After the user chooses a Diet Plan from the Dashboard, the Bot takes the required details like the height of the person, the weight of the person and food preference from the user as input and generates a diet plan by passing the inputs to ML model for content-based filtering. The Recommender Module passes the diet plan back to AI Bot to display to the user. The user is asked if he/she is satisfied with the diet plan. If the user is not satisfied, the AI Bot suggests an alternate diet plan.

E. Recommender Module

The Recommender Module takes the input from the AI Bot that is passed to the ML model and from the Firebase and based on Content-Based Filtering, outputs a diet plan to the AI Bot that displays the diet plan to the user.

IV. CONCLUSIONS

Unhealthy eating patterns are the root cause for many diseases and health problems. Therefore, our system thus proposes an artificial intelligence-based dietician which recommends a user specific diet plan. The system considers the input given by the user such as age, gender, height, weight, and allergies to make recommendations based on machine learning algorithms.

As future works, the system can be used to monitor and analyze users' weight throughout the week.

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