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Heart Disease Prediction System

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Abstract

The main aim of our project is to predict Heart Diseases. In today, our life becomes busy, hectic, and stressful with lots of responsibilities at home and office. There was also a sea change in our living, food habits. All these are leading to less self care and thus getting exposed to innumerable health problems. The major health problem relating heart and its related diseases. We hear at young age, many are having heart stunts, by-pass surgeries etc., and Thus health care in specific heart, needs alarming attention. This domain needs the usage of several technologies at attack its various problems.

Our project aims to study, analyze and provide solutions to some of these problems. Here, we use data mining techniques to predict the heart diseases in existing system by using "weka" tool .The successful application of data mining is highly visible in fields like e-business, marketing and other sectors .Among these just discovering is Health care. We are adding new algorithm to predict the heart diseases.

Here, we want to predict Heart disease in patients . In these project , an attempt is made to develop a new algorithm for Classification/Prediction upon studying existing algorithm like Induction tree , Bayesian etc .We want to predict the results by using new algorithm with minimum cost.

Keywords: Neural Networks, Bayesian classification, Decision Tree.

1. Introduction

In recent decades, heart disease has been identified as the leading cause of death across the world. However, it is considered as the most preventable and controllable disease at the same time. According to World Health Organization (WHO), the early and timely diagnosis of heart disease plays a remarkable role in preventing its progress and reducing related treatment costs. Heart disease was the major cause of casualties in the different countries including India. Heart disease kills one person every 34 seconds in the United States. Considering the ever-increasing growth of heart disease induced fatalities, researchers have adopted different data mining techniques to diagnose it. Medical data mining has great potential for exploring the hidden patterns in the data sets of the medical domain. These patterns can be utilized for clinical diagnosis. However, the available raw medical data are widely distributed, heterogeneous in nature, and voluminous. These data need to be collected in an organized form. This collected data can be then integrated to form a hospital information system.

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Data mining technology provides a user-oriented approach to novel and hidden patterns in the data. The World Health Organization has estimated that 12 million deaths occurs worldwide, every year due to the Heart diseases. Half the deaths in the United States and other developed countries occur due to cardio vascular diseases. It is also the chief reason of analyzing the dataset. Tanagra tool is used to classify the data and the data is evaluated using 10-fold cross validation and the results are compared. Tanagra is a data mining suite build around graphical user interface algorithms. The main purpose of Tanagra project is to give researchers and students an easy-to-use data mining software, and allowing to analyze either real or synthetic data. Tanagra is powerful system that contains clustering, supervised learning, meta supervised learning, feature selection, data visualization supervised learning assessment, statistics, feature selection and construction algorithms. Decision Tree is a popular classifier which is simple and easy to implement. It requires no domain knowledge or parameter setting and can handle high dimensional data. The results obtained from Decision Trees are easier to read and interpret. The drill through feature to access detailed patients‟ profiles is only available in Decision Trees. Naïve Bayes is a statistical classifier which assumes no dependency between attributes. It attempts to maximize the posterior probability in determining the class.

2. System Analysis

Term system is derived from the Greek word ‘Systema’ which means an organized relationship among functioning units or components. A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective.

2.1 Existing System

Existing system is the algorithm by using data mining Techniques .We wants to develop existing system by using weka tool. Data mining is most useful in an exploratory analysis because of nontrivial information in large volumes of data.

- Data mining knowledge afford a user-oriented approach to new and concealed patterns in the data.
- The knowledge which is exposed can be used by the healthcare practitioners to get better quality of service and to reduce the extent of adverse medicine effect.
- Hospitals have to reduce the charge of medical tests. They can attain these consequences by employing suitable decision support systems.

2.2 Proposed System

- Developing a new algorithm for Heart Disease Prediction System.
- We are taking the input parameters like age ,gender ,BP ,Cholesterol and Sugar.
- The BP parameter is again divided into Systolic_BP and Diastolic_BP.
- Cholesterol is divided into LDL_Cholesterol and HDL_Cholesterol.
- Checking Heart Status by using these parameters and providing results.

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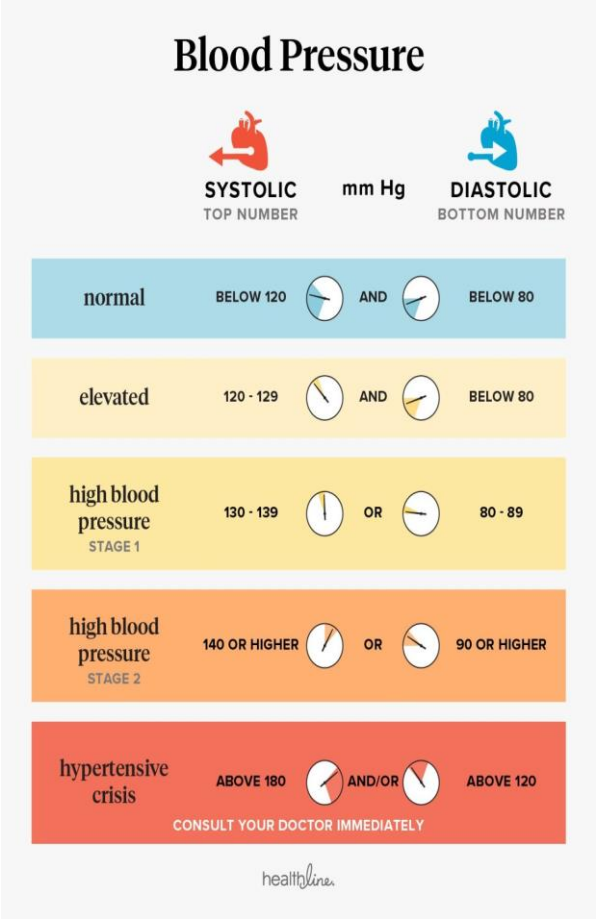

3. System Design

3.1 Architecture

A system architecture or systems architecture is the conceptual model that defines the structure, behaviour, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system.

3.2 Collaboration Diagram

Logical Model

Logical data models add further information to the conceptual model elements. It defines the structure of the data elements and set the relationships between them. The advantage of the Logical data model is to provide a foundation to form the base for the Physical model. However, the modeling structure remains generic. At this Data Modeling level, no primary or secondary key is defined. At this Data modeling level, you need to verify and adjust the connector details that were set earlier for relationships.

4. Development

Software development is the process of conceiving, specifying, designing, programming, documenting, testing, and bug fixing involved in creating and maintaining applications, frameworks, or other software components.

4.1 Existing System Screens using WEKA Tool

Here ,I have taken some patients data and converted to .arff file.

@relation Hdps_training_data

@attribute sno-real

@attribute age{20-39,40-59,>60}

@attribute gender{male,female}

@attribute systolic_BP{low,normal,elevated,high_BP_stage1,high_BP_stage2,high_BP_stage3}

@attribute diastolic_BP{low,normal,elevated,high_BP_stage1,high_BP_stage2,high_BP_stage3}

@attribute LDL_Cholesterol{optimum,good,boarderline_high,high,very_high}

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@attribute HDL_cholesterol{optimum,good,major_risk}

@attribute Sugar {normal,impaired_glucose,diabetic}

@attribute HT_flag{low,high}

@data %

1,20-39,female,low,optimum,good,major_risk,diabetic,low

2,40-59,male,high_BP_stage1,high_BP_stage1,high,major_risk,diabetic,high

3,>60,male,elevated,high_BP_stage2,very_high,major_risk,diabetic,high

4,20-39,male,high_BP_stage1,high_BP_stage1,optimum,good,normal,low

5,>60,female,high_BP_stage1,high_BP_stage1,high,major_risk,normal,high

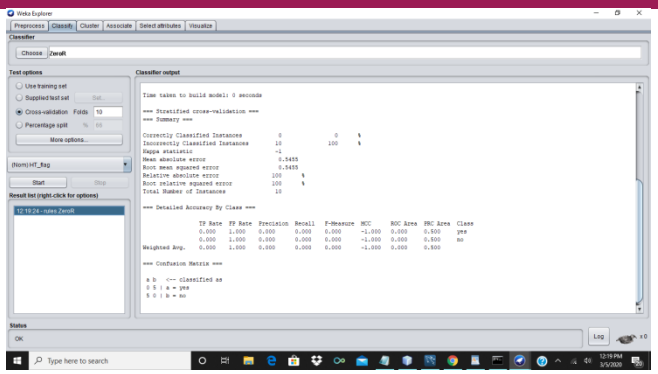
6,20-39,female,normal,normal,good,optimum,diabetic,low

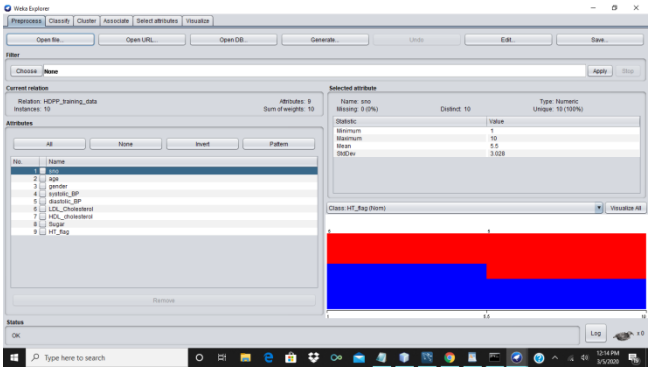
7,>60,male,high_BP_stage1,high_BP_stage1,good,good,diabetic,high

8,40-59,female,elevated,high_BP_stage1,optimum,optimum,normal,low%

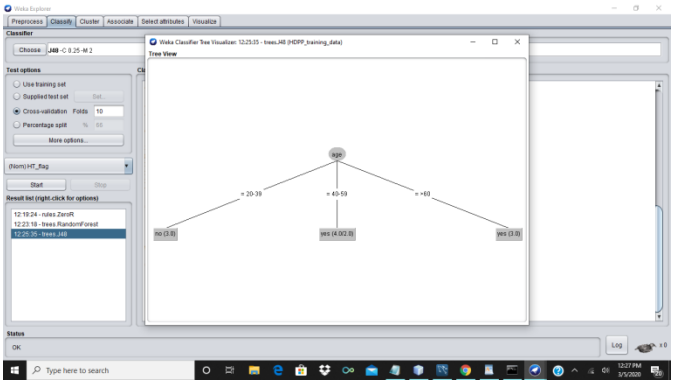
Below Screens shows some results of those data.

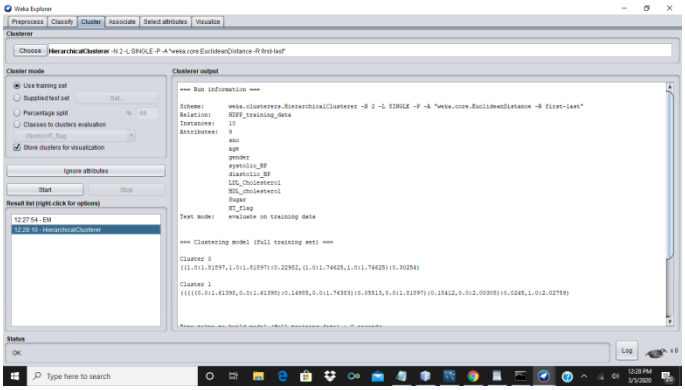
Screen 1: Pre-processing the data





Screen 2





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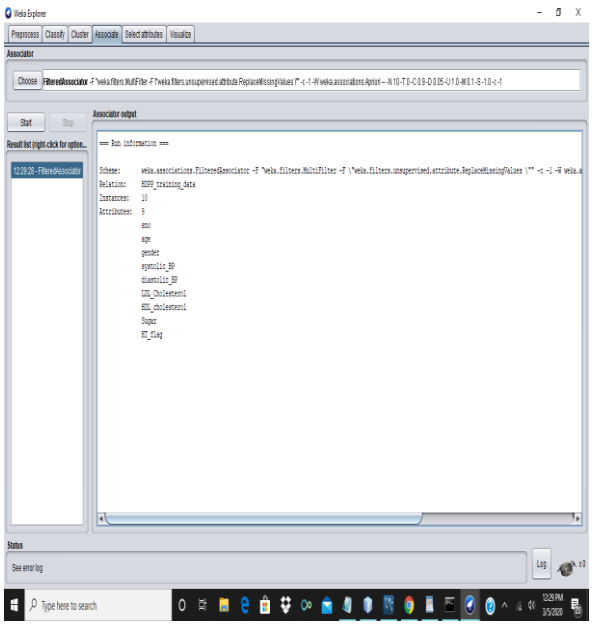
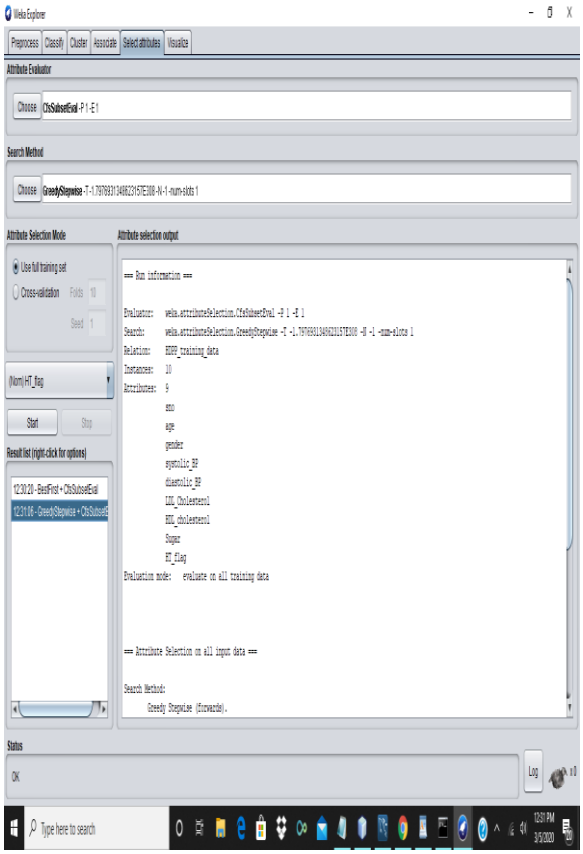
Screen 3: Classify data by using Hierarchal Cluster



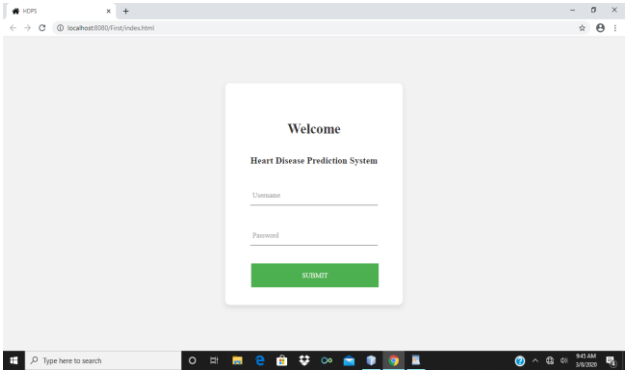
Screen 4: Associate output by using Filter Associater



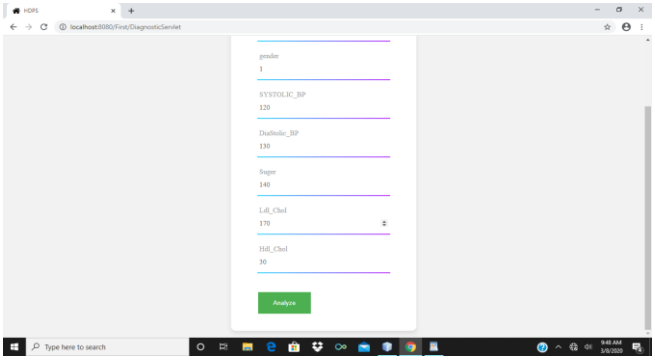
4.2 New Algorithm Screens

4.2.1 Input Screens

Screen 1: Login Screen For HDPS

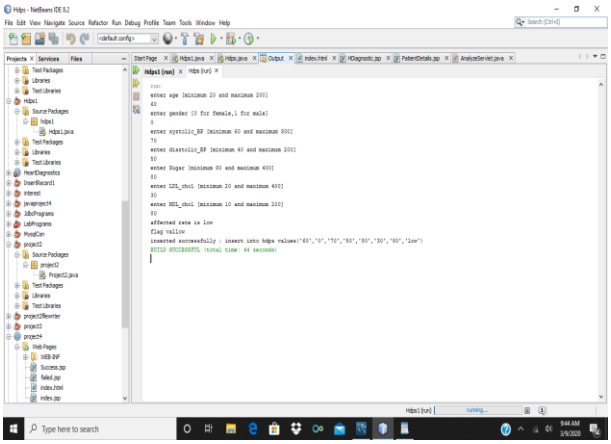


Screen 2: checking Heart Status



4.2.2 Output Screen

Screen 3: Result for HDPS JDBC Connection



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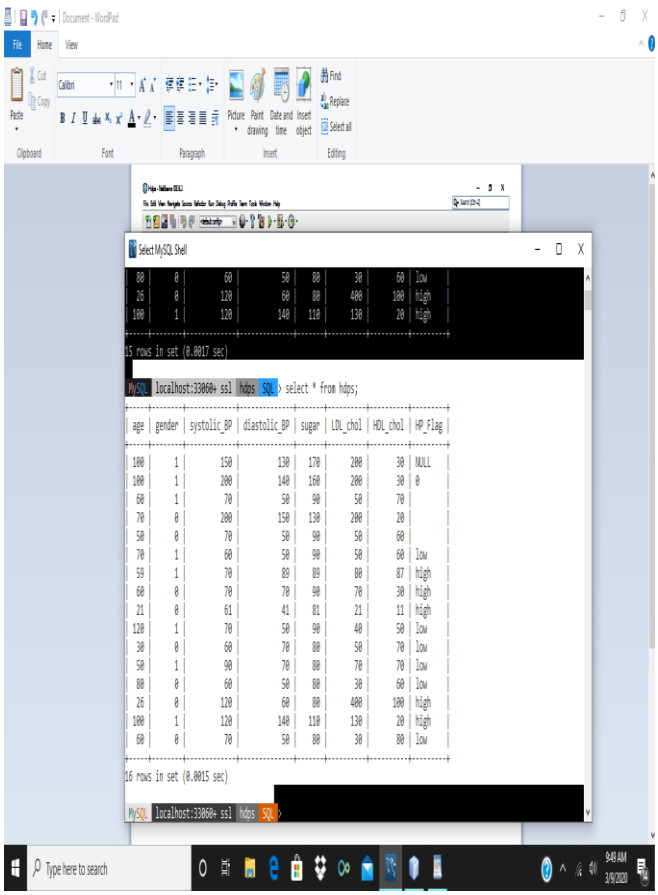
Screen 4: Insertion of HDPS data into Data Base.



4.3 Execution Sample Code

Sample code Containing Java, HTML , CSS, JS

HDPS Java Program

```
package hdps1;
import java.util.Scanner;
public class Hdps1 {
   public static void main(String[] args) {
      int
age=0,gender=0,systolic_BP=0,diastolic_BP=
0,sugar=0,LDL_chol=0,HDL_chol=0;
      char is_valid='n';
      while(is_valid=='n')
      {
      System.out.println("enter age [minimum
20 and maximum 200]");
      Scanner sc=new Scanner(System.in);
      age=sc.nextInt();
      if(age >= 20 && age <=120)
         is_valid='y';
      }
```

5. System Testing

System Testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. Usually, the software is only one element of a larger computer-based system. Ultimately, the software is interfaced with other software/hardware systems. System Testing is actually a series of different tests whose sole purpose is to exercise the full computer-based system.

5.1 Black Box Testing

- It is also called as Behavioral/Specification-Based/Input-Output Testing
- Black Box Testing is a software testing method in which testers evaluate the functionality of the software under test without looking at the internal code structure. This can be applied to every level of software testing such as Unit, Integration, System and Acceptance Testing.
- Testers create test scenario/case based on software requirements and specifications. So it is called Specification Based Testing.
- Tester performs testing only on the functional part of an application to make sure the behavior of the software

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is as expected. So it is called Behavioral Based Testing.

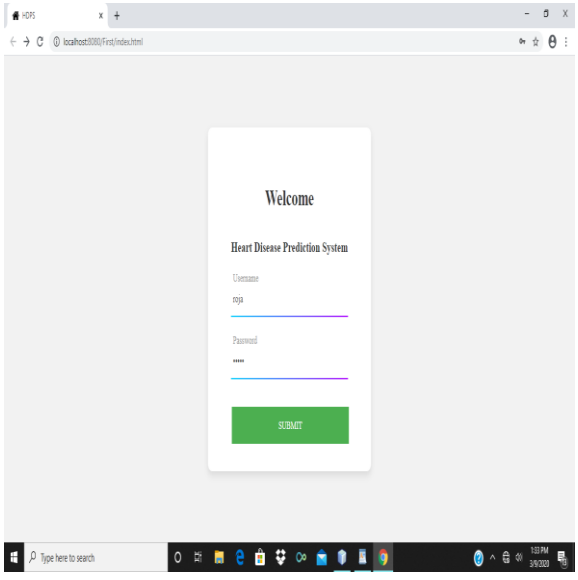
- The tester passes input data to make sure whether the actual output matches the expected output. So it is called Input-Output Testing.

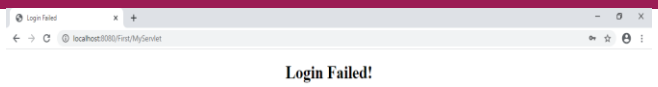
5.2 White Box Testing

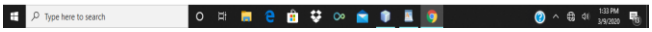
- It is also called as Glass Box, Clear Box, Structural Testing.
- White Box Testing is based on applications internal code structure. In white-box testing an internal perspective of the system, as well as programming skills, are used to design test cases. This testing usually done at the unit level.

5.3 HDPS Testing

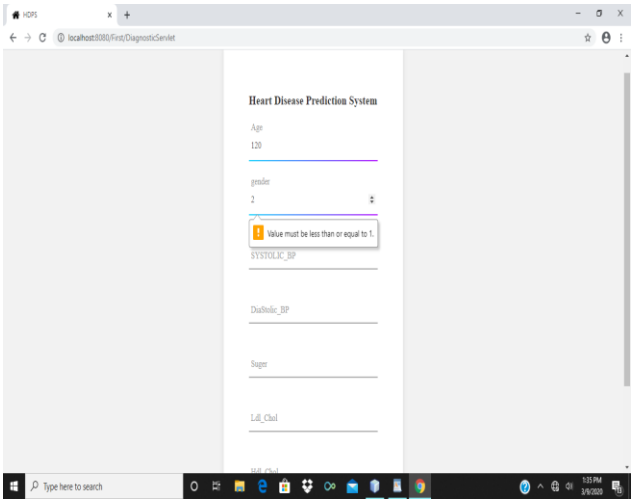
Test Case 1: Login Input Validation



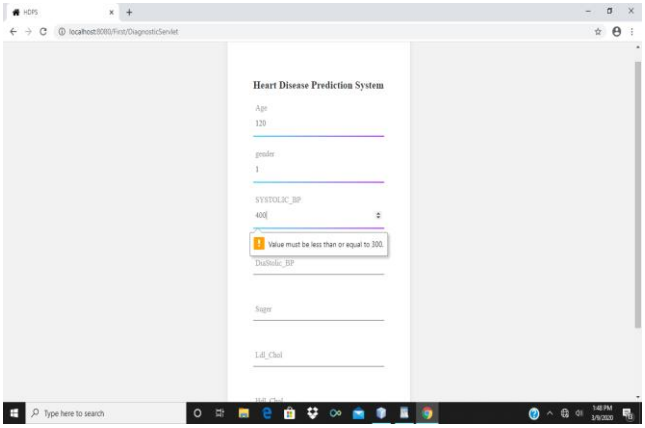




Test Case 2:



Test Case 3:



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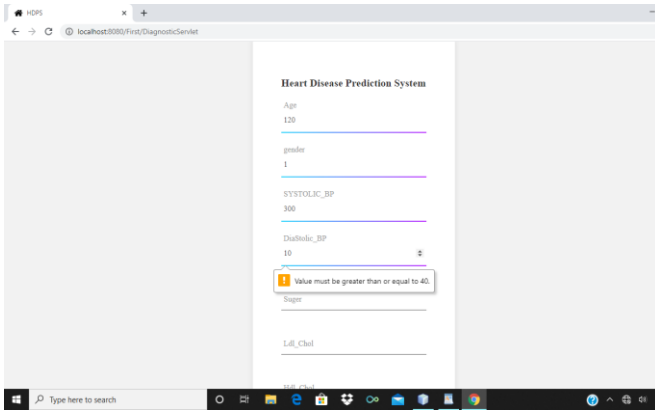
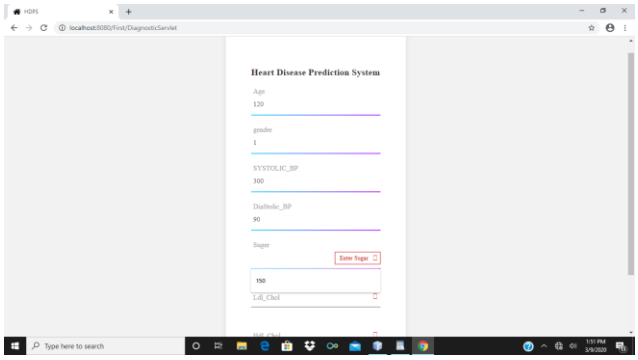
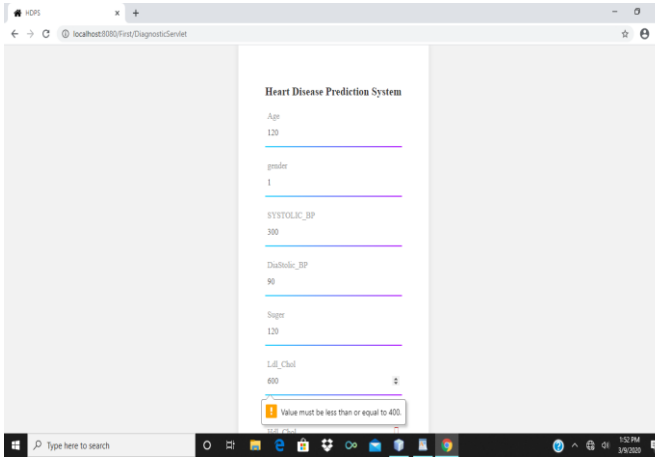
Test Case 4:



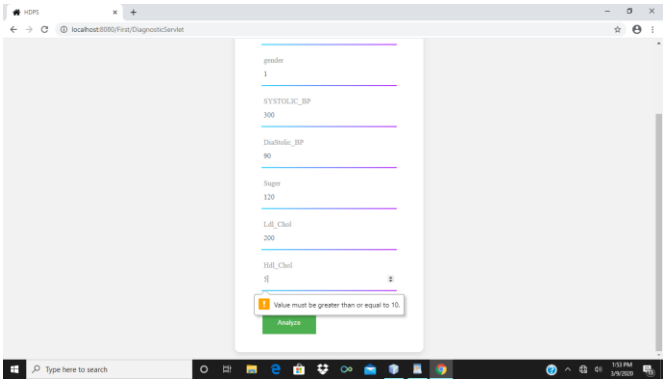
Test Case 5:



Test Case 6:



Test Case 7:



6. Implementation

Implementation simply means carrying out the activities described in our work plan. The **implementation phase** is where you and your **project** team actually do the **project** work to produce the deliverables. This **phase** is typically where approved changes are **implemented**. Most often, changes are identified by looking at performance and quality control data. Project implementation is an important phase as vendor's acceptance and paying the project fund takes place in this phase. Without implementation software has no value. The software implementation has some objectives and activities.

6.1 Objectives of the Implementation Phase:

The objectives of the implementation phase can be as follow:

- Putting the **action plan** into operation.
- Seeing the reality of working project.
- Achieving tangible change and improvements.
- Ensuring that new infrastructure, new institutions and new resources are sustainable in every aspect.

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6.2 Project Implementation Activities:

1) Project Implementation Starts with a Plan.
2) Form an operational team.
3) Involve all the Operations Team.
4) Prepare Training Materials.
5) Prepare user manual, operational Manual and Technical Manual.
6) Schedule Enough Time for Training.
7) Communicate, Communicate, And Communicate.
8) Prepare Operational Manual ,User Manual and Technical Manual

6.3 Hdps – Implementation:

As HDPS is presently a Prototype, we implemented it on couple of Hardware systems that includes both server and client components. We followed the following :

a) Installed Mysql, Java, Netbeans.
b) Created appropriate folders (bin, source,lib,doc etc.,)
c) Installed our application programs.
d) Run and checked output
e) Re-complied some programs for changed environment (user, password)

7. Conclusion

Heart Disease Prediction System was developed using a new algorithm from existing prediction algorithms. We have developed some results by using existing system WEKA tool. As, we don't know how algorithms are working in the existing system, we want to develop a new algorithm to predict Heart Disease. The algorithm is based on some important parameters like Age, gender, BP, Sugar and Cholesterol. The person who wants to know his Heart Status can enter these parameters and check his Heart Status. We store the patient data and results in our database of patients and use this database for future analysis. This system is mainly used to predict heart diseases at early stage. Here, I want to conclude that "Prevention is better than cure".

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