System Requirements Specification

For

Personal Food Log App

Version 1.0

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April 10, 2022

Content

1. Introduction

1.1 System purpose

This SyRS document aims to show the system information of the Personal Food Log App and how it is important to relate to the business nowadays. And in this document, we will present the results of the definition of need, the system operational concept, the system architecture, and the system requirements analysis tasks. In this goal, the SyRS document of Personal Food Log App will clearly show the System requirements and separate it into different components. And the Validation processes for each requirement will be represented. These contents are all for showing the Personal Food Log APP's system that how to construct links with third-party services and Digital Health inc. and the requirements for the system running, to better present the system concept.

1.2 System scope

This app runs the common platforms on mobile platforms, Android and IOS. As for the Personal Food Log App, it is a healthy type of software dedicated to helping track users' daily nutrition intake at all meals. The data including food log, personal ID, personal profile will be collected in a database secretly (AWS). Users only can see their personal information and analysis of daily meals. Only administrators and authorized departments can view data and have strict confidentiality agreements. The app can meet the user's calorie and nutrient standards to check out healthy diet standards, to meet the healthy eating habits.

1.3 System overview

1.3.1 System context

The system of this app applied to Android and IOS. Access to the Internet can carry out data (food photo) input and output, as well as app interaction systems. That is, after the data is input, the feedback and visualization of the data will be obtained.

1.3.2 System functions

The system main function is to collect the data (food photo) which is uploaded by users upload through the camera. And the system will scan the photo, load it into the required database and VBM program to read, analyze, classify, and calculate. After that, the system database storage must also be scalable with ease to easily accommodate growth.

1.3.3 User characteristics

Expected user characteristics are not restricted. The application can predict and analyze users with any characteristics.

1.4 Definitions

(a) big data:
Sets of information that are too large or too complex to handle, analyze or use with standard methods.
(b) Database:

Allocated storage for required data assets.

(c) dietitian:
A person whose job is to advise people on what kind of food they should eat to keep healthy.

(d) Server:
A computer or computer program which manages access to a centralized resource or service in a network.

(e) Machine Learning:
The use and development of computer systems that are able to learn and adapt by using algorithms and statistical models to analyze and draw inferences from patterns
in data.

(f) AI:
This new technology uses AI to recognize character features in the same way a human brain does.

(g) Algorithm:
A process or set of rules that is followed in calculations or other problem-solving
operations, especially by a computer.

(h) Stakeholder:
A person with an interest or concern in the project.

(i) User:
A person who uses or operates the application.

(j) Nutrition:
The process by which living things receive the food necessary for them to group and be healthy.

(k) Calorie:
A unit for measuring how much energy food will produce.

2. References

1. IEEE 29148-2018 Requirements Engineering. (2018, November).

2. *Oxford Learner's dictionaries: Find definitions, translations, and grammar explanations at Oxford Learner's dictionaries*. Oxford Learner's Dictionaries | Find definitions, translations, and grammar explanations at Oxford Learner's Dictionaries. (n.d.). Retrieved March 26, 2022, from https://www.oxfordlearnersdictionaries.com/us/

3. System requirements

3.1 Functional requirements

(a) Image recognition
- Scan and calibrate the food part of the picture.
- Distinguish food from background before uploading to Amazon Cloud accurately.
- The blurred photo prompts the user to take it again and upload it.

(b) AI Module
- The AI Module should calculate the calorie based on the input

photo with high accuracy that is at least 94.11%.
- The AI Module should incorporate new user generated data, learn and re-train the dataset.

(c) Database
- The database should be set with the encryption permission.
- The database should be built to support Food Log to hold data collected or generated in real time. The database will support a variety of data types and formats, including but not limited to images, tables, time series, spreadsheets, documents, reports, and uploaded photos.

(d) Application
- The application should be efficient and easy for users to use and provide users with tutorials.
- The application should visualize data and analysis to make it clearer to the user to view.
- The application should have wider compatibility.

3.2 Usability requirements

(a) Efficiency use
- Users can view the help document and each process contains guidance.
- Users can give feedback and click on each food type to view the data.
- Users can see the status of the process.
- Users do not need memory because the data and analysis are recorded in account.

(b) Intuitiveness
- Buttons and text conform to common standards, including size and patterns.
- Interface colors do not make users feel monotonous or ugly.
- The layout of the interface content is not unsuitable.

(c) Low perceived workload
- The interface appears easy to use, rather than intimidating, demanding and frustrating.

3.3 Performance requirements

(a) Platform
- The system should utilize the hardware to improve the performance.
- The performance should be suitable for Android and IOS.

(b) Response Time
- If any corresponding time exceeds 3 seconds, a progress bar is required to tell the user the remaining time.
- After the user initiates the “upload food photo” action, the system should respond within 0.5 seconds.
- After the user initiates the “deleted food photo” or “re-upload food photo”, the system should respond within 1 seconds.
- During the scan and analyze process, the system should take within 10 seconds with a progress bar.

(c) Scalability

- In the process of processing information, if the working time is more than 5 seconds, users need to be alerted with visual data such as a progress bar, and more running memory is enabled.
- The system should scale up or down under different workload automatically.

3.4 Interface requirements

3.4.1 External interface requirements

- The system will use the communications resources such as HTTP protocol for communication with the web browser and the web server and TCP/IP network protocol with HTTP protocol.

3.4.2 Internal interface requirements

- The user interface will be simple and consistent, using terminology commonly understood by the intended users of the system. The system will have a simple interface, consistent with industry standard interfaces, to eliminate the need for user training of infrequent users. The development team will evaluate the user interface of similar systems (such as MyFitnessPal, MealSnap) and apply appropriately.

3.5 System operations

(a) Maintainability requirements
- The system should be doing scheduled bi-weekly maintenance.
- The maintenance time should be kept within 3 hours. And the maintenance should be processed during the night.
- Notifications are required before maintenance. And maintenance or update content will be displayed to the user.

(b) Reliability requirements
- The system should match the output information based on the given input.
- The system should always be available except for the maintenance period.

(c) Other quality requirements
- The system should support both Android and IOS.

3.6 System modes and states

(a) Planning and brainstorming mode: Teams get together to study the requirements, meet with the product manager, and develop prototypes.
(b) Development mode: In this phase, the development team follows an agile approach to incrementally develop the application.
(c) Technical Support phase: In this phase, the Technical Support team thoroughly tests the app both manually and automatically using scripts.
(d) Release phase: In this phase, maintenance team takes the responsibility to monitor and report how the application and company servers perform.

3.7 Physical Characteristics

- Adaptability: The system should be able to expand and scale up easily, since the number of users grows.

3.8 Environmental conditions

● For each release week, short-handed problems may occur in both the development and deployment teams. The project management team should consider postponing the release date further for a stable and reliable release, after coordinating with the marketing team.
● During new laws releasing, the terms for users may be affected. The project management team should coordinate with the deployment team, then make a new list of terms that obey the new laws and release them to users.
● During the arrival of uncontrollable and destructive natural disasters such as fires, floods, and earthquakes, various departments need to actively cooperate and cooperate to ensure that all users' data are properly preserved.
● In the case of network security issues such as data leakage or server attacks, the project management team needs to take immediate measures to minimize server damage and protect users' personal information.

3.9 Security requirements

(a) Amazon Cloud: The system will be deployed on Amazon Cloud, and all the user data must not be exposed to other people and organizations.
(b) Agreement: Every employee must understand and follow the privacy requirements.
(c) Database: Database maintenance personnel must have permission to modify the contents of the database.

3.10 Information management requirements

(a) Information collected should be stored in Amazon Cloud.
(b) More backup servers in case of server accidents such as power outages.
(c) Frequent data backup.
(d) For data theft, establish a firewall, and control the transmission process of information, to prevent data leakage.
(e) Strictly control the authorization of access to information.

3.11 Policy and regulation requirements

(a) It is forbidden to give data information in any form to any unauthorized person or organization without contract and agreement.
(b) Prohibit system code modification without superior instruction
(c) Do not exchange information with third parties

3.12 System life cycle sustainment requirements

(a) Help document
(b) Employee training
(c) Timely maintenance

3.13 Packaging, handling, shipping, and transportation requirements

After the user takes a photo and uploads a photo of food, the system will package the user's information (ID, gender, age, characteristics) and upload it to the background for processing. The background calls VBM for handling and analysis. The obtained data will be delivered (shipped) to Amazon cloud service for backup, which required to prevent information interception by hackers in this process.

4. Verification

4.1 Functional requirements

(a) Image recognition

1) The resulting image is the analysis of the food, and the system returns the indicators of the food.

(b) AI Module

1) Procure several foods and calculate by hand their overall calories and macronutrients. And take several pictures of the test food to assert the calories calculated are within a reasonable (5.89%) margin of error.
2) The AI Module should incorporate new user generated data, learn and re-train the dataset.
3) Monitor the state and health of the module to assert changes are made with new inputs habitually.

(c) Database

1) Create datasets containing all data types and formats. Push these data sets to the database and attempt to pull the data afterwards. Assert the pulled data is equivalent to the initial data set.
2) Continually add data to the database until it is full to validate it will increase its operational size seamlessly and without user interference.
3) Assert read and write queries are possible with the metadata database by storing sets of expected test data.

(d) Application

1) Users will be polled about their experience, asserting over 80% of users finding the application easy to use.
2) Add a food then delete it. Close the application and reopen to assert the food has been deleted successfully.
3) After test data for over a month has been inserted, view user statistics to assert the weekly and monthly data matches with manually calculated data based on the input.

4.2 Usability requirements

(a) Efficiency use

1) Survey user experience during the first time using the app. Assert at least 90% of users can log food without intervention.
2) Survey user experience during the first time using the app. Assert at least 90% of users can add and delete food without intervention.

(b) Intuitiveness

1) Survey user experience during the first time using the app. Assert at least 90% of users can navigate to all areas of the application without intervention.
2) Survey user experience during the first time using the app. Assert at least 90% of users are able to understand all possible notification and title outputs of the application.

(c) Low perceived workload

1) Survey user experience during the first time using the app. Assert at least 90% of users agree the interface is understandable and easy to use.

4.3 Performance requirements

(a) Platform
Assert the application functions as expected when deployed.
Monitor the performance of specific standard actions such as taking a photo and make sure the performance is scaled to the resources available by the hardware of each individual device.

(b) Response Time
Attempt to upload food photos more than 100 times and assert the total is less than 0.5 seconds in each instance.
Attempt to delete photos and reupload photos more than 100 times and assert the total time is less than 1 seconds in each instance.
Attempt to take a picture of food more than 100 times and assert the total time to calculate calories is less 10 seconds in each instance.
Attempt to run all of the processes more than 100 times that display the progress bar when the time is over than 3 seconds.

(c) Scalability

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5. Appendices

5.1 Acronyms and abbreviations

Acronym/Abbreviation	**Definition**
Healthy eating plan	A healthy eating plan gives your body the nutrients it needs every day while staying within your daily calorie goal for weight loss. A healthy eating plan also will lower your risk for heart disease and other health conditions.
CNN	Convolution Neural Network, a class of artificial neural network (ANN), most commonly applied to analyze visual imagery.