Food Recognition System for Diabetic Patients

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Abstract— This real-time mobile application for diabetes patients' food recognition provides an approach for automatic food recognition that is based on web ontology. Diabetes is a chronic condition, but with ongoing, careful management, the build-up of sugars in the blood can be controlled. So, food intake and choices are significantly influenced by food recognition .This system for recognizing food, helps diabetic patients maintain their diets by making predictions based on the user's criteria (BMI, Diabetes Type, and Sugar Level), as well as the calories in the food they have already consumed. People therefore do not need to remember the number of calories in various food or what food they may have consumed. The major goal is to keep track of and maintain a diabetic patient's calorie and starch consumption in relation to their diet, without the assistance of a dietitian, and offer accurate nutrition advice. The Diet Recognition module serves as a liaison between the knowledge base and the user interface and offers what might be altered in the following meals with the calorie increase or decrease calculated in the currently consumed meal, rather than just suggesting what to eat. It also features a water reminder that notifies the user to drink water until the daily limit is reached. This is done by calculating the amount of water that should be consumed every day based on the user's details like age, weight, physical activity and gender. In addition to these, the BMI can also be calculated. As a result, this mobile application helps both diabetic and non-diabetic patients maintain a proper diet.

Index terms—Type1,Type2,PreDiabetic,ParaDiabetic.

I. INTRODUCTION

Diabetes is a condition that impairs the body's ability to process blood glucose, otherwise known as blood sugar. In today's society, the estimated number of people of all ages living with diagnosed and undiagnosed diabetes is 34.2 million. (From trusted Sources)Without ongoing, careful management, diabetes can lead to a build-up of sugars in the blood, which can increase the risk of dangerous complications, including stroke and heart disease. Food recognition thus plays an important role in food choice and intake, which is essential to the health and well-being of people especially with diabetes. The main difference between the type 1 and type 2 diabetes is that type 1 diabetes is a genetic condition that often shows up early in life, and type 2 is mainly lifestyle-related and develops over time. With type 1 diabetes, your immune system is attacking and destroying the insulin-producing cells in your pancreas. Therefore, the idea of helping people deal with this chronic disease has driven us to develop this mobile application called "Foodalysis" which is a Food recognition System for Diabetic Patients. This System for Recognizing Food is a real-time application that supports diabetic patients in keeping up their diets by providing predictions based on the user's specifications (BMI, Diabetes Type and Sugar level) and the calories in the food they have eaten. People therefore do not need to remember the number of calories in various food or what food they may have consumed. The major goal is to keep track of and maintain a diabetic patient's calorie and starch consumption in relation to their diet. Without the assistance of a dietitian, this mobile app offers accurate nutrition advice. The Diet Recognition module serves as a liaison between the knowledge base and the user interface and offers what might be altered in the following meals with the calorie increase or decrease calculated in the currently consumed meal, rather than just suggesting what to eat.

It also features a water reminder that notifies the user to drink water until the daily limit is reached. This is done by calculating the amount of water that should be consumed every day based on the user's details like age, weight, physical activity and gender.

II. LITERATURE REVIEW

In this paper [1], Improvised the manual method of developing a healthy diet plan by measuring calories based on an individuals' preferences which is often a time-consuming procedure, into a data mining project.

The advantage of this paper is a good recommendation for diabetes diet care is provided. This also develops the way for managing nutrition therapy knowledge. They have used clustering analysis; self-organizing map; k-mean clustering as technology. The scope of this paper is they have to be more careful in their diet but, usually, they cannot effective do as the suggestion because their daily food consumption behavior is barely changed.

In this paper [2], This is a calorie measurement system whereby the user is made to upload the image of food item and as a result, number of calories present in the uploaded food image will be predicted. Image processing could not deliver accurate recognition.

The advantage of this paper is Better performance and it will give more accurate food recommendations in an efficient way to diabetic patients.

In this paper [3], we analyzed that continuous administrative intervention was a waste of time and effort.

Continuous administrative intervention to resolve team conflicts results in a waste of time and effort.

It also states that combines the advantages of the genetic algorithm and rough set theory's relative deduct algorithm in a single model. The disadvantage of this paper is it leads to

Data Acquisition, Time and Resources, Results Interpretations, High Error Chances.

In this paper[4] , we analyzed about Machine Learning Implementation of a Diabetic Patient Monitoring System Using Interactive E-App. The advantage of this paper is the customer is allowed to log in with valid credentials and based on genetic algorithm, the recommendations are provided. Hence, it becomes easy for the user to know about the current intake of nutrients and based upon it, the user is recommended with certain products. The scope of this paper is The system for now provides recommendations to the user based upon their likeliness and also the system provides custom recommendation for the user having any genetic issues such a heart problem, diabetes, hypertension etc.

In this paper[5] they used intelligent Food Recommendation System Using Machine Learning. The advantage of this paper is better performance and it will give more accurate food recommendations in an efficient way to diabetic patients. Continuous administrative intervention to resolve team conflicts results in a waste of time and effort.

In this paper [6], It combines the advantages of the genetic algorithm and rough set theory's relative reduce algorithm in a single model. It leads to Data Acquisition, Time and Resources, Results Interpretations ,High Error Chances.

In this paper [7], The customer is allowed to log in with valid credentials and based on genetic algorithm, the recommendations are provided. Hence, it becomes easy for the user to know about the current intake of nutrients and based upon it, the user is recommended with certain products. The system for now provides recommendations to the user based upon their likeliness and also the system provides custom recommendation for the user having any genetic issues such a heart problem, diabetes, hypertension etc.

In this paper [8], Our diet recommendation system allows users to basically get the desired healthy diet on the bases of BMI to get balanced diet plans .Only the importance of nutritional guidance by accepting the user's preferences and a user's profile in the system a healthy diet plan is generated. Further this project can be extended to add more categories user having any genetic issues.

In this paper [9], A healthy diet plan may be developed by accepting the user's food choices and a user's profile in the system. Balancing the diet and developing a healthy diet plan by measuring calorie requirements based on an individual\'s preferences is often a time-consuming and labor-intensive procedure. In the future, an algorithm can be built to recommend a meal plan based on advanced nutrition levels

such as salt , phosphorous, fiber , manganese , and so on. Along with the food products recommended for each meal, the system may be programmed to develop and deliver recipes that contain all of the food items recommended in the meal plan.

In this paper [10], No domain knowledge necessary. We don't need domain knowledge because the embeddings are automatically learned. Significant investments required, too many choices, the complex onboarding process.

In this paper [11], The proposed architecture includes an intelligent algorithm developed to intelligently detect whether a parameter has exceeded a threshold, which may or may not involve urgency. This is a secure mechanism to establish a wireless connection with the smartphone.

The major limitation of the monitoring system is the measurement of interstitial glucose levels rather than real-time blood glucose levels; thus, there will be a delay in the treatment of hyperglycemia and hypoglycemia in patients.

III. METHODOLOGY

Glycemic Index Methodology:

The glycemic index (GI) is a value used to measure how much specific foods increase blood sugar levels .Foods are classified as low, medium, or high glycemic foods and ranked on a scale of 0–100.The lower the GI of a specific food, the less it may affect your blood sugar levels (1Trusted Source).

Here are the three GI ratings:

Low: 55 or less

Medium: 56–69

High: 70 or above

IV. SYSTEM DESIGN

A. User profile Creation

Users can enter personal data like their height, weight, and age using the interface it offers. These specifics will be used by the system to ascertain users' health status. On the basis of these findings, metabolic markers, including the BMI and blood sugar level, will be computed. By using this data, the recommendation engine will be better able to determine whether a user has a nutritional disorder and offer a diet that best suits their diabetes issues.

B. Food Recognizing Module

The Diet Recognition module acts as the mediator between the user interface and the knowledge base.

It is responsible for systematically converting the data collected by the user interface into an Web Ontology to ask the reasoner for the users' health condition. As a result, it retrieves the users' category of sugar level and also detects the water intake. Similarly, the system will utilize the information inferred to predict the users' health status and alter the subsequent meals accordingly.

The first module shown in the image alongside represents the user interface creation. This is used to capture certain characteristics about an individual user, and the process of obtaining the user profile is called user modeling or profiling. This is the front end part of the entire mobile application and it is framed using Eclipse.

The second module is the dataset, food and the respective calories are collected and fed into the system. This is the back end part of the project, carried out using Xampp.

Once both these modules are functional, all that the application has to do as a mediator is the processing of the data with respect to the user interface and the dataset and provide predictions as results in the final module.
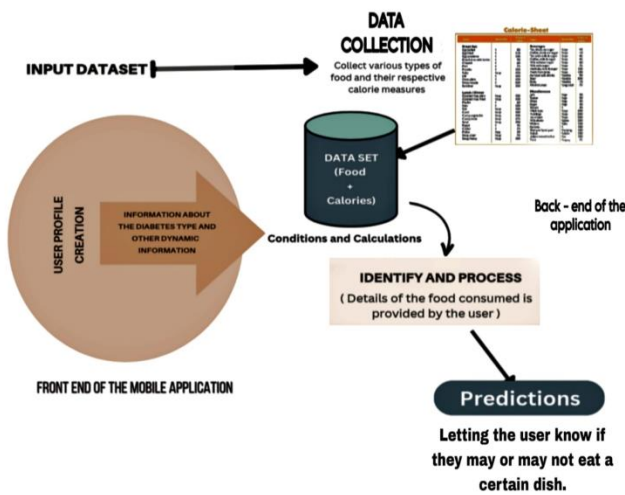
V. IMPLEMENTATION

Login module

The Login Module is a portal module that allows users to type a user name and password to log in, and in case they are new to the application, they can register with their e mail id. You can add this module on any module tab to allow users to log in to the system. More on creating module tabs.

This page utilizes the credentials of a user, in order to authenticate their access. It generally consists of the typical username or email and password.

About and profile module

The About page is a special page on this mobile application where your readers/visitors learn more about the application and what it does.

The primary purpose of this About page is to inform the reader about the various features of the app.

The user profile module is used to collect user details such as name, phone number, gender, age, sugar level and all other necessary specifics of the application and create a profile of their own.

It contains critical information that is used to identify an individual.

Bmi calculator module

This module is has a significant purpose, the BMI Calculator accepts the weight and height of an individual and calculates the Body Mass Index (BMI) of that person.

It also displays whether the person is under weight, healthy weighted, obese, severely obese, very severely obese, or underweighted according to the calculations, it will display user health conditions.

Water intake module

This module of the application will track time and show you notifications periodically to remind you to drink water. This module thus helps you create healthy water-drinking habits. With this app it's easy for you to implement set patterns into your daily life, with a tiny nudge set up.

Food recognition module

This is the most important module, this intelligent system classifies and segments food and their calories presented into breakfast, lunch and dinner drop down lists to help the user select the food they had consumed and get it checked or recognized. This automatic monitoring of user diet and nutritional intake is the major processing done by the various conditions that have been set by the developer.

The user can automatically record their food and calorie intake with just the click of a button.

The results will be declared in the final page.

VI. EXPERIMENT RESULT

Between the user interface and the knowledge base, this application serves as a liaison. It is in charge of methodically transforming the user interface's data into a Web Ontology to query the reasoner about the users' health status.

It consequently retrieves the user's category of sugar level an identifies the water input as well.

The system will similarly use the information inferred to forecast the users' health status and suggest the user to adjust the following meals in accordance. This automatic monitoring of user diet and nutritional intake is the major processing done by the various conditions that have been set by the developer with that information user will be able to know the information about the calorie intake. Based on the calorie intake, user will be need to improve or maintain the diet.

VII. CONCLUSION

By achieving the treatment objectives, people with diabetes can live longer, and regularly recognizing food can greatly aid in managing their blood sugar. The major goal is to keep track of and maintain a diabetic patient's calorie and starch consumption in relation to their diet. Without the assistance of a dietitian, this mobile app offers accurate nutrition advice. So, until scientists and researchers discover a cure for diabetes, which they are currently working on, this

smartphone application, Foodalysis, would be your personal diabetic dietician!

REFERENCES

[1] N. Naga Lakshmi, M. Jagadeesh Reddy , K. Hari Krishna , S. Sindhuja Reddy. İstanbul Gelisim University International Journal Engineering, Vitamin Deficiency and Food Recommendation System Using Machine Learning, DOI Link: https://doi.org/10.22214/ijraset.2022.43236

[2] V. Hemalatha Reddy- Food Recognition and Calorie Measurement for Diabetic Patients.

[3] A food recommender System considering nutritional information and user preferences.

[4] M. Phanich, P. Pholkul and S. Phimoltares, "Food Recommendation System Using Clustering Analysis for Diabetic Patients," 2010 International Conference on Information Science and Applications, Seoul, Korea (South), 2010, pp. 1-8, doi: 10.1109/ICISA.2010.5480416.

[5] Norouzi S, Kamel Ghalibaf A, Sistani S, Banazadeh V, Keykhaei F, Zareishargh P, Amiri F, Nematy M, Etminani K. A Mobile Application for Managing Diabetic Patients' Nutrition: A Food Recommender System. Arch Iran Med. 2018 Oct 1;21(10):466-472. PMID: 30415555.

[6] Show citatiMachine Learning Implementation of a Diabetic Patient Monitoring System Using Interactive E-App. Volume 2021 | Article ID 5759184 | . https://doi.org/10.1155/2021/5759184

[7] Pratiksha Ashok. Naik. Intelligent Food Recommendation System Using Machine Learning August 2020 DOI:10.38124/IJISRT20AUG414,

[8] Shubham Singh Kardam1, Pinky Yadav2, Raj Thakkar3, Prof Anand Ingle41,2,3 Student, Dept. of Computer Engineering, M.G.M College of Engineering and Technology, Kamothe Maharashtra, India. Website on Diet Recommendation Using Machine Learning,

[9] Prof. Dept of Computer Engineering, M.G.M College of Engineering and Technology, Kamothe, Maharashtra, India

[10] N. Naga Lakshmi, M. Jagadeesh Reddy , K. Hari Krishna , S. Sindhuja Reddy. Vitamin Deficiency and Food Recommendation System Using Machine Learning. DOI Link: https://doi.org/10.22214/ijraset.2022.43236

[11] M. Shah, S. Degadwala and D. Vyas, "Diet Recommendation System based on Different Machine Learners: A Review," 2022 Second International Conference on Artificial Intelligence and Smart Energy (ICAIS), Coimbatore, India, 2022, pp. 290-295, doi: 10.1109/ICAIS53314.2022.9742919.