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Subject : Project Based Learning (PBL)

Branch : Artificial Intelligence And Data Science

Academic Year : 2021-22

Project Name :Heart Disease Prediction System

Software Requirement Specifications (SRS)

Heart Disease Prediction System

Overview :

Section :1.0: - Discuses the scope and the purpose of the software.

Section :2.0: - Describe the overall functionalities and the constraints of the software and the user characteristics.

Section :3.0: - Explains features, external, functional and non-functional requirements of the system.

Section 1.0

Introduction:

    1.1 Purpose.
    1.2 Project Scope.
    1.3 References.
    1.4 Intended Audience.

Purpose:

A study shows that from 1990 to 2016 the death rate due to heart diseases have increased around 34 per cent from 155.7 to 209.1 deaths per one lakh population in India.

Thus preventing Heart diseases has become more than necessary. Good data-driven systems for predicting heart diseases can improve the entire research and prevention process, making sure that more people can live healthy lives. This is where Machine Learning comes into play. Machine Learning helps in predicting the heart diseases, and the predictions made are quite accurate.

Scope:

This system signifies its scope towards the early prediction of the heart disease which will be very helpful for the patient to identify whether he/she is suffering from heart disease or not.

Moreover, it is very efficient for detecting the rare disease at early stage which will help the medical researchers to specify the treatment to the patient.

References:

The references for the above system are as follows :

1) www.kaggle.com
2) www.google.com
3) www.geeksforgeeks.com
4) www.wikipedia.com

IEEE Research Papers References:

1) **Name of the Paper**: -IJERT-Heart Disease Prediction using Machine Learning

   Authors: - Apurb Rajdhan, Avi Agarwal, Milan Sai, Dundigalla Ravi, Dr. Poonam

   Ghuli. Year: - 04-April-2020

   Advantages: -

   1)Using random forest accuracy up to 90.6% can be achieved.

   2)By testing with multiple algorithms we can get higher accuracy level for the
   same dataset.

   Disadvantages: -

   1)Dataset is limited, higher accuracy can be achieved with more flexible inputs
   with a larger dataset.

2) **Name of the Paper**: -Heart Disease Prediction using Machine Learning Techniques.

   Authors: - Devansh Shah, Samir Patel, Santosh Kumar Bharti Year: - 2 October 2020

   Advantages: -

   1)Using random forest accuracy of 91% was achieved for people's dataset it was
   about 97%.

   2)By testing with multiple algorithms we can get higher accuracy level for the
   same dataset.

   Disadvantages: -

   1)Decision tree performed the worst by giving predictions with accuracy of on
   42%.

   2)Dataset is limited, higher accuracy can be achieved with more flexible inputs
   with a larger dataset.

3) **Name of the Paper**: -Heart Disease Prediction using Hybrid machine Learning Model

Authors: - Dr. M. Kavitha, G. Gnaneswar, R. Dinesh, Y. Rohith Sai, R. Sai Suraj

Year: -26 February 2021

Advantages: -

1)Using the hybrid of decision tree and random forest accuracy of 88% was achieved.

2)Due to use of combination of algorithms the ML model is more flexible to

multiple different use cases.

Disadvantages: -

1) Hybrid algorithms of other classification algorithms are not used which may give better results.

2)Dataset is limited, higher accuracy can be achieved with more flexible inputs

with a larger dataset.

Intended Audience:

This document is dedicated to project developers, healthcare industries, doctors, patients, medical organisations, hospitals etc. It can also be beneficial for researchers in the field of machine learning.

Section 2.0

The overall Description:

1. Product perspective :-
   1. The software will be based on predicting heart disease by checking the symptoms of the patients.
   2. It might have happened so many times that you or someone yours need doctors help immediately, but they are not available due to some reason.
   3. The Heart Disease Prediction application is an end user support and online consultation project.
   4. Here, we propose a desktop application that allows users to get instant guidance on their heart disease through an intelligent system online.
   5. The application is fed with various details and the heart disease associated with those details.
   6. The application allows user to share their heart related issues.

7. It then processes user specific details to check for various illness that could be associated with it.
8. Here we use some intelligent techniques to guess the most accurate illness that could be associated with patient's details.
9. Based on result, system automatically shows the result specific doctors for further treatment.
10. The system allows user to view doctor's details.

11. The system can be use in case of emergency.

2.Product Modules :-

The system comprises of 2 major modules as follows:

❖ **Admin Module**

1.   Add Training Data

2.   Add Doctor Details

3.   View User Details

4.   View Feedback

5.   View Doc Details

6.   View Training Data

❖ **User Module**

1.   Register (With Details like Age, Sex, etc.)

2.   Check Heart (By providing Details like:-

   - o   Age in Year
   - o   Gender
   - o   Chest Pain Type
   - o   Fasting Blood Sugar
   - o   Resting Electrographic Results(Restecg)
   - o   Exercise Induced Angina(Exang)
   - o   The slope of the peak exercise ST segment
   - o   CA – Number of major vessels colored by fluoroscopy
   - o   Thal
   - o   Trest Blood Pressure
   - o   Serum Cholesterol
   - o   Maximum heart rate achieved(Thalach)
   - o   ST depression induced by exercise(Oldpeak)

3.   System will accordingly view Doctor to consult.

4.   Give Feedback

5.   View Doctor

❖ **User Classes and Characteristics**:

User A:

Signifies a novice system customer. This user has no prior experience about using of this system. User A will find the product easy to use due to simple explanatory interface of the GUI (Graphical User Interface). The User A will have to enter his/her credentials (login details) which are new to the system and that will be saved permanently to the system database.

User B:

An experienced customer. This user has a prior experience about using of this system. User B will find the product easy to use due to simple explanatory interface of the GUI (Graphical User Interface). The User B will have to enter his/her credentials (login details) if he/she wants or else it is already saved to the system.

Admin:

The admin is totally familiar with the functioning of the system. The administrative person is responsible for storing and organising the credentials of the user A and user B and specially to resolve the system bugs or errors if any.

❖ **Operating Environment**:

- Windows 10 OS.
- Active Internet Connection.
- Desktop.
- Python and its libraries (NumPy, Pandas, Matplotlib, scikitlearn)
- Tkinkter for GUI application.

❖ **Constraints**:

If the information given by the end user is incorrect i.e., if the values for the particular symptoms are entered incorrect i.e., out of consideration limit then it may create invalid result for the same case of the user.

Section 3.0

3.**External interface Requirements**

3.1 **Users Interface**: -

The user will have a desktop application on a pc. The user will have to input his personal details, data related to predict disease on the desktop app and the result will be also shown on this app too.

3.2 **Hardware Interfaces**: -

The user will need to have a desktop in order to access the application and a valid internet connection.

3.3 **Software Interfaces**: -

The support libraries will include NumPy, pandas, Matplotlib, Scikit-learn and the algorithms will be one of the following logistic regression, random forest, naive bayes and a desktop application for user interface.

3.4 **Communication Interfaces**: -

The user can communicate with the tech team if a problem arises in the application

or if he/she wants to provide suggestions in order to improve the application and if wrong credentials/inputs are provided the user will get a pop up that the credentials/input are wrong.

4. **System Features**: -

4.1 **Use cases**: -

4.1.1 **Login/ Sign up**: -

In this use case the user will provide his credentials in order to login by his username and by his password, the system verifies whether the username and password is stored in data base and if it matches or not, if it matches then it allows the user to use the system else it asks to enter the

user to sign up in the system.

4.1.2 **Input of data**: -

In this use case the user will provide the symptoms as parameters in the system and the system will take the inputs and it will provide results.

4.1.3 **Generate Result**: -

In this use case the system will provide the result to the user and a report if he/she is suffering from the heart disease or not.

4.2 **Stimulus/Response Sequences**: -

As soon as the user enter the parameters the input are stored in the database and the system will compare the data with the datasets in the system and then it will specify the result to the user.

4.3 **Functional Requirements**: -

The details of the functionalities are as follows: -

1.Master file maintenance.

2. Login/signup of user

3.Saving data from user.

4.Input of data from prediction.

5.Comparison of data with the datasets.

6.Calculation for prediction.

7.Revaluation

8. Revaluation Journal

9. Linkage with other modules

10. Issue Division

11.Personnel and Administration Division

12.Research and Statistical Division

13. General Reports

14.MIS/Time Series Reports

5. **Detailed non -functional requirements**: -

(i) Functionality: - At a particular time huge number of people can access the application.

(ii) Usability: The desktop user interface shall be Windows 95/98/2000 XP/Windows 7/ 7 Ultimate ,8,9,10,11.

(iii) Performance: The heart disease prediction system can support many customers at a time. The speed and accurate transaction decide the performance factor. The screen must be clearly visible to the user. The system must record the input of the symptoms.

(iv) Security: The login credentials of the user will have to be properly stored so that someone cannot hack the system and get their hands on login credentials and datasets.

(v) Scope: The scope of this project is to allow the user to get prediction of the heart disease he/she may have through the symptoms provided by the user.

5.1 Item evolution: -

In the future this system will be updated to allow user to predict other diseases rather than just heart diseases. Database access speed can be increased further.

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