

HeartMate App

Software Engineering Project Software Requirements Specification Version 4.0

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Software Requirements Specification

1. Introduction

1.1 General Introduction

Heart disease remains one of the leading causes of mortality worldwide, emphasizing the critical need for effective preventive measures and early detection. With advancements in technology and healthcare analytics, software solutions have emerged as valuable tools in assessing individual risk factors for heart disease. This Software Requirements Specification (SRS) outlines the development requirements for a software system designed to predict the likelihood of an individual developing heart disease based on their health data.

1.2 Purpose

The purpose of this document is to provide a comprehensive outline of the requirements necessary for the development of a heart disease prediction system. By detailing the functional and non-functional aspects of the software, this document aims to guide the development team in creating a robust and user-friendly solution. Additionally, it serves as a reference point for stakeholders involved in the project, ensuring alignment with project goals and objectives.

1.3 Scope

The heart disease prediction system will encompass features such as user registration, data input, analysis, risk assessment, and personalized recommendations. It will utilize machine learning algorithms to analyze input data, including demographic information, medical history, and lifestyle factors, to generate predictions regarding the user's risk of developing heart disease. The system will cater to a diverse user base, offering a user-friendly interface accessible across multiple platforms.

1.4 Overview

This document is structured to provide a holistic view of the heart disease prediction system, encompassing its purpose, scope, and functional requirements. It delineates the system features, including user registration, data input, analysis, risk assessment, and recommendations. Additionally, it outlines external interface requirements, non-functional considerations such as performance and security, and other pertinent requirements. Through clear delineation of these aspects, this document aims to facilitate the development of a robust and effective software solution for heart disease prediction.

2. Functional Requirements

2.1 User Profile Management

2.1.1 Users shall have the ability to create and manage their profiles, such as age, gender, and medical history and other relevant parameters.

2.1.2 Users shall be able to update their profiles as needed.

2.1.3 Due to security concerns, data of an individual profile will be stored in their local device and not in the client server.

2.2 Data Collection and Storage

2.2.1 The app shall provide a user-friendly interface for users to input their health-related data, including blood pressure, cholesterol levels and body mass index (BMI).

2.2.2 The app shall validate and store the collected data in the database.

2.3 Machine Learning Model Integration

2.3.1 The app shall integrate a trained ML model to predict the likelihood of cardiovascular disease based on the user's inputted data.

2.3.2 The ML model shall utilize algorithms to analyze the collected data and generate accurate predictions.

2.3.3 The app shall display the prediction results to the user in a clear and understandable format.

2.3.4 The app shall utilize Flask framework to integrate the ML model to the Flutter application.

2.4 Data Visualization

2.4.1 The app shall provide visually appealing and informative graphs and charts to present the user's health data and general trends in cardiovascular diseases.

2.5 Database Management

2.5.1 The app shall maintain a database to store user profiles, health data, and prediction results.

2.5.2 SQLite database shall be used to store user information as per the profiles.

2.6 Health Recommendations

2.6.1 The app shall provide generic health recommendations based on the trained model. The recommendations will be subdivided based on factors such as cholesterol levels, BMI, blood sugar level, etc.

3. Non-Functional Requirements

3.1 Performance

3.1.1 The app shall have fast response times for data input, prediction generation, and data visualization.

3.2 Usability

3.2.1 The app shall have an intuitive and user-friendly interface, ensuring ease of use for users of all technical backgrounds.

3.2.2 The app shall provide clear instructions and guidance to users for data input and interpretation of prediction results.

3.3 Scalability

3.3.1 The application shall implement serverless architecture which will help in distribution faster, thus enhancing scalability.

3.3.2 Serverless architecture will also enable deployment of updates and new features faster. The developers will hence be able to put more resources and infrastructure in development rather than deployment.

3.4 Security

3.4.1 The application shall implement serverless architecture for user data, and this would ensure that the private details are secure unless and until the local device itself is compromised.

4. Other Requirements

4.1 Legal and Ethical Considerations

4.1.1 The software must adhere to all applicable laws and regulations concerning user data privacy and healthcare data handling. Ethical considerations regarding the use of sensitive health data must also be addressed.

4.1.2 The software will be advising nutrients to the user. Therefore, the management of the application will ensure that advice is being sought through licensed nutritionist and doctors only.

4.2 Documentation

Comprehensive documentation should be provided for users and developers, including user manuals, technical documentation, and API documentation. User guidance on interpreting analysis results and implementing recommendations should also be included.

This SRS document outlines the comprehensive requirements for the development of a software system aimed at predicting heart disease risk based on user-provided health data.

5. Conclusion

In conclusion, the HeartMate app has been designed with the primary goal of assisting users in assessing their risk of cardiovascular disease. By leveraging machine learning models, secure authentication, and a reliable database, the app provides a user-friendly platform for individuals to input their health data and receive predictions. With a focus on performance, security, usability, and reliability, HeartMate aims to support users in making informed decisions about their cardiovascular health. By offering a range of features, including data visualization and timely notifications, the app strives to contribute to the prevention and early detection of cardiovascular disease.