Research Paper on Disorder-based Food Recommendation System

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Abstract- **This research paper focuses on a diet-based food recommendation system. Here, we have deployed a system that helps the user get the food that suits his/her health. Since the Covid19 pandemic has hit us, the world has become more aware of immunity, and strong immunity needs good health. This system has used machine learning algorithms and techniques to make recommendations of the required food items. The algorithms that are used in this system are K-means clustering, Random Forest Classification algorithm and rank-based collaborative filtering. This system focuses on giving food recommendations that help the user in maintaining and boosting his/her health. It aims to make dining-out a healthier experience.**

Keywords- K-means, collaborative filtering, random forest, clustering, classification, food recommendation, accuracy.

I. INTRODUCTION

This project is titled 'Disorder-based Food Recommendation System'. In the wake of the worldwide pandemic of Covid19, immunity and good health are of paramount importance. In order to ensure that people eat healthy, this system tries to give them food options that best suit their health.

The user will be able to sign up to the website. After a restaurant is selected, the user will be prompted to fill in all of this health details like height and weight to calculate the Body Mass Index (BMI), and information about other disorders like Blood Pressure (BP) and diabetes.

On the basis of this information, the food from that restaurant which is suitable for their health conditions is presented to them. The restaurant recommendation system of this project is a machine learning module. It is a well-known fact that machine learning algorithms are used far and wide for prediction and recommendation purposes. The algorithms generate results by learning the trends and patterns in previously available data. These results are used to predict the future behavior of the user.

In this module, there are three machine learning techniques used. The first one is rank-based collaborative filtering, the second one is K-means clustering and the third oneis the random forest classification algorithm.

The rank-based collaborative filtering approach is used to determine the highest-rated and the most favourite restaurants of the user. The highest-rated restaurant is determined basis the number of searches that restaurant has got. On the other hand, the most favourite restaurant of the user is determined on the basis of how many times that specific user has searched that restaurant.

K-means clustering is used to cluster the food items on the basis of their nutrient levels. Every disorder needs different level of nutrients. Hence, we have used the levels which have been approved by authorized medical bodies to determine which level is suitable for a specific user.

Random Forest Classification algorithm is used to classify the clustered items into suitable and unsuitable food categories. Then, only those food items that are suitable for the person are displayed.

II. SYSTEM ARCHITECTURE
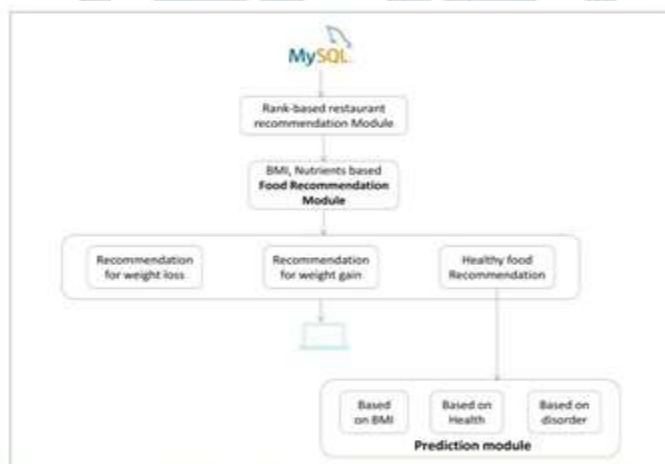
The front-end of the system is web-based. At the front-end, there are user functions like logging in or signing up and entering the details of his/her health conditions. The system, then, shows the restaurants nearby and the food items that suit the health of the user. Once the user selects a particular food item, he/she can log out of the system.

At the backend, this system has deployed a MySQL database. Here, all the user data like login credentials and the disorder- based data is stored. The connectivity between the front-end andthe backend is established using the Flask Framework.

III.   DATA-FLOW DIAGRAM

This data-flow diagram shows how data will flow from one entity to the other in this whole system. There are entities like user, restaurant and the recommendation engine comprising the machine learning modules.
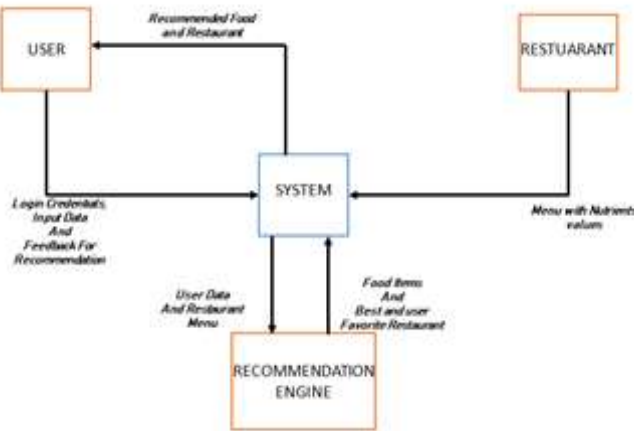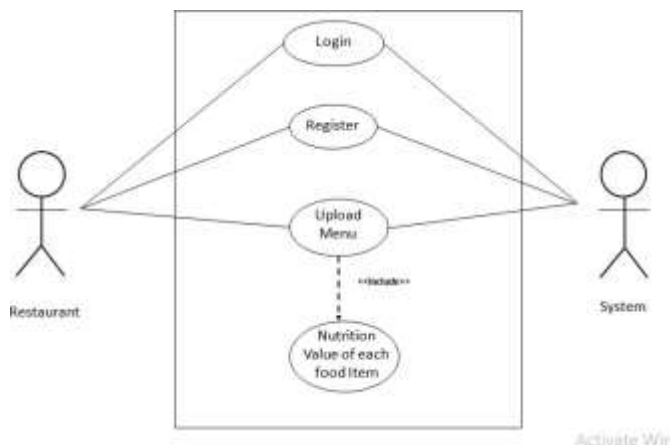

IV.   USE-CASE DIAGRAMS

The use-case diagrams are of the utmost importance while enhancing the usability of the system. Here, we have developed this system on the basis of two use-case diagrams, viz. user-side use-case diagram and restaurant-side use-case diagram.
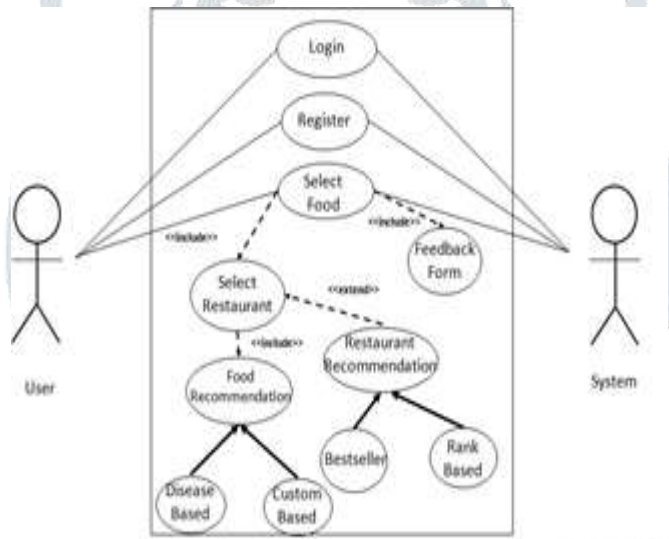

In the user-side use-case diagram, all the user-side functions of the system are shown. The users can use functions like logging in, registering to the system (sign-up) and selecting the restaurant and the food items. The selection of the food-items is powered by the machine learning modules.

The restaurant-side use-case diagram shows the login and registration of the restaurants from their ends. This side gives the restaurateurs interface to register a restaurant and upload its menu into the system.

V.   ACTIVITY DIAGRAM
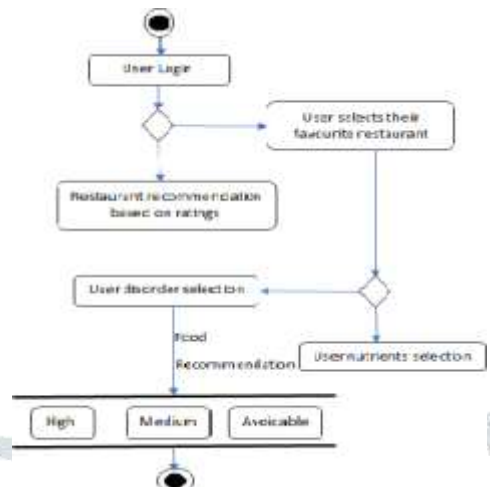
This activity diagram of the system shows the activities like user login, user selects favourite restaurant, user disorder selection and selection of the food items.

VI.   E-R DIAGRAM
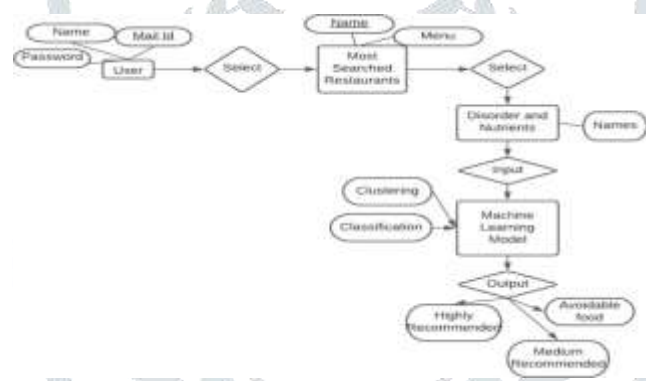
An E-R diagram is the one which shows the relationships between different entities in the system. Here, there are entities like user, most-searched restaurants, disorder and nutrients and the machine learning model. Every entity has a primary key. The relationship among every entity is described in this diagram.

VII.   CLASS DIAGRAM
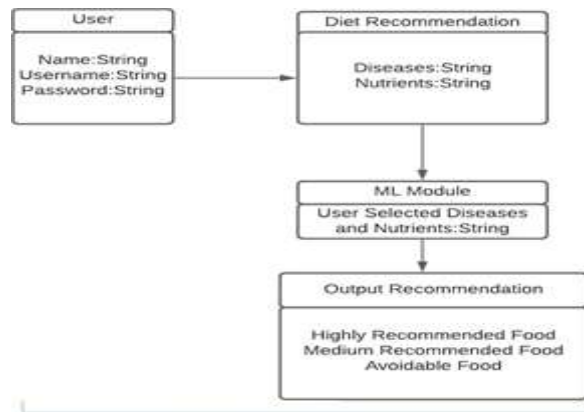
The class diagram shows how the system has been divided optimally into various classes. It ensures ease of usage and better understanding of the system. There are classes like user, diet recommendation, ML module and output recommendation. This bifurcation into classes makes it easier to reuse the code, hence, optimizing the system with respect to both, time and space.
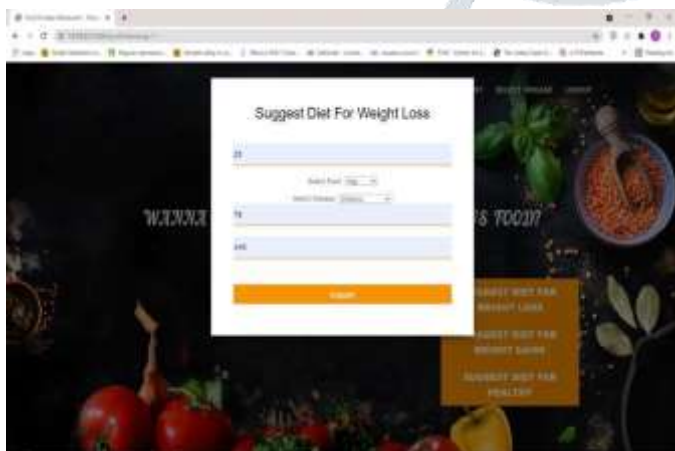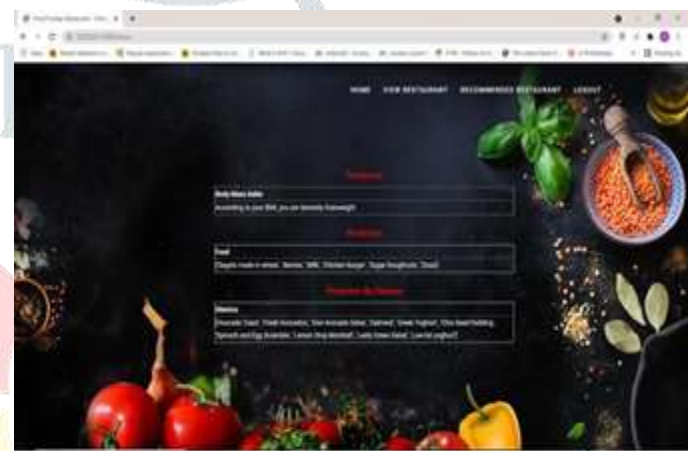
VIII.   OUTPUT

Home Screen
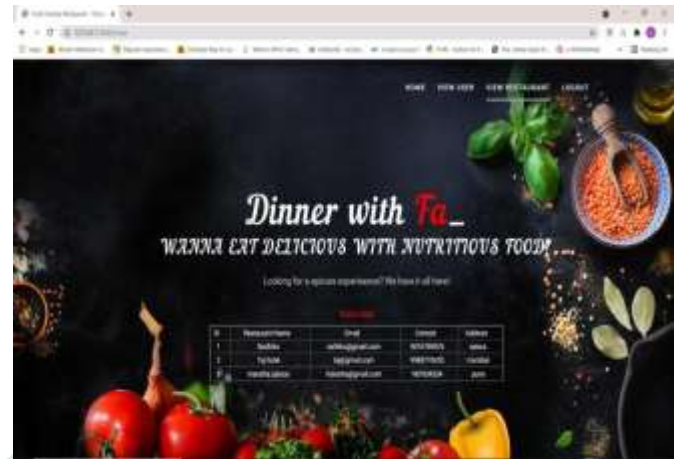
Displaying the Restaurants

Entering Disorder-based Data

Recommendations

Viewing the Users on Admin Side

IX.   CONCLUSION

In this paper, we have tried to build a system which recommends food keeping the health and wellness of the user in prime focus. There are three machine learning methods, viz. rank-based collaborative filtering, K-means clustering and Random Forest Classification algorithm used in this system which make the system more robust. These algorithms have been zeroed down upon after an accuracy check on the system to make it more convenient and trustworthy. The conclusion of this paper, the system focuses on real time environment and actual usage for a disorder-based food recommendation system. The main aim of this paper is to propose a system that gives the best and highly accurate results for food recommendation.

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