Software Requirement Specification
For
Sepsis Detection

Version 1.0.0

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Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

The purpose of this document is to provide a comprehensive and detailed overview of the requirements for the development of a Sepsis Detection System, outlining the functional and non-functional requirements, system features, and constraints. The Sepsis detection system is a platform that will help healthcare professionals to predict sepsis at an early stage as soon as the patient arrives the hospital for treatment to avoid unnecessary delays in detection that can be cause various after affects such as higher death rates or morbidity issues if it is detected after sometime. The platform will enable doctors to easily detect sepsis in minimal time just by providing the related patient data with various parameters in minimal time. This document outlines the requirements for the Sepsis Detection.

1.2 Scope

The Sepsis Detection System aims to assist healthcare professionals in early identification of sepsis cases using machine learning algorithms. The system will analyze patient data to predict the likelihood of sepsis, supporting timely intervention and improving patient outcomes. The environment provided is user friendly and very easy to use for detecting sepsis.This project is only helpful for doctors who has knowledge on the disease and its related treatment although it is useful for patients also ultimately by improving the treatment outcomes of the disease. The main aim of the project is to provide an easy to use interface to detect sepsis with accuracy in minimal time.

1.3 Objectives

Our objective of developing this project is mainly to help doctors to detect sepsis at an early stage with ease and accuracy.

We have observed some limitations in existing system:

- Existing system is offline.
- Time consuming for detecting sepsis.
- Heavy hospital resources wastage.
- Sometimes may lead to false results.

So, our objective is to overcome this limitation with following features.

- More accurate.
- To provide sepsis detection any time.
- Easy to use.
- Saving of time.

- Less wastage of resources.
- Lesser possibility of false results.
- No man power required for detection.

2. Overall Description

2.1 System description and Characteristics

The Sepsis Detection is a web application that provides a platform for professionals who are working for health care communities to detect the presence and even severity of stage of sepsis easily in minimal time. The platform allows doctors to search for sepsis by providing with the relevant patient details. Additionally, users can easily detect the infection with accuracy that too within minimal time and probability of lesser false results.

2.2 Design and Implementation Constraints

Website will be made for the ease of people with the latest technology used.

2.2.1 Technology Used

Software:-

- Python for machine learning
- Pandas
- Seaborn
- Sklearn
- Matplotlib
- HTML and CSS
- Machine Learning Algorithms
- Google Colab
- Windows 7 and above

HARDWARE:-

- Processor above intel i3
- Ram 4 or 8 GB
- Disk Space – 4GB SSD

Functional Requirement:

2.3 Functional Requirement:

The functional requirement analysis entails a thorough examination, analysis, and description of software requirements and hardware requirements in order to meet actual and also necessary criteria in order to solve an issue. Analyzing functional Requirements includes a number of processes. The Functional Requirements includes the hardware and software requirements that are essentially required to solve the issue.
The platform must allow dcotors to easily search for the presence and severity stage of sepsis as soon as the patient arrives the emergency department for treatment. The platform must display accurate results about the sepsis presence in minimal time. The platform must allow doctors to easily use and provide the necessary patient details that are required for detecting sepsis.

2.4 Non Functional Requirement:

2.4.1 Performance Requirements:

The platform must be responsive and load quickly. The platform must be available 24/7 with minimal downtime. The platform must be able to provide accurate results within minimal time to avoid unnecessary details in treatment. The platform must be efficient for providing accurate results to improve the patient outcomes.

2.4.2 Usability Requirements:

The platform must be easy to navigate and use. The platform must have a user-friendly interface. Usability defines how difficult it will be for a user to learn and operate the system. It is assessed by using efficiency of use, Intuitiveness.

2.4.3 Reliability:

The system must demonstrate high reliability, ensuring consistent and accurate predictions across different datasets.

3 External Interface Requirements

3.4User Interfaces

The user interface for sepsis detection will have one main interface: Web Application:
The web application will be built and will be accessible through a web browser.

3.2 Software Requirement

- Web Browser : Internet Explorer, Google Chrome, Mozilla Firefox etc.
- Windows 7 or above.
- Python for machine learning.
- Machine learning algorithms.
- Google colab.
- Hosting Services.

4 System Features:

4.1 User Management:

The platform will allow users to easily use it without any headache of creating and maintaining accounts.

4.2 Sepsis Search:

The platform will allow health care providers to easily detect sepsis with accuracy in minimal time.

4.3 Resource saving:

The platform will allow users to easily search for sepsis without wasting so much resources and time also.

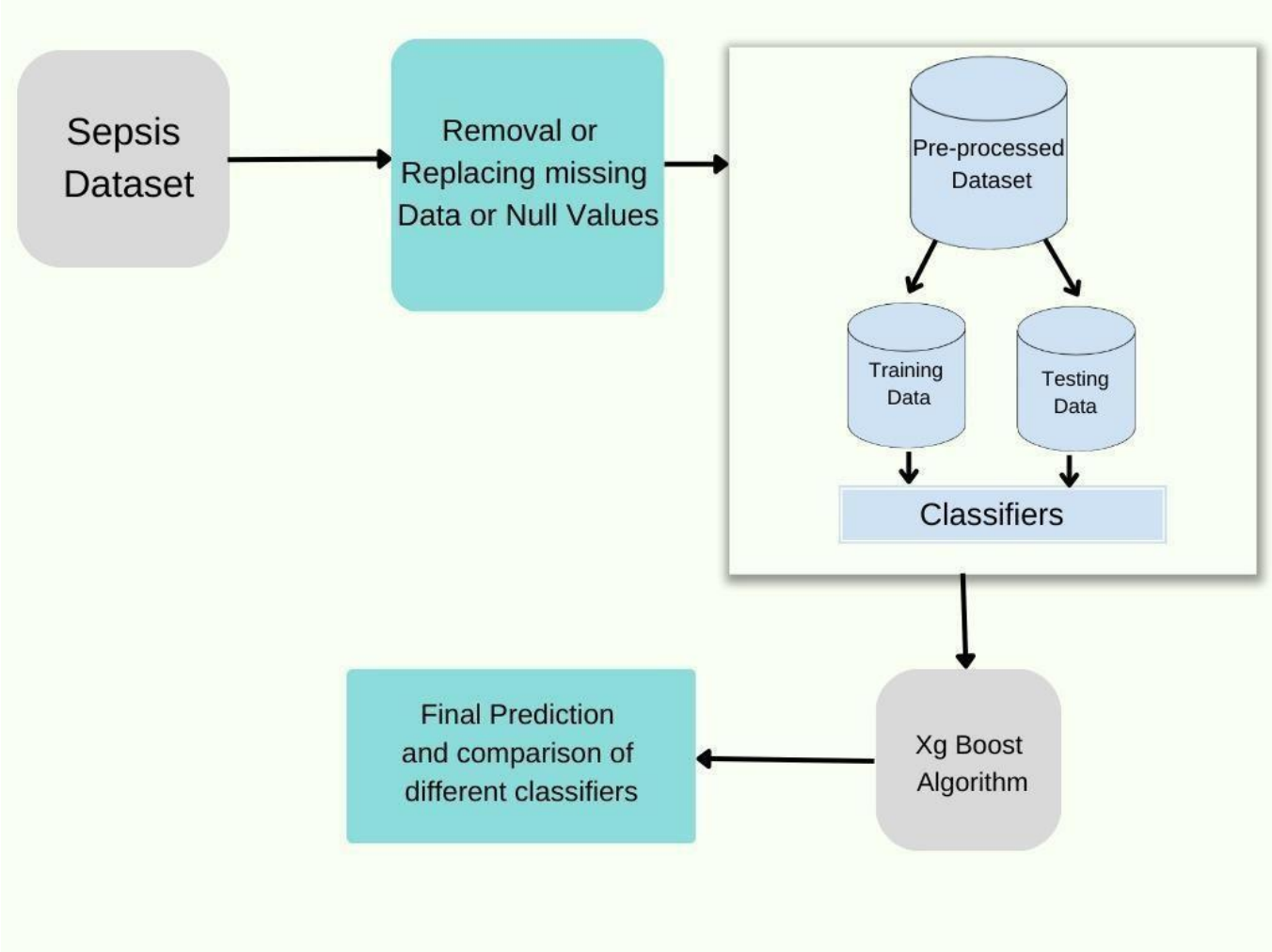
4.4 Accuracy of System:

The platform will be integrated with machine learning algorithms to improve accuracy of detecting infections.

5 Functions of System

The function of the system consists of the flowchart of how the system will work step wise tofinally predict the onset of sepsis and also architecture of the system.

5.1 Architecture:-



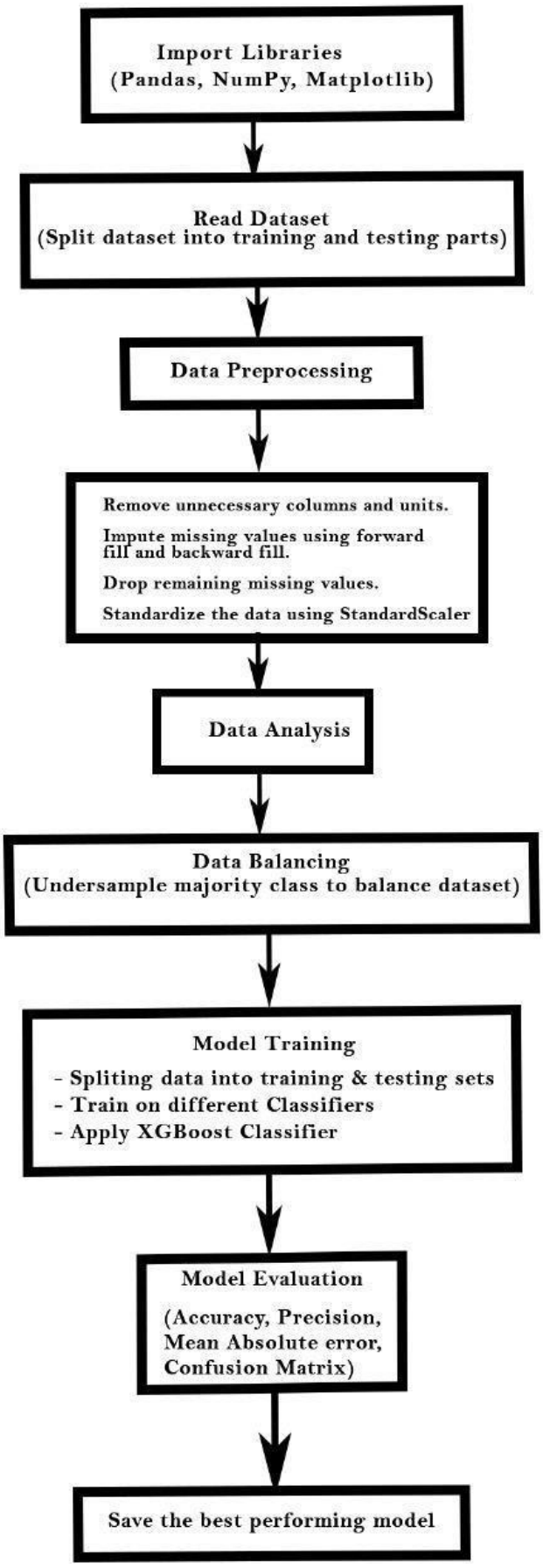
System Architecture

5.2 Functional and Behavioral Modeling

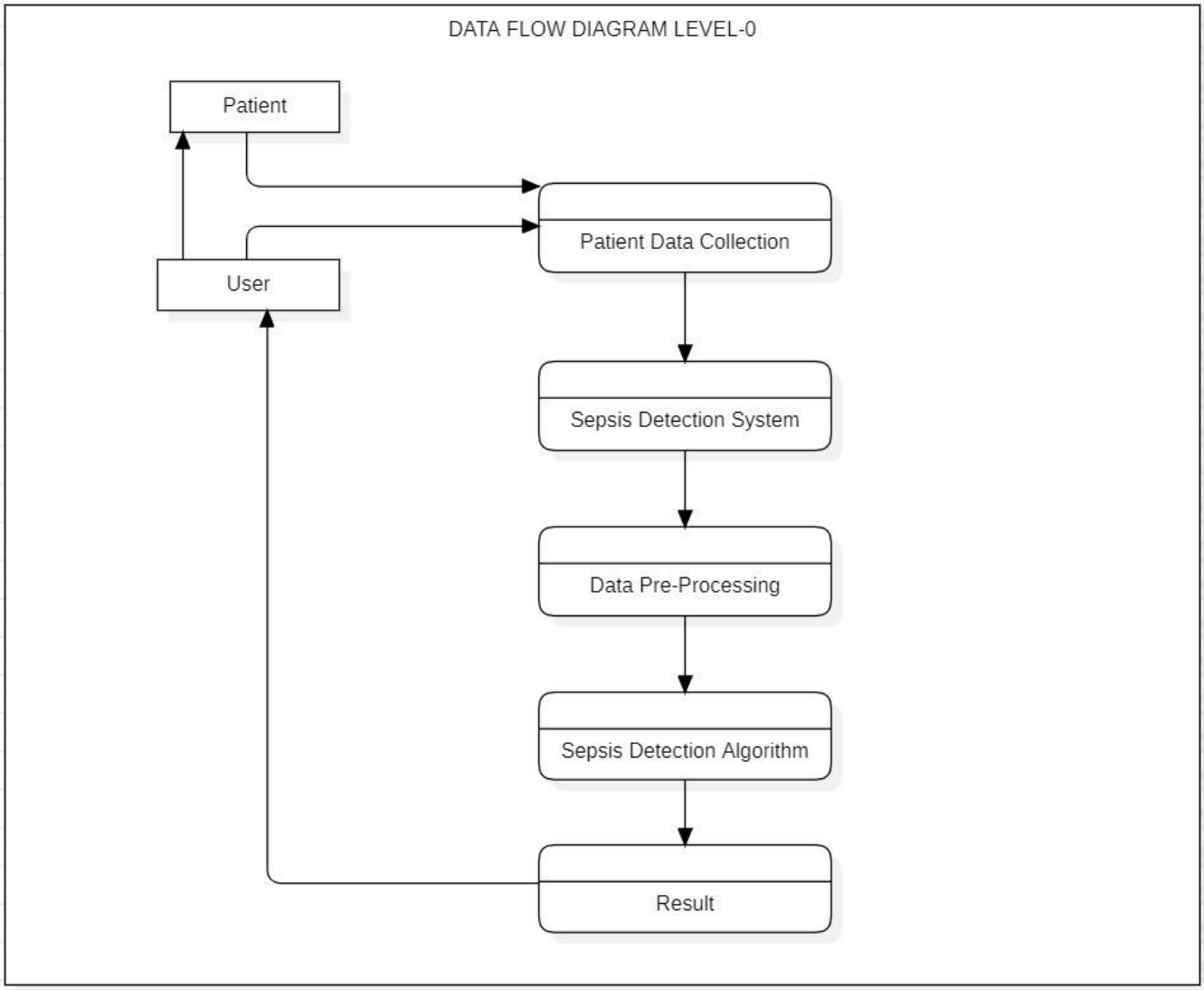
It gives the basic description of the functions how the system will work and the behaviour of the system.

5.2.1 Flow Chart:-

A data flowchart of the system help to explain how the system will be build step by step to predict sepsis.


Import Libraries
(Pandas, NumPy, Matplotlib)
Read Dataset
(Split dataset into training and testing parts)
Data Preprocessing
Remove unnecessary columns and units.
Impute missing values using forward fill and backward fill.
Drop remaining missing values.
Standardize the data using StandardScaler
Data Analysis
Data Balancing
(Undersample majority class to balance dataset)
Model Training
- Spliting data into training & testing sets
- Train on different Classifiers
- Apply XGBoost Classifier
Model Evaluation
(Accuracy, Precision, Mean Absolute error, Confusion Matrix)
Save the best performing model

5.2.2 Data Flow Diagram Level 0 :-



5.2.3 Data Flow Diagram Level 1:-