

Project Report: The “Health Management”

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INFO 5002 Introduction To Python For Information System
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December, 2023

Introduction

Purpose

The purpose of the report is to provide an insightful understanding of “Health Management”, an application built in the Python language that helps users record their basic health statement (height, weight, BMI.....etc.) , daily dietary calorie intake, calorie burned through activities, and set personalized water-drinking habits. The report will introduce more about the system’s purpose and comprehensively explain the system's product scope, services, constraints and model diagrams to capture the core functionalities of the system, visualizing the interactions of the users and other actors involved and the architecture of the overall system. The report is intended for system stakeholders including users, developers, testers and software architects.

Product Scope

Compared with the previous generation, Gen Z is facing more obesity problems and feeling more anxious about their weight that a huge proportion of them try to lose weight through dieting and exercising (Solmi & Patalay, 2020). However, dieting or exercising methods which are against science might cause more serious physical or mental issues to these young adults, such as eating disorders, bone disease, and hormone deficiency (Sciarrillo & Joyce & Hildebran & Emerson, 2020) . The young generation is indeed able to gain more feasible and effective health management plans from professional practitioners or institutions, but it also means expensive costing which might be hard for young adults to pay for these bills. Based on this social reality, the team aims to provide a convenient to use and lower-cost way to help target users to better manage their weight and stay in healthy. To start to use the “Health Management”, new users just need to create his account and input certain basic data, including age, gender, current height, current weight, target weight as well as how many days they want to achieve their goal. By invoking the inputting data, the calculated system in the application would automatically output the user’s BMI evaluation, daily basal metabolism and daily caloric burning suggestion. In addition, the user can find calorie intaking data of common dishes as well as calorie burning data of most activities to know about their calorie consumption status. Finally, the application is also equipped with a water-drinking reminding system which would send a reminder message to a user at the moments that need to drink water. To stimulate the system, what the user needs to do is to tell the system how many cups of water they tend to drink during a specific time period.

To sum up, users are able to know about the health statement of themselves, gain the calorie data of common food and calorie burning data of common activities, and the application also could urge them to develop regular drinking habits.

Definitions, Acronyms, and Abbreviations

“Health Management” -It is the name of the application built by the team, which is coded in Python . The main purpose of the application is to provide target users a feasible and easy-use way to follow up with their weight loss and other related health status.

new users -The users group who did not log in to the application or do not have an account, so they do not have permission to visit or use any functions in the application. Their basic health statements also do not have any recordings in the application’s database.

Current users -The users who already have a personal account after creating their owner username and password with the application. This type of user can access every function in the application, and there are certain recordings for them in the database which could be changed, clear or updated by the corresponding user operation instructions.

CSV -CSV is a comma-separated file which allows data to be saved in a tabular format (BIGCOMMERCE, n.d.). For the “Health Management Application ”, the team utilizes CSV files as databases to store the specific information.

Python - Python is a high-level, versatile, and interpreted programming language, known for its readability and simplicity. Currently, Python is widely utilized in the data analysis field.

BMI - Body Mass Index (BMI) is an index reflecting the relation between weight and height, which is also one of essential screening tools to estimate weight status in relation to potential disease risk (CDC.gov, n.d.). In the application, the BMI can be calculated automatically.

Basal Metabolism - Equal to Basal Metabolic Rate (BMR), which is the number of calorie a person burns as his body performs basic life-sustaining functions. In other words, a person will burn this number of calorie a day even if he spends the whole day staying in bed (GarnetHealth, 2016). In the application, the basal metabolism can be calculated automatically.

Overall Description

Product Perspective And Functions

- The main actors in the system include **the new users and the current users**. The current users have their own account with the “Health Management” application and have permission to access all functions in the application, while the new users do not have an account and are unable to access any parts in the application. New users have the ability to create an account and start to use the “Health Management ” Application.
- After a new user finishes creating his account by setting username and password, he will see the guidance of putting down personal information when log in the account for the first time. Once he successfully sets these data, the role of the new user will change to the current user.
- When current users successfully log in the accounts, they can see their basic health data and related evaluation results on the screen. Moreover, certain instructions will also be displayed on the screen to guide users in entering other functions in the application.
- If the current user selects the “to calculate calorie intake” part, he will enter the calorie intake and burning function. In this function, current users can input the food they eat and activities they take, and the system will calculate their calorie consumption based on the data in the database and internal formula.
- If the current user selects “to change your basic information”, he will enter the health recording functions. In this function, current users can change and update their basic health data, which would be re-stored in the database. Meanwhile, the system would also re-evaluate the user’s health statement, such as BMI.
- If the current user selects “to set your water drinking reminder”, he will enter the water-drinking reminding function. In this function, the current users can set a period of time for drinking water, and tell the system how many cups of water they want to drink during this period. Once the computer receives this information, it will send a prompt message to the user periodically.

Design and Implementation Constraints

- To accurately gain the BMI, basal metabolism, daily calorie burning suggestion, and evaluate the user's health statement precisely, certain data, including current weight, current height, goal weight and goal days should be updated by the user frequently.
- The databases, storing the date of food calorie and activity calorie burning should be maintained termly, making sure users can find exhaustive information through the database.

Database

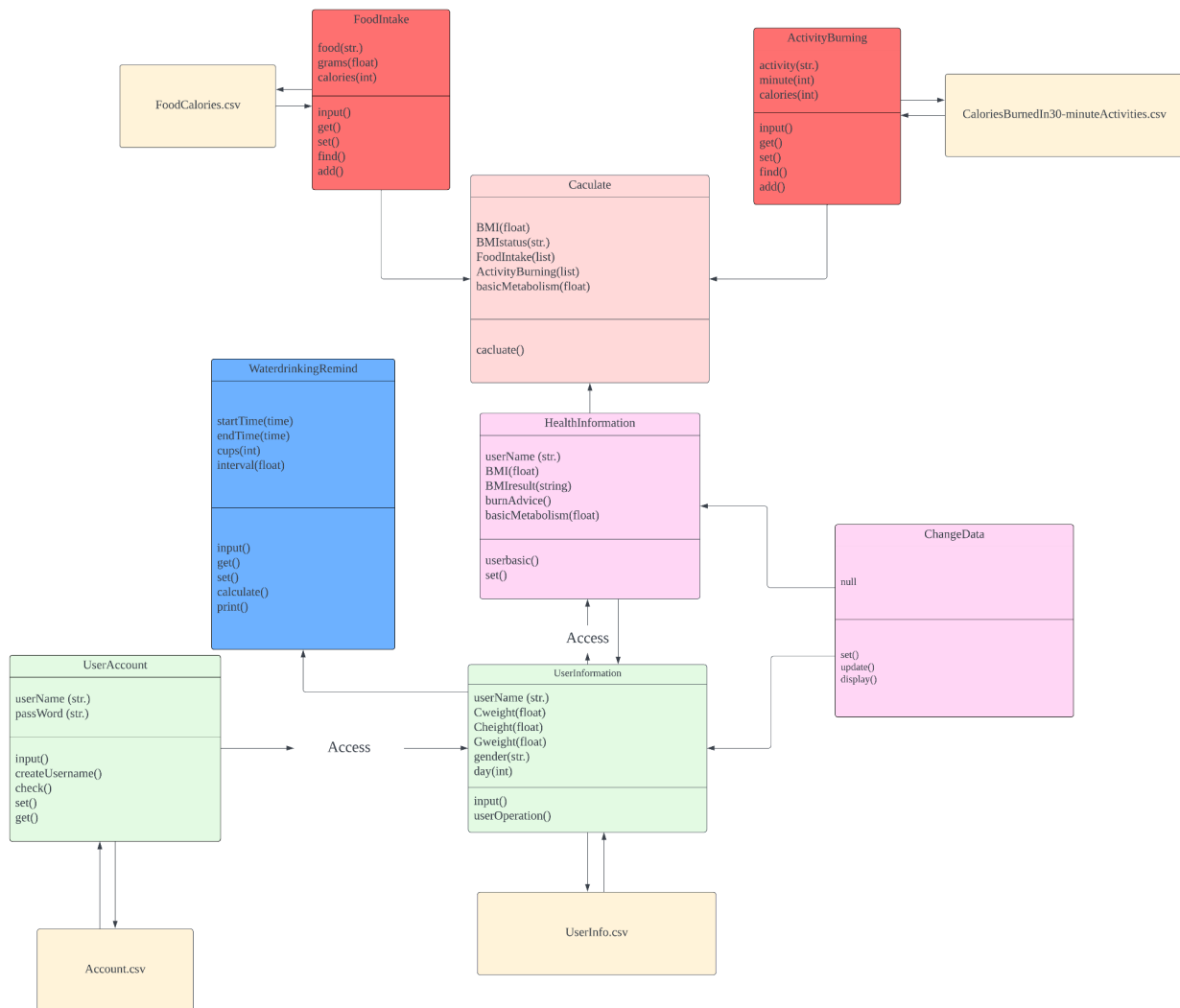
- The “Health Management” application connects with four CSV files (“Account.csv”, “UserInfo.csv”, “calorie Burned in 30-minute activities.csv”, “Foodcalorie.csv”) as databases to store information.
 - **Account.csv** -The information of username and password are stored in this database.
 - **UserInfo.csv** - The information of user’s age, gender, height, current weight, goal weight, goal days to achieve goal weight, BMI, and BMI result are stored in this database.
 - **calorie Burned in 30-minute activities.csv** - The information of common activities and its calorie burning data in 30 minutes are stored in this database.
 - **Foodcalorie.csv** - The information of common food and dishes calorie per 100g serving are stored in this database.

System Models

In this section, the team uses certain diagrams to present how users operate the application and how different functions and databases work together with each other to implement the whole application.

Class Diagrams of the Application

This diagram shows the structure of the “Health Management”, which can be roughly divided into **five parts**: database, user management system, health recording system, calorie intaking and burning system, and water-drinking reminding system.



- **Database**

- The detailed introduction of the database can be found in the “Database” part in the overall description section.
 - *The team uses functions from pandas in Python to build bridges between the databases and classes.*

- **User Management System**

- The user management system chiefly includes two classes, *UseAccount* and *UseInformation*. These two classes are connected with the *Account.csv* database and the *UserInfo.csv* database respectively.
- The main role of the *UseAccount class* is to help users finish their **register and log-in** actions. In order to achieve these results, the class gives guidance to the new users to **create** their own account and allows current users to **input** their username and password. The class also has a method to **check** if the username and password are matched with each other. Once the username and password are matched, the class will allow the users to **access** the UserInformation class.
- The *UserInformation class* generally works with basic health data **inputted** by the users when they first log in to their account. After the system detects these initial data, it **displays the operation menu** to users, **instructing** users to **access** the Health Recording System, calorie Intake And Burning System, or Water-Drinking Reminding System. From the diagram, it can also find an arrow between UserInformation class and ChangeData class, which means that the class would get the renewable data if the users revise their initial information. Whatever the inputting or updating basic data, they would also be stored in the database through this class.

- **Health Recording System**

- The Health Recording System is one of the core parts in the “Health Management”, which consists of two classes, *HealthInformation* and *ChangeData*.
- Connected with *UseInformation class* and *Calculate class*, the position of the *HealthInformation class* is more similar to a showcase, **displaying** what individual basic information the application have recorded and updated to the user. Since the BMI, BMI result, burning advice and basal metabolism also present in this section, which need to be calculated by specific formulas, the HealthInformation class also has a link to the Calculae class.

- With the methods provided by the ***ChangeData class*** allow users to ***revise*** their basic information.

- **Calorie Intake And Burning System**

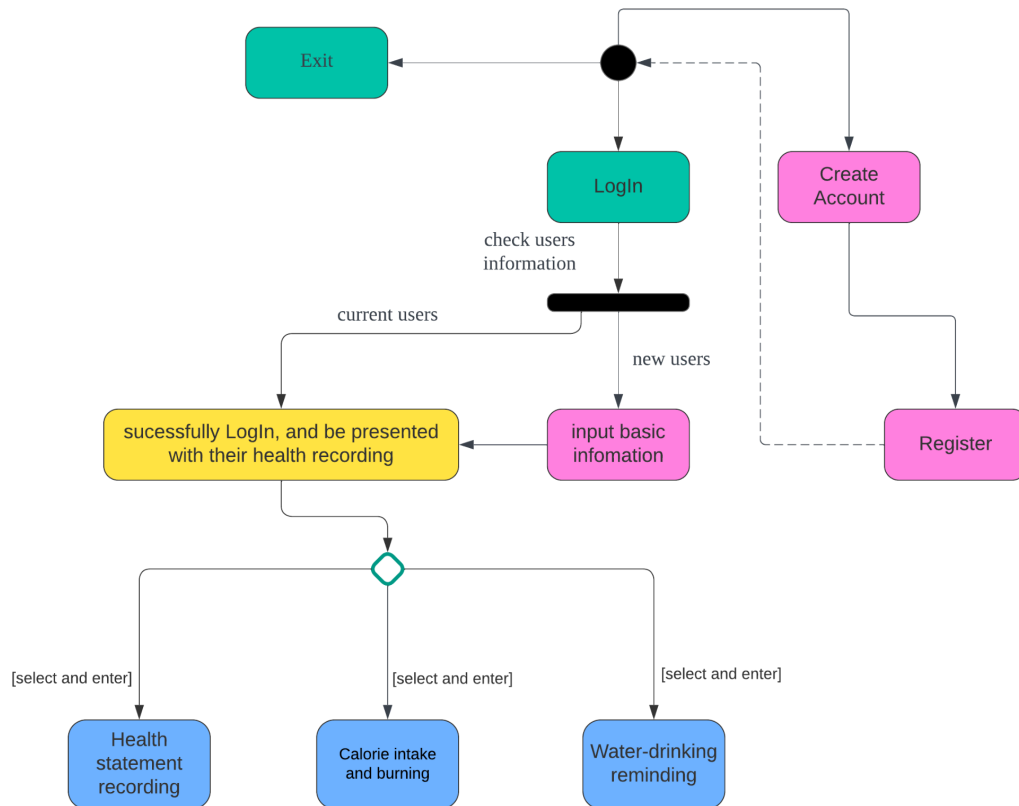
- the Calorie Intake And Burning System is another important function in the application. Beside two databases, these parts can be divided into three classes: ***Calculate, FoodIntake and ActivityBurning***.
- ***The Calculate class*** is a factory equipped with different formulas to handle the data collected from users. The class can ***calculate*** BMI, BMI result, calorie intake and burn, as well as daily basal metabolism, after getting necessary data from relative classes.
- The main responsibility of the ***FoodIntake class*** is to make users easily record their diet statements. Supported by the huge database and based on the describable keyword ***inputted*** by the users, the class can ***search*** the information of possible food or dishes and get its calorie data. When the food string is failed to be found in the database, the system would allow users to input the diet by hand and store the contents in the database.
- The attributes and methods in the ***ActivityBurning class*** are similar to those in the FoodIntake class.

- **Water-Drinking Reminder System**

- In some words, although the water-drinking reminder system has a connection with the ***UseInformation class***, it is still an independent system in the whole application. When the water-drink reminding system is working, it is unnecessary for the system to invoke data or invoke attributes from other classes.
- After the System ***gets*** the expected ***start and end time*** to drink water and how many cups of water the user plans to drink, it will calculate ***intervals*** to ***prompt*** reminder messages to the user.
 - *The team utilizes functions from time in Python to achieve the calculation between moments.*

Activity Diagrams

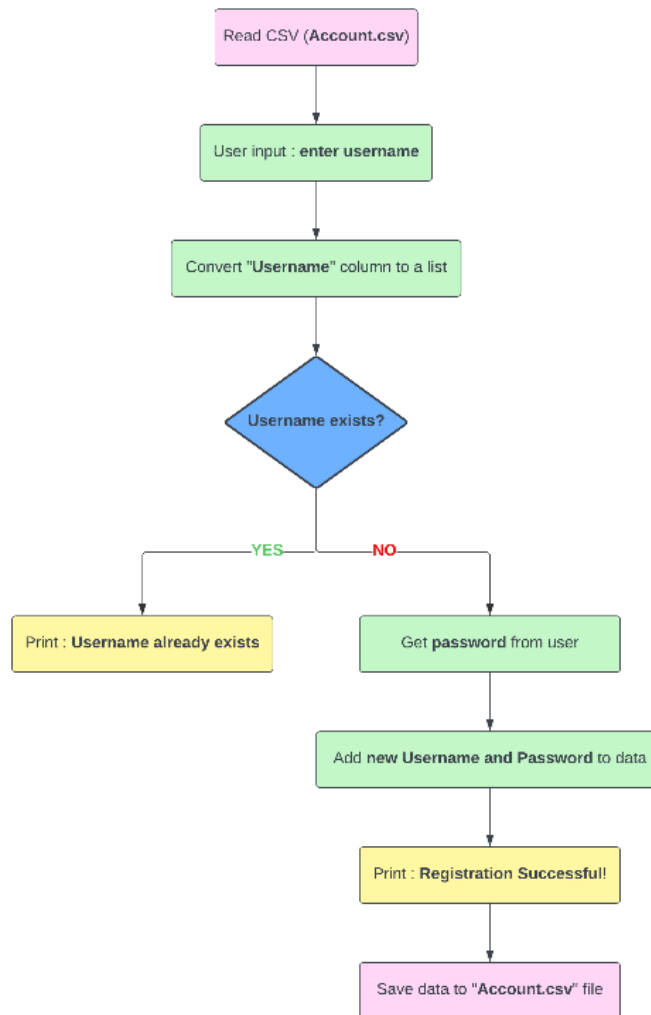
The activity diagram practically describes how new users and current users operate the “Health Management”, which can be better understood with the word contents titled Product Perspective And Functions in the overall description part in this report.



The below flow charts and other descriptive contents give more information about how users operate the application when they access specific parts in the “Health Management”.

- **Log In And Register**

The first thing for users to use the “Health Management” is to log in or register their own account. The below flow chart shows more details of login and register process.



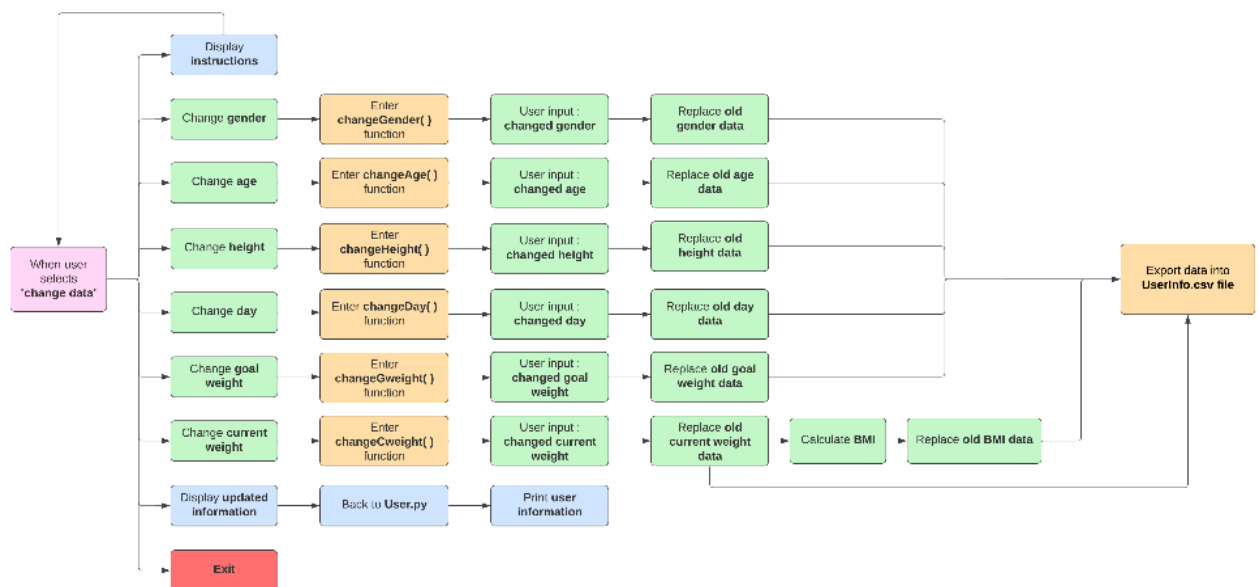
- The current users can log into their “Health Management” account directly with a matchable username and password.
- If the new users try to log into the application with an inexistent username and password, they will be asked to register first (or they can directly select to create an account). After receiving the message “Registration Successful !”, this type of user can successfully log into their account with a matchable username and password.

- **Record And Change Basic Information**

After the users successfully log into their own account, they formally enter and permitted to use the “Health Management”.

- The current users will not experience the process to entering their basic information, they can the recordings of their information, including gender, age, current height, current weight, suggested weight, goal days, BMI, BMI result, basal metabolism, and daily ideal calorie consumption. Also, the user can find instructions to enter other functions in the application on the screen.
- The new users will first be asked to finish recording their basic information including gender, age, current height, current weight, goal weight, and how many days the user wants to achieve his target. After the user completes the questionnaire, they will see the same information and instructions as the current users saw on the screen.

If the users want to revise their information records, they need input 1 to start to change basic information. The below chart explains how the process of data changes can be finished by the user.



- The guidance of changing data will be display on the screen once the users start to change the information. All basic information are able to changed by users

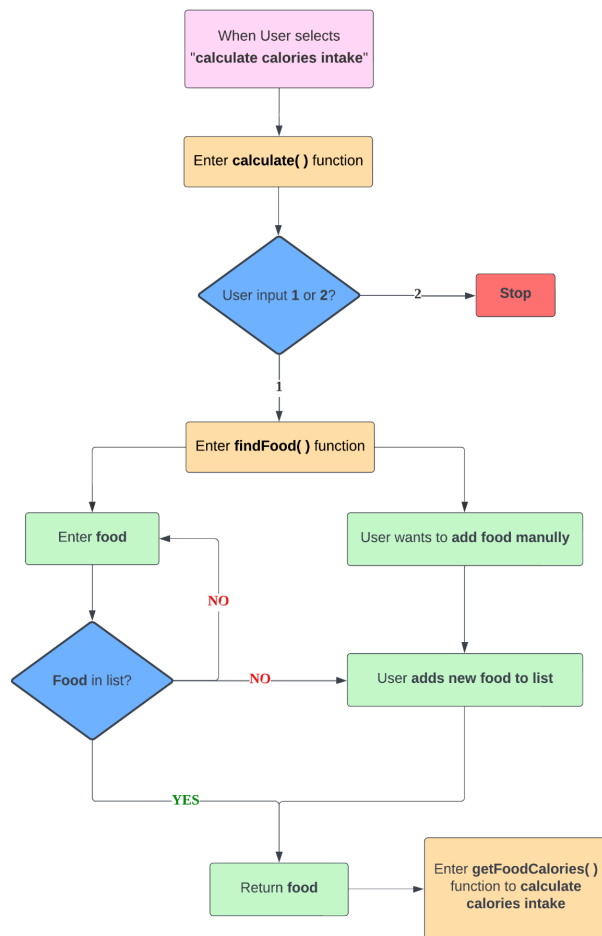
repeatedly. To do the changes, users just need to select specific information they tend to change and input the renewable contents into the application.

- After they changed data, it is also possible for the users to order the application to display their revised information on the screen. Besides, basic information inputted directly by the users, the re-calculated data of BMI, BMI result and basal metabolism, and daily ideal calorie consumption will also be printed out.

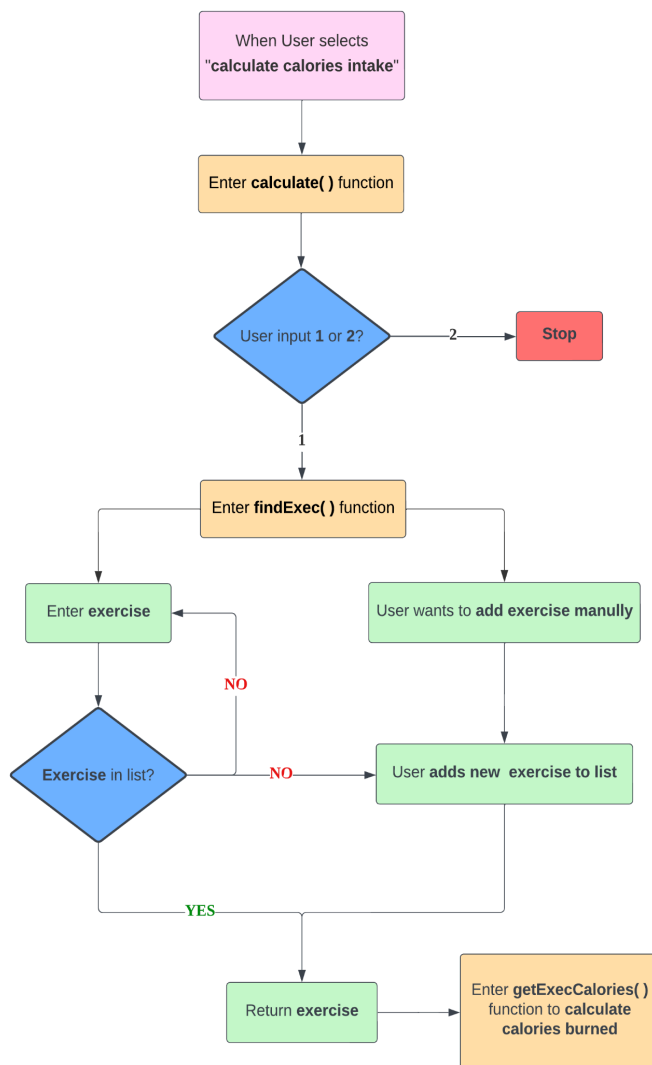
● Record Calorie Intake And Burning

To record the calorie-intake from diet and calorie-burn from activities, knowing about their calorie-consuming statements, it is time for the user to enter the calorie intake and burning system.

Since the users' actions are the same when they interact with the diet recording part and activity recording part, the below contents just take how users will interact with the application when they record their diet as an example to introduce users' actions in this function.



- If the user selects “to calculate calorie intake” , he can deal with his calorie consumption in the application. At the beginning to record his diet history, the user first tells the “Health Management” what he ate by key words of foods, such as “potato”. Then the computer will return the search results from the database to the user (the user will see a list of possible food names on the screen now). The user chose a particular food he wanted to add based on the findings. After the food is selected, he also needs to enter how many grams he took.
- If the application does not find any in the database, the user will be asked if he wants to add the new food manually and store this information in the database.
- If the user wants to record more than one kind of food he can repeat the above steps.

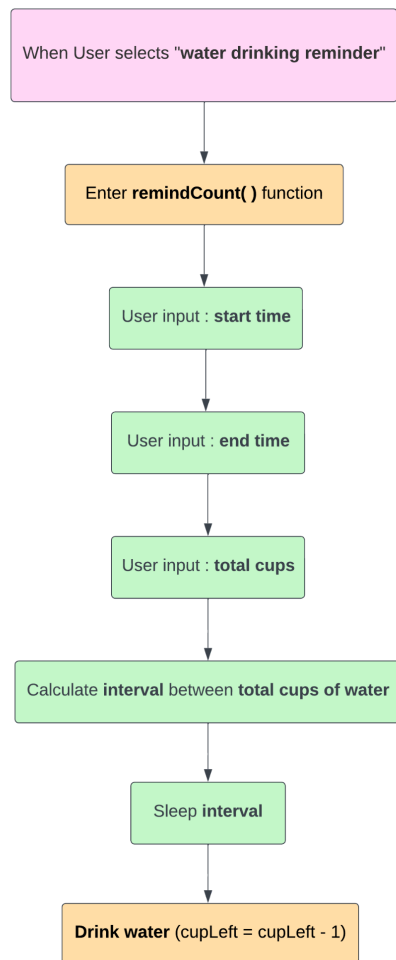


- The above picture describes how users can add activities they took in the application.

- After the user completes to record all food he ate and activities he took, he will get to know whether he successfully burned some calorie or ate too much calorie.

- **Set Personal Water-Drinking Reminder**

The last part displays how to set personal water-drinking reminders in the water-drinking reminder system in the application.



- After entering the water-drinking Reminder system, the first thing the user should do is to set the time period that he needs to finish today's water-drinking and total cups he wants to drink.
- Once the above variables are set successfully, the users will receive reminders from the "Health Management" termly.

Reference

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