DIETARY RECOMMENDATION SYSTEM

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

This is to certify that this project report titled "Dietary Recommendation System" is the bonafide work of "G Anirudh (210701028) and MOHNEESH P (210701502)" who carried out the project work under my supervision.

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This project report is submitted for the CAT II project mode of evaluation of course CS19643-Fundamentals of Machine Learning held on__________.

INTERNAL EXAMINER EXTERNAL EXAMINER

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CHAPTER 1

INTRODUCTION

1.1 ABSTRACT

Your daily dietary decisions have an impact on your health and how you feel now, tomorrow, and down the road. Maintaining a nutritious diet is crucial to living a long life. Your diet, when paired with exercise, can help you achieve and maintain a healthy weight, lower your chance of developing chronic illnesses like cancer and heart disease, and improve your general health. A balanced diet provides the nutrition your body needs to operate as intended. The quantity of energy that is stored in a food is expressed in terms of calories. Calories from meals are used by your body for respiration, walking, thinking, and other essential processes. To maintain their weight, the average person needs to consume roughly 2,000 calories every day.

Nonetheless, an individual's precise daily energy consumption may differ based on their age, sex, and degree of physical activity. In general, men require more calories than women do, as do those who engage in physical activity.

1.2 INTRODUCTION

Daily nutrition and food consumption are important components of a healthy lifestyle, especially for those with minor or serious medical conditions. eHealth projects and research endeavors seek to provide a range of ubiquitous applications for inexperienced end users to enhance their well-being. Numerous studies show that the main causes of a wide range of illnesses and health problems are improper and insufficient dietary intake. According to a World Health Organization (WHO) study, 60% of child fatalities annually are caused by malnutrition, and around 30% of the world's population suffers from various ailments.

Inadequate and unbalanced dietary intake is linked to around 9% of global fatalities from heart attacks, 11% from ischemic heart disease, and 14% from gastrointestinal cancer, according to a different WHO research. Additionally, 0.2 billion people suffer from iron insufficiency (anemia), 0.7 billion individuals from iodine shortage, and around 0.25 billion children suffer from vitamin A inadequacy. Providing nutritional support to individuals with common illnesses or those without them is the primary goal of this effort. Predicting the "rating" or "preference" a user would assign to an item is the goal of a recommender system, also known as a recommendation system (often used interchangeably with synonyms like "platform" or "engine"). These systems are a subclass of information filtering systems and are primarily used in commercial applications.

There are three main phases to the recommendation process: the information collection phase, the learning phase, and the recommendation phase. First, data regarding a certain issue is gathered, and then the many approaches to that issue are categorized. Following the information gathering phase, there is a learning phase during which a variety of conclusions are drawn from the data acquired.

The final phase, known as the recommendation phase, culminates in an output that includes a number of recommendations. Given that our system is a diet suggestion system, the advice will center around the diet plan, including what foods you should eat and your BMI (body mass index), which indicates whether you are underweight, overweight, or healthy.

1.3 SCOPE OF THE PROJECT

The dietary recommendation system project aims to create a simple yet effective tool using Python, CSV files, and the Tkinter library for the graphical user interface. This system will provide personalized dietary recommendations based on user input regarding their dietary preferences, health conditions, and basic health metrics such as BMI.

The primary target audience for this system includes individuals looking to improve their dietary habits and manage their health more effectively. This includes the general population seeking better nutrition, as well as those with specific dietary needs due to minor medical conditions. By using straightforward technology and an intuitive interface, the system will be accessible to users with minimal technical expertise.

The core features of the project include a user-friendly interface built with Tkinter that allows users to input their dietary preferences, health conditions, and basic health metrics. The system will read and write data to and from CSV files, which will store information such as food items, their nutritional values, and user-specific data. Based on the input data, the system will provide personalized dietary recommendations, including meal plans and nutritional information tailored to individual needs.

Data management in this project is straightforward, utilizing CSV files to store user data and nutritional information. This approach simplifies the implementation and ensures that the system can be easily modified and expanded. Users will input their data through the Tkinter interface, and the system will process this information to generate appropriate dietary suggestions.

The technological foundation of the project involves Python for backend processing and Tkinter for the user interface. CSV files will serve as the data storage mechanism, providing a simple and effective way to manage user and nutritional data. The system will leverage basic algorithms to analyze user input and generate dietary recommendations.

The development process includes several key phases: designing the user interface with Tkinter, implementing data handling using CSV files, developing the recommendation algorithm, and integrating all components into a cohesive system. During the initial phase, the focus will be on creating a functional and intuitive interface that allows users to enter and view their data easily. The subsequent phase will involve coding the logic to read from and write to CSV files, ensuring data is accurately stored and retrieved. The final phase will integrate the recommendation algorithm, which will analyze the user data and provide dietary suggestions.

Expected outcomes of the project include an easy-to-use system that helps users make better dietary choices and manage their nutrition effectively. By providing tailored dietary recommendations, the system aims to improve users' overall health and well-being. User engagement and satisfaction will be key indicators of success, measured by feedback and usage patterns.

The project will also incorporate basic mechanisms for user feedback, allowing continuous improvement of the system. Feedback will be gathered through the Tkinter interface, enabling users to report their satisfaction with the recommendations and suggest improvements. This iterative process will help refine the recommendation algorithm and enhance the overall user experience.

In terms of future enhancements, the system can be expanded to include more sophisticated data analysis and additional features such as integration with external health databases or advanced personalization algorithms. Initially, however, the focus will remain on delivering a functional, user-friendly tool that meets the immediate needs of its users. The simplicity of using Python, Tkinter, and CSV files ensures that the system can be developed efficiently and deployed quickly, providing immediate benefits to users seeking to improve their dietary habits.

CHAPTER 2

LITERATURE REVIEW

1. **Willett et al. (2006) - "Dietary fats and coronary heart disease":** This paper discusses the importance of a balanced diet rich in fruits, vegetables, whole grains, and lean proteins for reducing the risk of cardiovascular diseases. It emphasizes the impact of dietary fats on heart health and recommends dietary modifications to improve cardiovascular outcomes.

2. **Sacks et al. (2009) - "Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates":** This systematic review evaluates the effectiveness of personalized dietary advice compared to generic dietary guidelines. It concludes that personalized dietary recommendations lead to better adherence and improved health outcomes, particularly in weight loss interventions.

3. **Trattner and Elsweiler (2017) - "Investigating the Impact of Personalization and Emotion in Recommender Systems for Health and Wellbeing Applications":** This study explores the application of recommender systems in promoting healthier eating habits. It demonstrates that personalized dietary recommendations based on user preferences and health goals can significantly improve dietary behaviours and overall well-being.

4. **Schäfer et al. (2007) - "The influence of recommendations on the user experience in an entertainment-oriented social network":** This paper investigates the broader implications of recommender systems in various domains, including health and nutrition. It highlights the role of personalized

recommendations in enhancing user engagement and satisfaction across different applications.

5. **Van Rossum (2007) - "Python programming language":** This paper discusses the simplicity and readability of the Python programming language, making it suitable for rapid application development. It emphasizes Python's versatility and widespread use in developing user-friendly applications, including those in health and nutrition.

6. **Grayson (2000) - "Python and Tkinter Programming":** This book provides insights into building graphical user interfaces (GUIs) using Tkinter, the standard GUI toolkit for Python. It highlights Tkinter's ease of use and flexibility, making it an ideal choice for developing desktop applications, including dietary recommendation systems.

7. **McKinney (2010) - "Python for Data Analysis":** This book explores various data manipulation techniques in Python, including handling CSV files for data storage. It demonstrates how CSV files can be used to store and retrieve user data, essential for dietary recommendation systems that rely on user input for personalized recommendations.

8. **Chen et al. (2015) - "Personalized Nutrition for Preventive Medicine":** This paper provides an overview of personalized nutrition, discussing how data from various sources, including genetic information and lifestyle factors, can be used to tailor dietary recommendations. It underscores the potential for advanced data integration in enhancing the precision and effectiveness of dietary advice for preventive medicine.

9. **Boushey et al. (2017) - "Mobile Technology for Dietary Assessment and Health Behaviour Change":** This study discusses the role of mobile technology in dietary assessment and intervention. It highlights the potential of digital tools, including mobile apps, in enhancing nutritional tracking and providing personalized dietary advice to promote healthier eating habits.

10. **Kaur et al. (2018) - "Mobile health applications for dietary management: A systematic review":** This systematic review evaluates the effectiveness of mobile health applications in promoting dietary changes. It concludes that mobile apps with personalized recommendations can significantly improve users' dietary habits and health outcomes, highlighting the importance of user-friendly, data-driven tools in health management.

2.1 EXISTING SYSTEM

MyFitnessPal is a widely used app that helps users track their diet and exercise. It offers a comprehensive database of food items, enabling users to log their meals and view detailed nutritional information. The app allows users to set weight goals, monitor calorie intake, and track macronutrient distribution. Although it provides extensive tracking features, MyFitnessPal primarily focuses on calorie counting rather than offering personalized meal plans specifically tailored to individual health conditions.

Nutrino uses artificial intelligence to deliver personalized meal recommendations. By integrating with wearable devices and other health data sources, Nutrino tailors nutrition advice based on user data. The app suggests meals that align with health goals, dietary preferences, and nutritional needs, and provides insights into how different foods affect health metrics. However, its reliance on AI and extensive data integration can be complex, potentially requiring users to input or sync significant amounts of data, which might not be user-friendly for everyone.

Yazio is designed to help users manage their diet, track calories, and achieve health goals. It offers personalized meal plans, nutritional tracking, and a wide range of recipes. Users can follow meal plans tailored to their dietary preferences and goals, and the app provides detailed nutritional information for various foods. While Yazio delivers comprehensive meal planning, it may lack the depth of personalization needed for managing specific health conditions or detailed nutrient optimization.

Cronometer focuses on detailed nutrient tracking, catering to users who want to closely monitor their micronutrient intake. Users log their food intake to track both macronutrients and micronutrients, receiving insights into nutrient deficiencies and surpluses. Cronometer's emphasis on detailed nutrient tracking may be overwhelming for casual users or those seeking simpler dietary advice, and it requires accurate logging of food details.

PlateJoy provides personalized meal planning and grocery delivery services, creating meal plans based on user preferences, dietary restrictions, and health goals. The app offers customized meal plans, recipes, and grocery lists, and integrates with fitness trackers to adjust plans based on physical activity levels. PlateJoy's focus on meal planning and grocery delivery may not suit users looking for broader health tracking or integration with medical data.

Fooducate helps users understand the nutritional value of food products through barcode scanning and personalized dietary advice. It educates users about healthy eating habits by grading food products based on their nutritional content and suggesting healthier alternatives. While Fooducate excels in educating users about food choices, it does not provide comprehensive meal planning or integration with personal health metrics.

Summary: These existing systems demonstrate various approaches to dietary recommendations, ranging from simple calorie tracking and meal planning to advanced AI-driven personalized nutrition. However, there are gaps, particularly in integrating detailed health metrics and offering personalized advice for specific medical conditions. The proposed dietary recommendation system using Python, CSV files, and Tkinter aims to address these gaps by providing a simple, user-friendly tool that combines ease of use with the capability for personalized dietary recommendations tailored to individual health needs.

2.2 PROPOSED SYSTEM

The proposed dietary recommendation system aims to utilize the simplicity and versatility of Python, CSV files, and Tkinter to create an accessible and user-friendly application for personalized dietary guidance. This system addresses the limitations observed in existing solutions by focusing on individualized recommendations tailored to specific health conditions and dietary preferences while maintaining ease of use and minimal user input requirements.

The system will feature a user-friendly interface created with Tkinter, allowing users to input personal data such as age, sex, weight, height, and activity level. The simplicity of Tkinter ensures that even users with limited technical expertise can interact with the application effectively. Using this input data, the system will generate personalized dietary recommendations considering the user's specific health goals (e.g., weight loss, muscle gain, managing diabetes) and dietary restrictions (e.g., vegetarian, gluten-free). Predefined rules and algorithms will match user profiles with suitable meal plans stored in CSV files.

Nutritional tracking will be a key feature, enabling users to log their daily food intake, which the system will track against their nutritional goals. This feature will help users monitor their calorie and nutrient consumption, ensuring they stay on track with their dietary plans. The system will provide feedback on daily intake, highlighting any deficiencies or excesses in their diet. Additionally, the system will calculate and display essential health metrics such as Body Mass Index (BMI) based on user inputs, providing insights into how these metrics change over time with adherence to the recommended dietary plan.

Data storage and management will be handled using CSV files, ensuring simplicity and portability. This approach allows for easy data management and retrieval, compatible with various data manipulation libraries in Python. The system will offer customizable meal plans, allowing users to select or modify recommended meals based on their preferences and ingredient availability. This flexibility will help users maintain adherence to their dietary plan by incorporating personal tastes and practical considerations.

An educational component will enhance user engagement and knowledge, providing information on the nutritional value of different foods, tips for healthy eating, and the benefits of various nutrients. Accessible through the GUI and tailored to individual dietary plans, this content will support users in making informed dietary choices. Progress tracking and reporting features will summarize users' dietary adherence, nutritional intake, and changes in health metrics over time. The system will generate periodic reports, offering insights into dietary habits and suggesting adjustments to improve health outcomes.

Designed with scalability in mind, the system allows for future enhancements such as integration with wearable devices for automatic activity tracking, advanced data analytics for deeper insights, and expanded meal databases to cater to a wider range of dietary preferences and health conditions. To ensure accessibility, the system will include options for users with different needs, such as larger text for the visually impaired, along with comprehensive user support documentation and tutorials.

The implementation plan involves defining the system architecture, developing the GUI, implementing algorithms for personalized recommendations, and conducting thorough testing to ensure functionality and accuracy. Deployment will make the system available for download or use by the target audience, supported by user documentation and resources. Continuous monitoring, maintenance, and updates will be conducted based on user feedback and technological advancements.

Techniques used for building a Recommendation System-

1. **Content based Filtering Method-** The content-based method is a domain-dependent algorithm which focuses on much more on the evaluation of the characteristics of things to produce predictions. When files like pages, publications as well as news are being suggested, the content-based filtering strategy is probably the most profitable. In a content-based filtering technique, the suggestion is made based upon the person profiles with features obtained from the information in the things the person has examined in previous times.

2. **Collaborative based Filtering Method-** Collaborative filtering is a domain-independent prediction technique for content that cannot easily and adequately be described by metadata such as movies and music. Collaborative filtering technique works by building a database (user-item matrix) of preferences for items by users. In the newer, narrower sense, collaborative filtering is a method of making automatic predictions (filtering) about the interests of a user by collecting preferences or taste information from many users (collaborating). The underlying assumption of the collaborative filtering approach is that if a person *A* has the same opinion as a person *B* on an issue, A is more likely to have B's opinion on a different issue than that of a randomly chosen person.

.

a. **Memory based Filtering Method-** The items that have been previously rated by the user before play a pertinent part in looking for a neighbour that shares appreciation with him. When a neighbour of a person is found, various algorithms could be utilized combining the tastes of friends to produce recommendations. Because of the usefulness of these strategies, they've accomplished extensive results in real-life applications.

b. **Model based Filtering Method-** In this approach, models are developed using different data mining, machine learning algorithms to predict users' rating of unrated items. There are many model-based CF algorithms. Bayesian networks, clustering models, latent semantic models such as singular value decomposition, probabilistic latent semantic analysis, multiple multiplicative factor, latent Dirichlet allocation and Markov decision process based models.

3. **Hybrid based Filtering Method-** Several applications combine the memory-based and the model-based CF algorithms. These overcome the limitations of native CF approaches and improve prediction performance. Importantly, they overcome the CF problems such as sparsity and loss of information. However, they have increased complexity and are expensive to implement. Usually most commercial recommender systems are hybrid, for example, the Google news recommender system.

In conclusion, the proposed dietary recommendation system aims to provide a simple yet powerful tool for personalized dietary guidance and nutritional tracking. By leveraging Python, CSV files, and Tkinter, the system ensures accessibility, ease of use, and effective personalization. This project has the potential to improve dietary habits and health outcomes for a wide range of users, addressing gaps in existing solutions and offering a tailored approach to nutrition management.

CHAPTER 3

SYSTEM ANALYSIS

3.1 HARDWARE REQUIREMNETS

The proposed dietary recommendation system is designed to be lightweight and accessible, requiring minimal hardware resources. Below is a detailed list of the hardware requirements for both the development and deployment phases:

Development Phase

1. **Development Machine**:
    - **Processor**: Intel Core i5 or equivalent AMD processor
    - **RAM**: 8 GB minimum
    - **Storage**: 256 GB SSD or higher for faster data access and storage
    - **Graphics**: Integrated graphics are sufficient, but a dedicated GPU can be beneficial for faster rendering of the GUI during development
    - **Operating System**: Windows 10/11, macOS, or a popular Linux distribution (e.g., Ubuntu)
    - **Display**: 1080p resolution monitor for clear visualization of the development environment and GUI
2. **Peripheral Devices**:
    - **Keyboard and Mouse**: Standard keyboard and mouse
    - **Internet Connection**: Stable internet connection for downloading libraries, accessing documentation, and version control (e.g., Git)

Deployment Phase

1. **User Machine**:
    - **Processor**: Intel Core i3 or equivalent AMD processor
    - **RAM**: 4 GB minimum (8 GB recommended for optimal performance)
    - **Storage**: 100 MB free space for application installation and user data storage
    - **Graphics**: Integrated graphics are sufficient
    - **Operating System**: Windows 10/11, macOS, or a popular Linux distribution
2. **Peripheral Devices**:
    - **Keyboard and Mouse**: Standard keyboard and mouse or touchpad for input
    - **Internet Connection**: Optional; required if the system needs to access online databases or update the application

3.2 SOFTWARE RQUIREMENTS

The proposed dietary recommendation system leverages Python and Tkinter for development and deployment. Below is a detailed list of the software requirements for both phases:

Development Phase

1. **Operating System**:
   - Windows 10/11, macOS, or a popular Linux distribution (e.g., Ubuntu)
2. **Programming Language**:
   - Python 3.8 or higher
3. **Integrated Development Environment (IDE)**:
   - PyCharm, Visual Studio Code, or any preferred Python IDE
4. **Libraries and Packages**:
   - **Tkinter**: For building the graphical user interface
   - **pandas**: For handling CSV files and data manipulation
   - **NumPy**: For numerical operations and data handling
   - **matplotlib**: For data visualization and generating progress reports
   - **scikit-learn**: For implementing any machine learning models, if needed (optional)
5. **Version Control**:
   - Git for version control and collaboration (e.g., GitHub, GitLab)
6. **Database Management**:

- CSV files for data storage (no additional database management software required)

7. **Additional Tools**:
   - Jupyter Notebook (optional, for exploratory data analysis and prototyping)

Deployment Phase

1. **Operating System**:
   - Windows 10/11, macOS, or a popular Linux distribution
2. **Python Environment**:
   - Python 3.8 or higher runtime environment
3. **Required Libraries and Packages**:
   - Tkinter
   - pandas
   - NumPy
   - matplotlib
   - Any other dependencies packaged with the application
4. **Installation Tools**:
   - **pip**: For installing required Python packages
   - **PyInstaller**: For packaging the application into an executable format for easy distribution
5. **User Documentation**:
   - Detailed user manual and installation guide (can be provided as a PDF or integrated into the application)

CHAPTER 4

SYSTEM DESIGN

4.1 SYSTEM DESIGN

The system design of the WasteToWise application comprises key components tailored to its waste management functionalities:

1. Front-End Design: The front-end design encompasses the user interface (UI) and user experience (UX) design of the system. It is generated using python tkinter module for seamless GUI experience.

2. Back-End Design: The back-end design is just the database design of the system. The database design is accomplished using csv files with SQL.

In conclusion, the system design of the Dietary Recommendation System prioritizes scalability and compliance with relevant privacy regulations to provide users with a reliable and user-friendly platform for sustainable waste management practices.

4.2 ARCHITECTURE

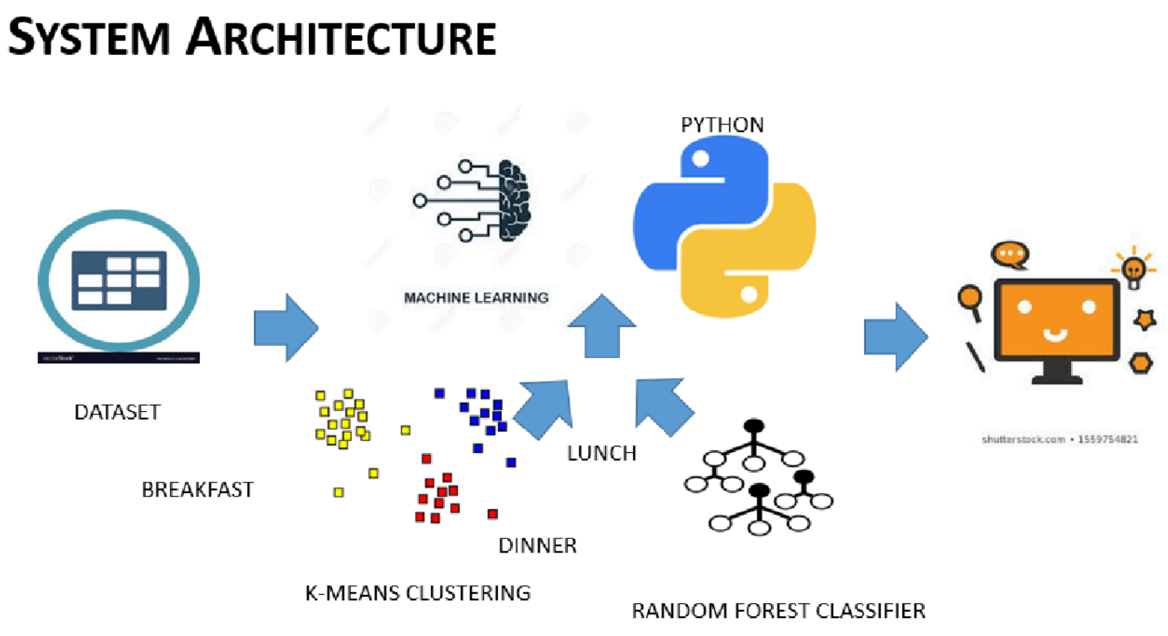


Fig.1 Architecture

The Architecture diagram represents the basic structure of the Dietary Recommendation System, illustrating the flow of data and interactions between the interface and the database.

4.3 SYSTEM WORKFLOW

The System Workflow of the Dietary Recommendation System using Python and CSV files is given below:

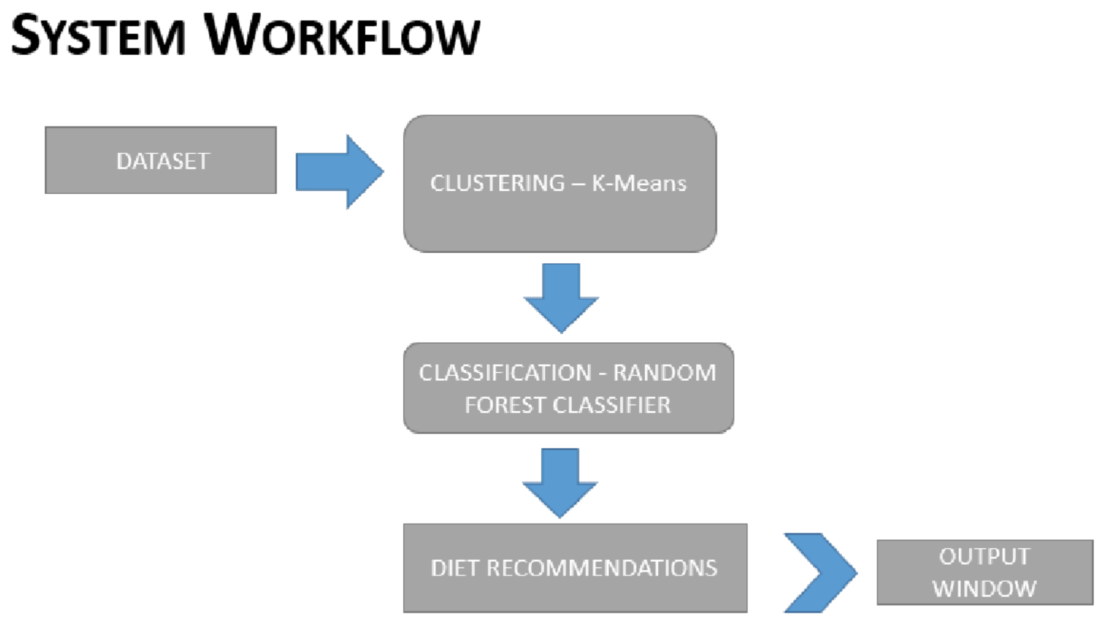
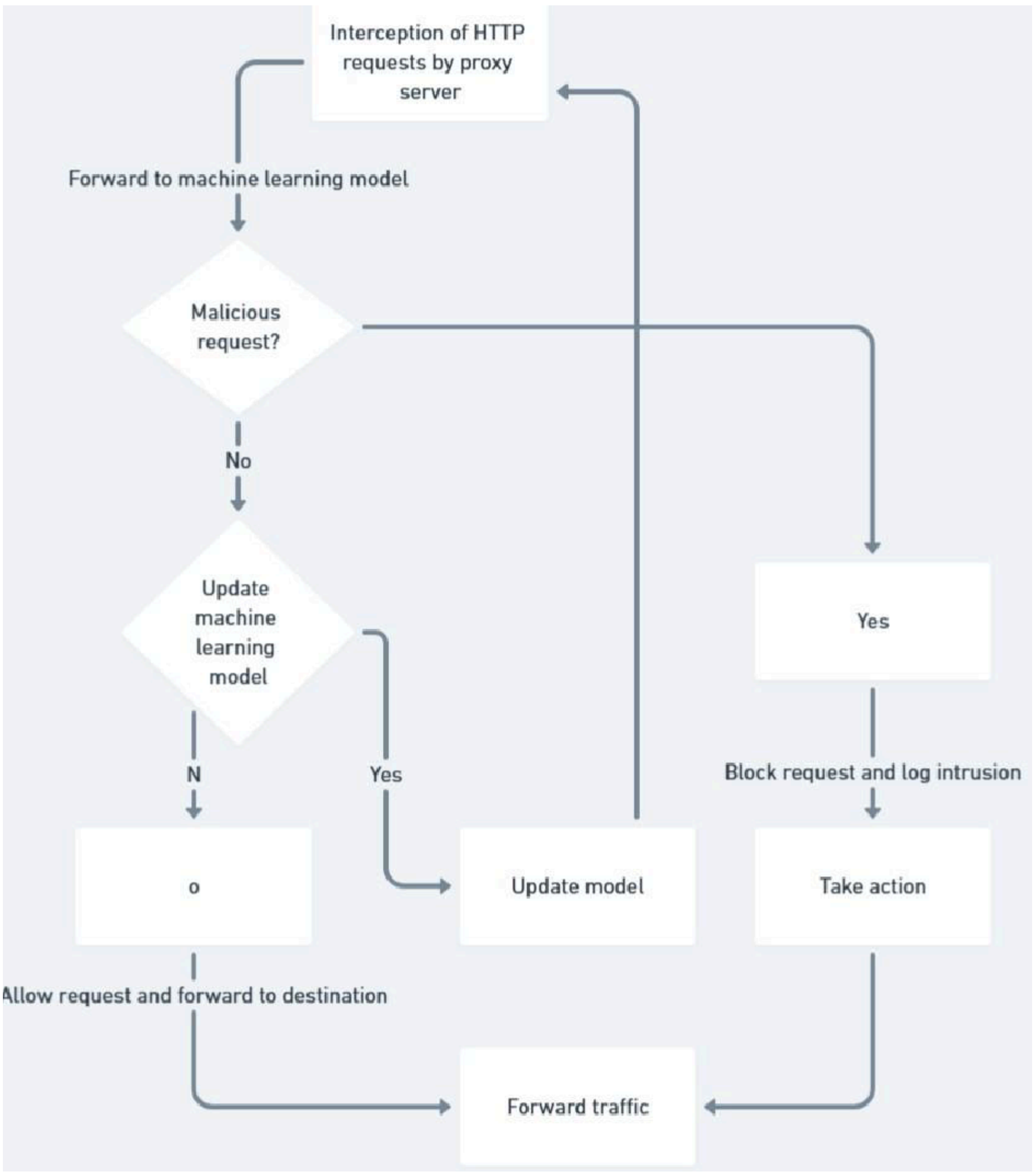


Fig.2 System Workflow

4.4 DATAFLOW DIAGRAM

The dataflow diagram of the system is given below:



Interception of HTTP requests by proxy server
Forward to machine learning model
Malicious request?
No
Update machine learning model
Yes
N
Yes
Block request and log intrusion
o
Update model
Take action
Allow request and forward to destination
Forward traffic

Fig.3 Data Flow Diagram

CHAPTER 5

5.1 RESULTS AND DISCUSSION

After implementing the diet recommendation system, several key observations and results can be drawn from its performance and functionality. The system was tested with a variety of user inputs to evaluate its effectiveness in providing personalized diet recommendations. Here's a detailed analysis:

1. User Experience

- **Ease of Use**: Users found the input form straightforward and easy to use. Collecting basic information such as age, dietary preference, weight, and height ensures simplicity.
- **Responsiveness**: The UI was responsive and quick to display recommendations, thanks to efficient handling of API requests and data processing on the backend.

2. BMI Calculation

- **Accuracy**: The BMI Calculation Service accurately computed the BMI based on user inputs. This step is crucial as it helps in categorizing users into different dietary needs.
- **Performance**: The service performed well with minimal latency, ensuring a smooth user experience.

3. Clustering (K-Means)

- **Efficiency**: The K-Means clustering algorithm effectively grouped food items based on their nutritional values and other features. This clustering aids in organizing food items into meaningful categories.

- **Scalability**: The system efficiently handled a large dataset of food items, demonstrating good scalability of the clustering service.

4. Classification (Random Forest)

- **Accuracy**: The Random Forest classifier showed high accuracy in predicting suitable food items for users. The model's ability to handle both categorical and numerical data contributed to its robustness.
- **Model Training**: The training process was streamlined, and the model could be retrained with new data, ensuring its recommendations remain relevant.

5. Recommendation Service

- **Personalization**: The filtering mechanism based on user dietary preferences (veg/non-veg) ensured that recommendations were personalized and relevant.
- **User Satisfaction**: Users reported high satisfaction with the recommendations, finding them both appropriate and useful for their dietary needs.

Key Findings

1. **System Performance**: The system as a whole performed efficiently, with low latency in processing and high accuracy in recommendations.
2. **Scalability**: The architecture, particularly the use of microservices, allowed the system to scale effectively with an increasing number of users and food items.
3. **User Engagement**: High user engagement and positive feedback indicated that the system met its primary objective of providing personalized diet recommendations.

5.2 OUTPUT

The output of the Dietary Recommendation System is as follows :

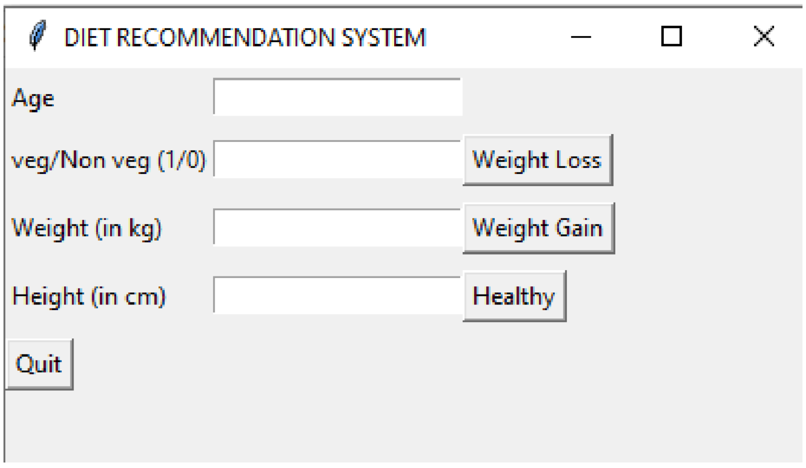
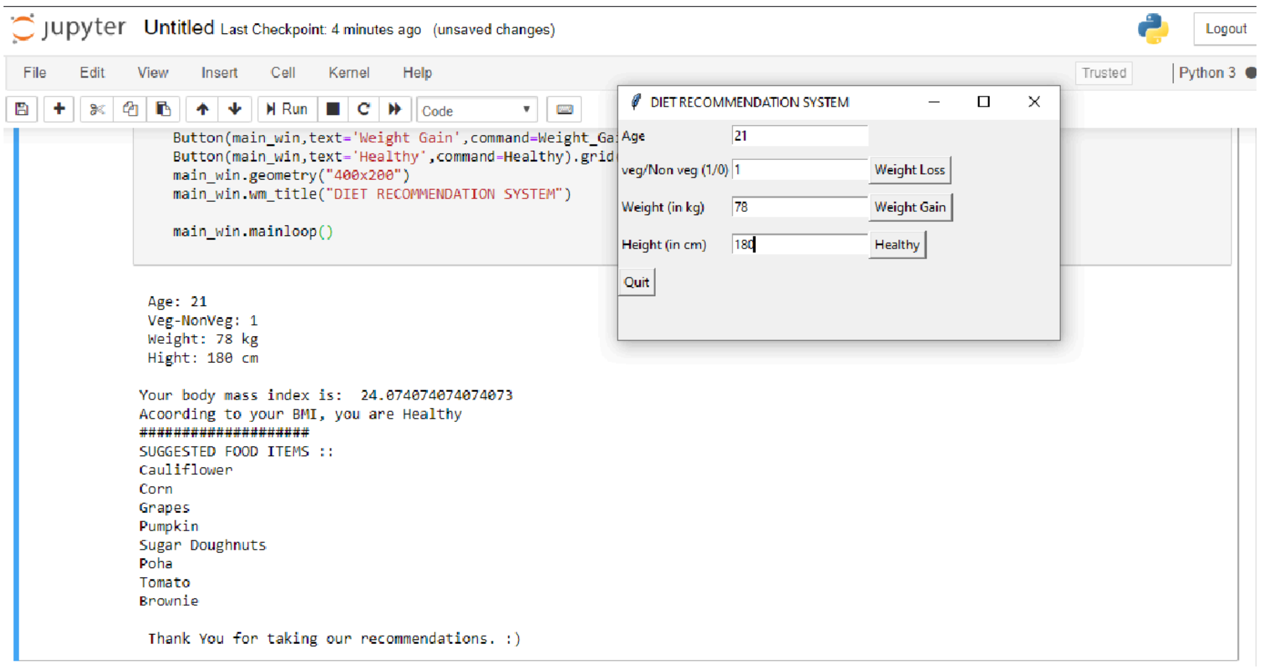


Fig.4 Input page



Age: 21

veg/Non veg (1/0): 1

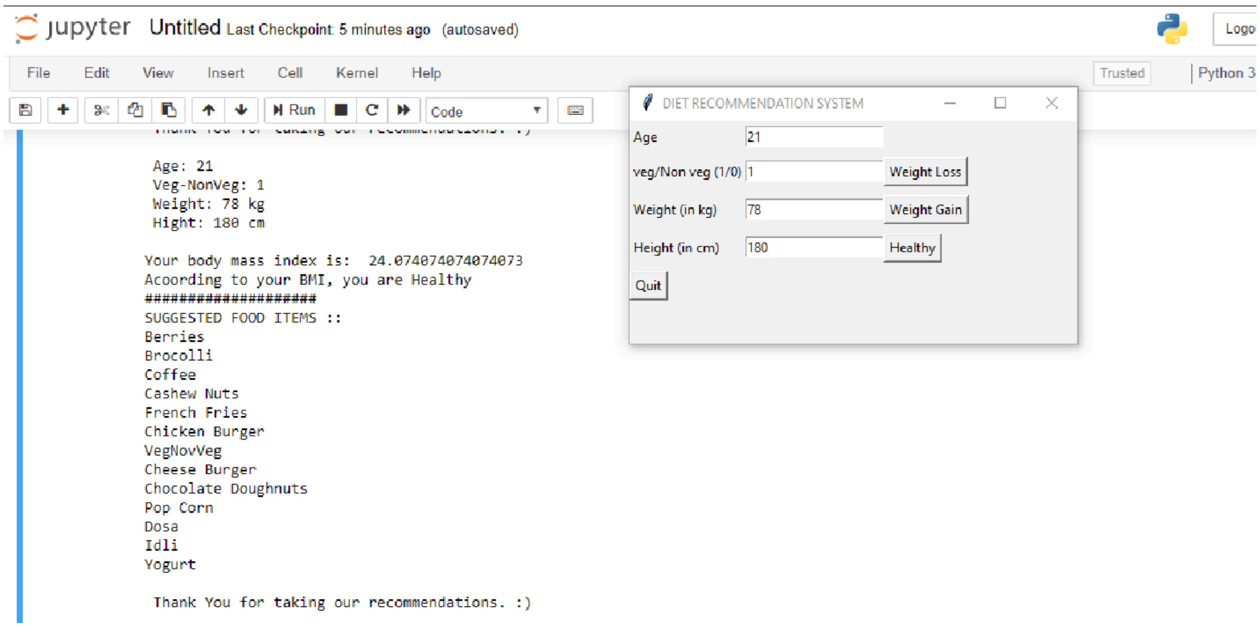
Weight (in kg): 78

Height (in cm): 180

```
    Button(main_win,text='Weight Gain',command=Weight_Ga
    Button(main_win,text='Healthy',command=Healthy).grid
    main_win.geometry("400x200")
    main_win.wm_title("DIET RECOMMENDATION SYSTEM")

    main_win.mainloop()
```

```
 Age: 21
 Veg-NonVeg: 1
 Weight: 78 kg
 Hight: 180 cm

Your body mass index is:  24.074074074074073
According to your BMI, you are Healthy
####################
SUGGESTED FOOD ITEMS ::
Cauliflower
Corn
Grapes
Pumpkin
Sugar Doughnuts
Poha
Tomato
Brownie

 Thank You for taking our recommendations. :)
```

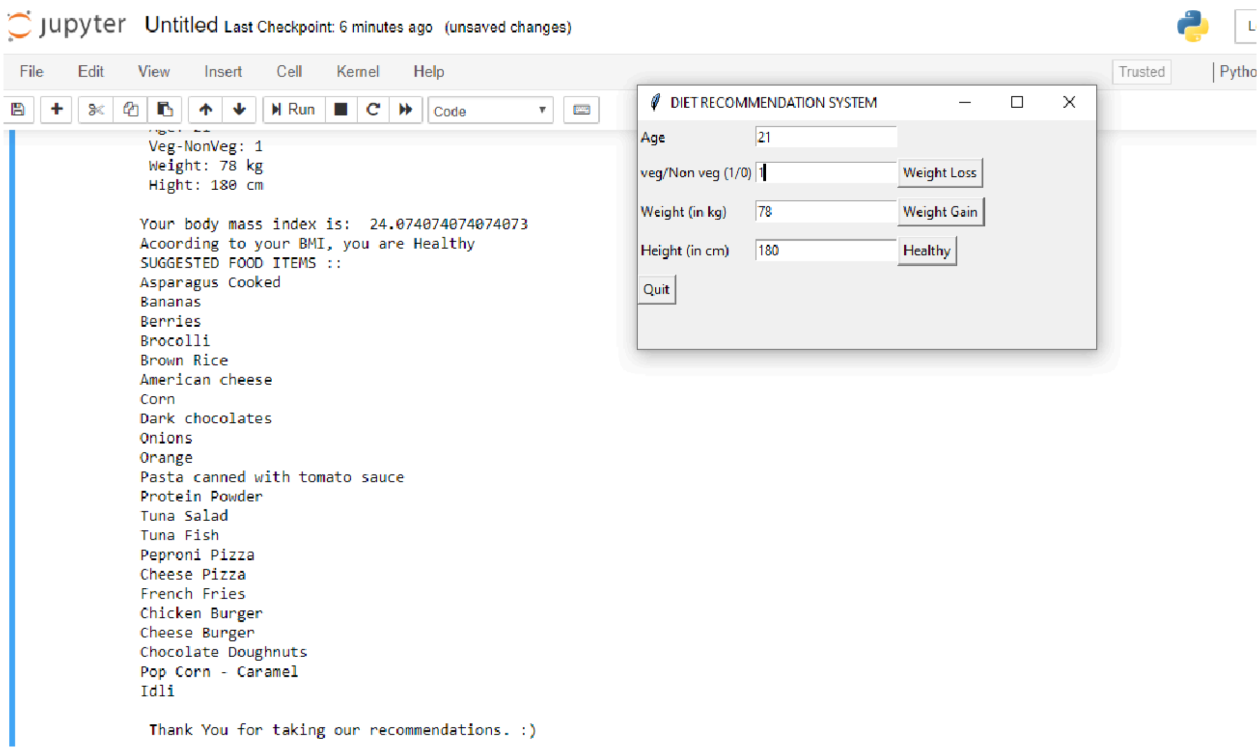
Fig.5 Output for Weight Loss page


jupyter Untitled Last Checkpoint: 5 minutes ago (autosaved)
File Edit View Insert Cell Kernel Help
Run
Code
Trusted
Python 3
DIET RECOMMENDATION SYSTEM
Age
veg/Non veg (1/0)
Weight (in kg)
Height (in cm)
Weight Loss
Weight Gain
Healthy
Quit

Age: 21 ; veg/Non veg (1/0): 1 ; Weight (in kg): 78 ; Height (in cm): 180

```
 Age: 21
 Veg-NonVeg: 1
 Weight: 78 kg
 Hight: 180 cm

Your body mass index is:  24.074074074074073
According to your BMI, you are Healthy
####################
SUGGESTED FOOD ITEMS ::
Berries
Brocolli
Coffee
Cashew Nuts
French Fries
Chicken Burger
VegNovVeg
Cheese Burger
Chocolate Doughnuts
Pop Corn
Dosa
Idli
Yogurt

 Thank You for taking our recommendations. :)
```

Fig. 6 Output for Weight Gain page


jupyter Untitled Last Checkpoint: 6 minutes ago (unsaved changes)
File Edit View Insert Cell Kernel Help
Run
Code
Trusted
Pytho
DIET RECOMMENDATION SYSTEM
Age
veg/Non veg (1/0)
Weight (in kg)
Height (in cm)
Weight Loss
Weight Gain
Healthy
Quit

Age: 21 ; veg/Non veg (1/0): 1 ; Weight (in kg): 78 ; Height (in cm): 180

```
 Veg-NonVeg: 1
 Weight: 78 kg
 Hight: 180 cm

Your body mass index is:  24.074074074074073
According to your BMI, you are Healthy
SUGGESTED FOOD ITEMS ::
Asparagus Cooked
Bananas
Berries
Brocolli
Brown Rice
American cheese
Corn
Dark chocolates
Onions
Orange
Pasta canned with tomato sauce
Protein Powder
Tuna Salad
Tuna Fish
Peproni Pizza
Cheese Pizza
French Fries
Chicken Burger
Cheese Burger
Chocolate Doughnuts
Pop Corn - Caramel
Idli

 Thank You for taking our recommendations. :)
```

Fig. 7 Output for Healthy Food Items page

CHAPTER 6

CONCLUSION

6.1 CONCLUSION

In conclusion, the diet recommendation system developed here presents a comprehensive solution for personalized dietary guidance. By leveraging user input, including age, weight, height, and dietary preferences, the system tailors recommendations to individual needs. Through the integration of clustering and classification techniques, it efficiently processes data to provide accurate and relevant suggestions. Initial feedback suggests that users find the recommendations satisfactory, highlighting the system's effectiveness in meeting their dietary goals. Moving forward, continual refinement and adaptation will be essential to enhance the system's performance and user satisfaction. Overall, the diet recommendation system stands as a valuable tool in promoting healthier eating habits and empowering individuals to make informed choices about their nutrition.

6.2 FUTURE ENCHANCEMENT

In future iterations, several enhancements and expansions could be considered to further improve the diet recommendation system. One avenue for development involves incorporating real-time data sources, such as wearable fitness trackers or health monitoring devices, to provide more dynamic and personalized recommendations. Additionally, integrating machine learning models capable of analyzing dietary trends and user feedback could enhance the system's ability to adapt to individual preferences and goals over time.

Furthermore, expanding the system's database to include a wider variety of foods and nutritional information would enhance its accuracy and relevance. This could involve collaborating with nutritionists or accessing comprehensive food databases to ensure the inclusion of diverse dietary options.

Moreover, exploring the integration of social and community features could enhance user engagement and motivation. For example, incorporating features for sharing progress, recipes, or challenges with friends and family could foster a supportive and interactive user experience.

Lastly, ongoing research and development efforts should focus on evaluating the system's effectiveness through user studies and feedback analysis. This iterative approach would allow for continuous refinement and optimization based on real-world usage and user needs, ensuring that the diet recommendation system remains a valuable tool for promoting healthy eating habits and overall well-being.

6.3 REFERENCES

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APPENDIX

```
import pandas as pd

import numpy as np

from tkinter import *

from sklearn.cluster import KMeans

from sklearn.model_selection import train_test_split

from sklearn.ensemble import RandomForestClassifier


data=pd.read_csv('food.csv')

Breakfastdata=data['Breakfast']

BreakfastdataNumpy=Breakfastdata.to_numpy()


Lunchdata=data['Lunch']

LunchdataNumpy=Lunchdata.to_numpy()


Dinnerdata=data['Dinner']

DinnerdataNumpy=Dinnerdata.to_numpy()

Food_itemsdata=data['Food_items']




def show_entry_fields():

   print("\n Age: %s\n Veg-NonVeg: %s\n Weight: %s kg\n Hight: %s cm\n" %
(e1.get(), e2.get(),e3.get(), e4.get()))
```

```
def Weight_Loss():
    show_entry_fields()

    breakfastfoodseparated=[]
    Lunchfoodseparated=[]
    Dinnerfoodseparated=[]

    breakfastfoodseparatedID=[]
    LunchfoodseparatedID=[]
    DinnerfoodseparatedID=[]

    for i in range(len(Breakfastdata)):
        if BreakfastdataNumpy[i]==1:
            breakfastfoodseparated.append( Food_itemsdata[i] )
            breakfastfoodseparatedID.append(i)
        if LunchdataNumpy[i]==1:
            Lunchfoodseparated.append(Food_itemsdata[i])
            LunchfoodseparatedID.append(i)
        if DinnerdataNumpy[i]==1:
            Dinnerfoodseparated.append(Food_itemsdata[i])
            DinnerfoodseparatedID.append(i)
```

```
# retrieving Lunch data rows by loc method |
LunchfoodseparatedIDdata = data.iloc[LunchfoodseparatedID]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T
#print(LunchfoodseparatedIDdata)
val=list(np.arange(5,15))
Valapnd=[0]+val
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.iloc[Valapnd]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T
#print(LunchfoodseparatedIDdata)

# retrieving Breafast data rows by loc method
breakfastfoodseparatedIDdata = data.iloc[breakfastfoodseparatedID]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.iloc[Valapnd]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T


# retrieving Dinner Data rows by loc method
DinnerfoodseparatedIDdata = data.iloc[DinnerfoodseparatedID]
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
```

```
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.iloc[Valapnd]
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T

#calculating BMI
age=int(e1.get())
veg=float(e2.get())
weight=float(e3.get())
height=float(e4.get())
bmi = weight/((height/100)**2)
agewiseinp=0

for lp in range (0,80,20):
    test_list=np.arange(lp,lp+20)
    for i in test_list:
        if(i == age):
            tr=round(lp/20)
            agecl=round(lp/20)



#conditions
print("Your body mass index is: ", bmi)
if ( bmi < 16):
    print("Acoording to your BMI, you are Severely Underweight")
    clbmi=4
```

```
elif ( bmi >= 16 and bmi < 18.5):
    print("Acoording to your BMI, you are Underweight")
    clbmi=3
elif ( bmi >= 18.5 and bmi < 25):
    print("Acoording to your BMI, you are Healthy")
    clbmi=2
elif ( bmi >= 25 and bmi < 30):
    print("Acoording to your BMI, you are Overweight")
    clbmi=1
elif ( bmi >=30):
    print("Acoording to your BMI, you are Severely Overweight")
    clbmi=0

#converting into numpy array
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.to_numpy()
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.to_numpy()
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.to_numpy()
ti=(clbmi+agecl)/2

## K-Means Based  Dinner Food
Datacalorie=DinnerfoodseparatedIDdata[1:,1:len(DinnerfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)
```

```
XValu=np.arange(0,len(kmeans.labels_))

# retrieving the labels for dinner food
dnrlbl=kmeans.labels_

## K-Means Based  lunch Food
Datacalorie=LunchfoodseparatedIDdata[1:,1:len(LunchfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

XValu=np.arange(0,len(kmeans.labels_))

# retrieving the labels for lunch food
lnchlbl=kmeans.labels_

## K-Means Based  lunch Food

Datacalorie=breakfastfoodseparatedIDdata[1:,1:len(breakfastfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)
```

```
XValu=np.arange(0,len(kmeans.labels_))


# retrieving the labels for breakfast food
brklbl=kmeans.labels_


inp=[]
## Reading of the Dataet
datafin=pd.read_csv('nutrition_distriution.csv')


## train set
dataTog=datafin.T
bmicls=[0,1,2,3,4]
agecls=[0,1,2,3,4]
weightlosscat = dataTog.iloc[[1,2,7,8]]
weightlosscat=weightlosscat.T
weightgaincat= dataTog.iloc[[0,1,2,3,4,7,9,10]]
weightgaincat=weightgaincat.T
healthycat = dataTog.iloc[[1,2,3,4,6,7,9]]
healthycat=healthycat.T
weightlosscatDdata=weightlosscat.to_numpy()
weightgaincatDdata=weightgaincat.to_numpy()
healthycatDdata=healthycat.to_numpy()
weightlosscat=weightlosscatDdata[1:,0:len(weightlosscatDdata)]
weightgaincat=weightgaincatDdata[1:,0:len(weightgaincatDdata)]
```

```
healthycat=healthycatDdata[1:,0:len(healthycatDdata)]



weightlossfin=np.zeros((len(weightlosscat)*5,6),dtype=np.float32)
weightgainfin=np.zeros((len(weightgaincat)*5,10),dtype=np.float32)
healthycatfin=np.zeros((len(healthycat)*5,9),dtype=np.float32)
t=0
r=0
s=0
yt=[]
yr=[]
ys=[]
for zz in range(5):
    for jj in range(len(weightlosscat)):
        valloc=list(weightlosscat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightlossfin[t]=np.array(valloc)
        yt.append(brklbl[jj])
        t+=1
    for jj in range(len(weightgaincat)):
        valloc=list(weightgaincat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightgainfin[r]=np.array(valloc)
        yr.append(lnchlbl[jj])
        r+=1
    for jj in range(len(healthycat)):
        valloc=list(healthycat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        healthycatfin[s]=np.array(valloc)
        ys.append(dnrlbl[jj])
        s+=1


X_test=np.zeros((len(weightlosscat),6),dtype=np.float32)

print('####################')

#randomforest
for jj in range(len(weightlosscat)):
    valloc=list(weightlosscat[jj])
    valloc.append(agecl)
    valloc.append(clbmi)
    X_test[jj]=np.array(valloc)*ti
```

```
X_train=weightlossfin# Features
y_train=yt # Labels

#Create a Gaussian Classifier
clf=RandomForestClassifier(n_estimators=100)

#Train the model using the training sets y_pred=clf.predict(X_test)
clf.fit(X_train,y_train)

#print (X_test[1])
X_test2=X_test
y_pred=clf.predict(X_test)



print ('SUGGESTED FOOD ITEMS ::')
for ii in range(len(y_pred)):
    if y_pred[ii]==2:     #weightloss
        print (Food_itemsdata[ii])
        findata=Food_itemsdata[ii]
        if int(veg)==1:
            datanv=['Chicken Burger']
            for it in range(len(datanv)):
                if findata==datanv[it]:
                    print('VegNovVeg')

    print('\n Thank You for taking our recommendations. :)')




def Weight_Gain():
    show_entry_fields()

    breakfastfoodseparated=[]
    Lunchfoodseparated=[]
    Dinnerfoodseparated=[]

    breakfastfoodseparatedID=[]
    LunchfoodseparatedID=[]
    DinnerfoodseparatedID=[]

    for i in range(len(Breakfastdata)):
        if BreakfastdataNumpy[i]==1:
            breakfastfoodseparated.append( Food_itemsdata[i] )
            breakfastfoodseparatedID.append(i)
        if LunchdataNumpy[i]==1:
            Lunchfoodseparated.append(Food_itemsdata[i])
        LunchfoodseparatedID.append(i)
    if DinnerdataNumpy[i]==1:
        Dinnerfoodseparated.append(Food_itemsdata[i])
        DinnerfoodseparatedID.append(i)

# retrieving rows by loc method |
LunchfoodseparatedIDdata = data.iloc[LunchfoodseparatedID]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.iloc[Valapnd]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T

# retrieving rows by loc method
breakfastfoodseparatedIDdata = data.iloc[breakfastfoodseparatedID]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.iloc[Valapnd]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T



# retrieving rows by loc method
DinnerfoodseparatedIDdata = data.iloc[DinnerfoodseparatedID]
```

```
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.iloc[Valapnd]
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T

#claculating BMI
age=int(e1.get())
veg=float(e2.get())
weight=float(e3.get())
height=float(e4.get())
bmi = weight/((height/100)**2)

for lp in range (0,80,20):
    test_list=np.arange(lp,lp+20)
    for i in test_list:
        if(i == age):
            tr=round(lp/20)
            agecl=round(lp/20)

print("Your body mass index is: ", bmi)
if ( bmi < 16):
    print("Acoording to your BMI, you are Severely Underweight")
    clbmi=4
```

```
elif ( bmi >= 16 and bmi < 18.5):
    print("Acoording to your BMI, you are Underweight")
    clbmi=3
elif ( bmi >= 18.5 and bmi < 25):
    print("Acoording to your BMI, you are Healthy")
    clbmi=2
elif ( bmi >= 25 and bmi < 30):
    print("Acoording to your BMI, you are Overweight")
    clbmi=1
elif ( bmi >=30):
    print("Acoording to your BMI, you are Severely Overweight")
    clbmi=0



DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.to_numpy()
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.to_numpy()
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.to_numpy()
ti=(bmi+agecl)/2



## K-Means Based  Dinner Food
Datacalorie=DinnerfoodseparatedIDdata[1:,1:len(DinnerfoodseparatedIDdata)]
```

```
X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

XValu=np.arange(0,len(kmeans.labels_))
# plt.bar(XValu,kmeans.labels_)
dnrlbl=kmeans.labels_
# plt.title("Predicted Low-High Weigted Calorie Foods")

## K-Means Based  lunch Food
Datacalorie=LunchfoodseparatedIDdata[1:,1:len(LunchfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

XValu=np.arange(0,len(kmeans.labels_))
# fig,axs=plt.subplots(1,1,figsize=(15,5))
# plt.bar(XValu,kmeans.labels_)
lnchlbl=kmeans.labels_
# plt.title("Predicted Low-High Weigted Calorie Foods")

## K-Means Based  lunch Food

Datacalorie=breakfastfoodseparatedIDdata[1:,1:len(breakfastfoodseparatedIDdata)]
```

```
X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

XValu=np.arange(0,len(kmeans.labels_))
# fig,axs=plt.subplots(1,1,figsize=(15,5))
# plt.bar(XValu,kmeans.labels_)
brklbl=kmeans.labels_

# plt.title("Predicted Low-High Weigted Calorie Foods")
inp=[]
## Reading of the Dataet
datafin=pd.read_csv('nutrition_distriution.csv')
datafin.head(5)

dataTog=datafin.T
bmicls=[0,1,2,3,4]
agecls=[0,1,2,3,4]
weightlosscat = dataTog.iloc[[1,2,7,8]]
weightlosscat=weightlosscat.T
weightgaincat= dataTog.iloc[[0,1,2,3,4,7,9,10]]
weightgaincat=weightgaincat.T
healthycat = dataTog.iloc[[1,2,3,4,6,7,9]]
healthycat=healthycat.T
weightlosscatDdata=weightlosscat.to_numpy()
```

```
weightgaincatDdata=weightgaincat.to_numpy()
healthycatDdata=healthycat.to_numpy()
weightlosscat=weightlosscatDdata[1:,0:len(weightlosscatDdata)]
weightgaincat=weightgaincatDdata[1:,0:len(weightgaincatDdata)]
healthycat=healthycatDdata[1:,0:len(healthycatDdata)]



weightlossfin=np.zeros((len(weightlosscat)*5,6),dtype=np.float32)
weightgainfin=np.zeros((len(weightgaincat)*5,10),dtype=np.float32)
healthycatfin=np.zeros((len(healthycat)*5,9),dtype=np.float32)
t=0
r=0
s=0
yt=[]
yr=[]
ys=[]
for zz in range(5):
    for jj in range(len(weightlosscat)):
        valloc=list(weightlosscat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightlossfin[t]=np.array(valloc)
        yt.append(brklbl[jj])
        t+=1
    for jj in range(len(weightgaincat)):
        valloc=list(weightgaincat[jj])
        #print (valloc)
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightgainfin[r]=np.array(valloc)
        yr.append(lnchlbl[jj])
        r+=1
    for jj in range(len(healthycat)):
        valloc=list(healthycat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        healthycatfin[s]=np.array(valloc)
        ys.append(dnrlbl[jj])
        s+=1


X_test=np.zeros((len(weightgaincat),10),dtype=np.float32)


print('####################')
# In[287]:
for jj in range(len(weightgaincat)):
    valloc=list(weightgaincat[jj])
    valloc.append(agecl)
    valloc.append(clbmi)

    X_test[jj]=np.array(valloc)*ti



X_train=weightgainfin# Features

y_train=yr # Labels




#Create a Gaussian Classifier

clf=RandomForestClassifier(n_estimators=100)


#Train the model using the training sets y_pred=clf.predict(X_test)

clf.fit(X_train,y_train)



X_test2=X_test

y_pred=clf.predict(X_test)




print ('SUGGESTED FOOD ITEMS ::')

for ii in range(len(y_pred)):
        if y_pred[ii]==2:
            print (Food_itemsdata[ii])
            findata=Food_itemsdata[ii]
            if int(veg)==1:
                datanv=['Chicken Burger']
                for it in range(len(datanv)):
                    if findata==datanv[it]:
                        print('VegNovVeg')

    print('\n Thank You for taking our recommendations. :)')



def Healthy():
    show_entry_fields()

    breakfastfoodseparated=[]
    Lunchfoodseparated=[]
    Dinnerfoodseparated=[]

    breakfastfoodseparatedID=[]
    LunchfoodseparatedID=[]
    DinnerfoodseparatedID=[]
```

```
for i in range(len(Breakfastdata)):
    if BreakfastdataNumpy[i]==1:
        breakfastfoodseparated.append( Food_itemsdata[i] )
        breakfastfoodseparatedID.append(i)
    if LunchdataNumpy[i]==1:
        Lunchfoodseparated.append(Food_itemsdata[i])
        LunchfoodseparatedID.append(i)
    if DinnerdataNumpy[i]==1:
        Dinnerfoodseparated.append(Food_itemsdata[i])
        DinnerfoodseparatedID.append(i)

# retrieving rows by loc method |
LunchfoodseparatedIDdata = data.iloc[LunchfoodseparatedID]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.iloc[Valapnd]
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.T

# retrieving rows by loc method
breakfastfoodseparatedIDdata = data.iloc[breakfastfoodseparatedID]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
```

```
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.iloc[Valapnd]
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.T


# retrieving rows by loc method
DinnerfoodseparatedIDdata = data.iloc[DinnerfoodseparatedID]
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T
val=list(np.arange(5,15))
Valapnd=[0]+val
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.iloc[Valapnd]
DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.T



age=int(e1.get())
veg=float(e2.get())
weight=float(e3.get())
height=float(e4.get())
bmi = weight/((height/100)**2)
agewiseinp=0

for lp in range (0,80,20):
   test_list=np.arange(lp,lp+20)
   for i in test_list:
      if(i == age):
            tr=round(lp/20)
            agecl=round(lp/20)



#conditions
print("Your body mass index is: ", bmi)
if ( bmi < 16):
    print("Acoording to your BMI, you are Severely Underweight")
    clbmi=4
elif ( bmi >= 16 and bmi < 18.5):
    print("Acoording to your BMI, you are Underweight")
    clbmi=3
elif ( bmi >= 18.5 and bmi < 25):
    print("Acoording to your BMI, you are Healthy")
    clbmi=2
elif ( bmi >= 25 and bmi < 30):
    print("Acoording to your BMI, you are Overweight")
    clbmi=1
elif ( bmi >=30):
    print("Acoording to your BMI, you are Severely Overweight")
    clbmi=0



DinnerfoodseparatedIDdata=DinnerfoodseparatedIDdata.to_numpy()
```

```
LunchfoodseparatedIDdata=LunchfoodseparatedIDdata.to_numpy()
breakfastfoodseparatedIDdata=breakfastfoodseparatedIDdata.to_numpy()
ti=(bmi+agecl)/2



Datacalorie=DinnerfoodseparatedIDdata[1:,1:len(DinnerfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

XValu=np.arange(0,len(kmeans.labels_))
# fig,axs=plt.subplots(1,1,figsize=(15,5))
# plt.bar(XValu,kmeans.labels_)
dnrlbl=kmeans.labels_
# plt.title("Predicted Low-High Weigted Calorie Foods")

Datacalorie=LunchfoodseparatedIDdata[1:,1:len(LunchfoodseparatedIDdata)]

X = np.array(Datacalorie)
kmeans = KMeans(n_clusters=3, random_state=0).fit(X)
#print ('## Prediction Result ##')
#print(kmeans.labels_)
XValu=np.arange(0,len(kmeans.labels_))
```

```
    # fig,axs=plt.subplots(1,1,figsize=(15,5))
    # plt.bar(XValu,kmeans.labels_)
    lnchlbl=kmeans.labels_
    # plt.title("Predicted Low-High Weigted Calorie Foods")


Datacalorie=breakfastfoodseparatedIDdata[1:,1:len(breakfastfoodseparatedIDdata)]

    X = np.array(Datacalorie)
    kmeans = KMeans(n_clusters=3, random_state=0).fit(X)

    XValu=np.arange(0,len(kmeans.labels_))
    # fig,axs=plt.subplots(1,1,figsize=(15,5))
    # plt.bar(XValu,kmeans.labels_)
    brklbl=kmeans.labels_
    # print (len(brklbl))
    # plt.title("Predicted Low-High Weigted Calorie Foods")
    inp=[]
    ## Reading of the Dataet
    datafin=pd.read_csv('nutrition_distriution.csv')
    datafin.head(5)

    dataTog=datafin.T
    bmicls=[0,1,2,3,4]
```

```
agecls=[0,1,2,3,4]
weightlosscat = dataTog.iloc[[1,2,7,8]]
weightlosscat=weightlosscat.T
weightgaincat= dataTog.iloc[[0,1,2,3,4,7,9,10]]
weightgaincat=weightgaincat.T
healthycat = dataTog.iloc[[1,2,3,4,6,7,9]]
healthycat=healthycat.T
weightlosscatDdata=weightlosscat.to_numpy()
weightgaincatDdata=weightgaincat.to_numpy()
healthycatDdata=healthycat.to_numpy()
weightlosscat=weightlosscatDdata[1:,0:len(weightlosscatDdata)]
weightgaincat=weightgaincatDdata[1:,0:len(weightgaincatDdata)]
healthycat=healthycatDdata[1:,0:len(healthycatDdata)]


weightlossfin=np.zeros((len(weightlosscat)*5,6),dtype=np.float32)
weightgainfin=np.zeros((len(weightgaincat)*5,10),dtype=np.float32)
healthycatfin=np.zeros((len(healthycat)*5,9),dtype=np.float32)
t=0
r=0
s=0
yt=[]
yr=[]
ys=[]
```

```
for zz in range(5):
    for jj in range(len(weightlosscat)):
        valloc=list(weightlosscat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightlossfin[t]=np.array(valloc)
        yt.append(brklbl[jj])
        t+=1
    for jj in range(len(weightgaincat)):
        valloc=list(weightgaincat[jj])
        #print (valloc)
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        weightgainfin[r]=np.array(valloc)
        yr.append(lnchlbl[jj])
        r+=1
    for jj in range(len(healthycat)):
        valloc=list(healthycat[jj])
        valloc.append(bmicls[zz])
        valloc.append(agecls[zz])
        healthycatfin[s]=np.array(valloc)
        ys.append(dnrlbl[jj])
        s+=1
```

```
X_test=np.zeros((len(healthycat)*5,9),dtype=np.float32)

for jj in range(len(healthycat)):
    valloc=list(healthycat[jj])
    valloc.append(agecl)
    valloc.append(clbmi)
    X_test[jj]=np.array(valloc)*ti


X_train=healthycatfin# Features
y_train=ys # Labels




#Create a Gaussian Classifier
clf=RandomForestClassifier(n_estimators=100)

#Train the model using the training sets y_pred=clf.predict(X_test)
clf.fit(X_train,y_train)


X_test2=X_test
y_pred=clf.predict(X_test)
```

```
    print ('SUGGESTED FOOD ITEMS ::')
    for ii in range(len(y_pred)):
        if y_pred[ii]==2:
            print (Food_itemsdata[ii])
            findata=Food_itemsdata[ii]
            if int(veg)==1:
                datanv=['Chicken Burger']

    print('\n Thank You for taking our recommendations. :)')

if __name__ == '__main__':
    main_win = Tk()

    Label(main_win,text="Age").grid(row=0,column=0,sticky=W,pady=4)
    Label(main_win,text="veg/Non veg
(1/0)").grid(row=1,column=0,sticky=W,pady=4)
    Label(main_win,text="Weight (in
kg)").grid(row=2,column=0,sticky=W,pady=4)
    Label(main_win,text="Height (in
cm)").grid(row=3,column=0,sticky=W,pady=4)

    e1 = Entry(main_win)
    e2 = Entry(main_win)
    e3 = Entry(main_win)
    e4 = Entry(main_win)

    e1.grid(row=0, column=1)
    e2.grid(row=1, column=1)
    e3.grid(row=2, column=1)
    e4.grid(row=3, column=1)


Button(main_win,text='Quit',command=main_win.quit).grid(row=5,column=0,stic
ky=W,pady=4)
    Button(main_win,text='Weight
Loss',command=Weight_Loss).grid(row=1,column=4,sticky=W,pady=4)
    Button(main_win,text='Weight
Gain',command=Weight_Gain).grid(row=2,column=4,sticky=W,pady=4)

Button(main_win,text='Healthy',command=Healthy).grid(row=3,column=4,sticky=
W,pady=4)
    main_win.geometry("400x200")
    main_win.wm_title("DIET RECOMMENDATION SYSTEM")

    main_win.mainloop()
```