

2. Introduction

2.1. PROBLEM STATEMENT

The goal of this project is to predict whether a patient would have an allergic reaction to a medicine. It will use machine learning to make a decision based on factors about the individual along with the medicine itself. This will allow for faster and easier tests, as the model will have a rapid response time, and no additional patient information is required to run the model.

2.2. REQUIREMENTS & CONSTRAINTS

Model Requirements:

- Predicts whether a patient would have an allergic reaction to a medicine
- Able to process large number of input variables

Backend Requirements:

- Backend can send data from front-end to model
- Backend validates data and ensures it follows correct formatting
- Backend can return results to front-end
- Backend has limited read/write access to database

UI/front-end Requirements:

- Clear display of prediction and confidence level
- Location for user to upload information to test the model
- The remaining UI should be visibly appealing to the user
- Web accessibility from anywhere

Legal Requirements:

- Data collection and storage does not violate any health privacy laws

Testing Requirements:

- The model should be tested for an overall accuracy percentage to report
- Each component has multiple iterations of tests for any type of error
- System has tests covering entire scope of the project
- Logs should be implemented to catch faults or errors

Maintainability Requirements:

- File structure should be clear
- Code should be well documented

Data Requirements:

- Data stored in a database to be accessed by the model
- Database has security to prevent outside access

2.3. ENGINEERING STANDARDS

Since our project would take place in the medical field we should follow the IEC 62304 standard [1]. The IEC 62304 standard [1] specifies the life cycle for medical software devices such as risk management, software requirement analysis, software system testing, etc.

IEEE 11073 [2] is the "Health informatics - Point-of-care medical device communication," this provides a framework for compatibility between various medical devices and systems. It [2] defines communication protocols and data formats for exchanging information between medical devices and healthcare information systems, such as electronic health records or AI systems. When developing an AI model for allergy prediction, adherence to this standard can facilitate easy integration with other medical devices and systems, ensuring that relevant patient data can be efficiently shared and utilized for accurate predictions and informed healthcare decisions.

IEEE 2801 [3] is a standard built around the management of data in medical artificial intelligence. It [3] places a high emphasis on how data should be used and controlled once it has been gathered. Following this will help us ensure that we are using data in an ethical manner.

The model will be built using Python, because this language supports a wide variety of libraries, including ones with a focus on machine learning. One of the key libraries we will use is Keras, which is used to create a neural network system to train models.

2.4. INTENDED USERS AND USES

Some of our intended users would be medical professionals, who could see if a patient might have an allergic reaction to a medicine; patients themselves, who can enter their information and determine if one of their medicines is causing allergic reactions; and medicine manufacturers, who can find whether their upcoming medicine could cause widespread allergic reactions.