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.

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. 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.

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 compare these two algorithms and predict the results with minimum cost with some attributes.

1.1 Problem Statement

Heart disease can be managed effectively with a combination of lifestyle changes, medicine and, in some cases, surgery. With the right treatment, the symptoms of heart disease can be reduced and the functioning of the heart improved. The predicted results can be used to prevent and thus reduce cost for surgical treatment and other expensive. The overall of my work is to predict accurately with few tests and attributes the presence of heart disease. Attributes considered form the primary basis for tests and give accurate results more or less. Many more input attributes can be taken but our goal is to predict with few attributes and faster efficiency the risk of having heart disease. Decisions are often made based on doctors' intuition and experience rather than on the knowledge rich data hidden in the data set and databases. This practice leads to unwanted biases, errors and excessive medical costs which affects the quality of service provided to patients.

Data mining holds great potential for the healthcare industry to enable health systems to systematically use data and analytics to identify inefficiencies and best practices that improve care and reduce costs. According to (Wurz &Takala, 2006) the opportunities to improve care and reduce costs concurrently could apply to as much as 30% of overall healthcare spending. The successful application of data mining in highly visible fields like e-business, marketing and retail has led to its application in other industries and sectors. Among these sectors just discovering is healthcare. The healthcare environment is still "information rich" but "knowledge poor". There is a wealth of data available within the healthcare systems. However, there is a lack of effective analysis tools to discover hidden relationships and trends in the data for African genres.

I want to generate new algorithm, compare with existing algorithm and produce some results to predict Heart Diseases.

1.2 Objectives

Main Objective

The main objective of this research is to develop a heart prediction system. The system can discover and extract hidden knowledge associated with diseases from a historical heart data set Heart disease prediction system aims to exploit data mining techniques on medical data set to assist in the prediction of the heart diseases by using Weka tool and compare those results with new algorithm.

Specific Objectives

- Provides new approach to concealed patterns in the data.
- Helps to avoid Human biasness.
- To implement new algorithm for existing algorithm.
- Reduce the cost of medical tests.

1.3 Scope

Here the scope of the project is that integration of clinical decision support with computer-based patient records could reduce medical errors, enhance patient safety, decrease unwanted practice variation, and improve patient outcome. This suggestion is promising as data modeling and analysis tools, e.g., data mining, have the potential to generate a knowledge-rich environment which can help to significantly improve the quality of clinical decisions and generating new algorithms.

1.4 Limitations

Medical diagnosis is considered as a significant yet intricate task that needs to be carried out precisely and efficiently. The automation of the same would be highly beneficial. Clinical decisions are often made based on doctor’s intuition and experience rather than on the knowledge rich data hidden in the database. This practice leads to unwanted biases, errors and excessive medical costs which affects the quality of service provided to patients. Data mining have the potential to generate a knowledge-rich environment which can help to significantly improve the quality of clinical decisions.

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.

Keywords

Neural Networks, Bayesian classification, , Decision Tree.

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.
- Data mining techniques, namely, Decision Trees, Naïve Bayes and Neural Network. is implemented in using .NET platform . IHDPS is Web-based, user-friendly, scalable, reliable and expandable system. It can also answer complex “what if” queries which traditional decision support systems cannot. Using medical profiles such as age, sex, blood pressure and blood sugar it can predict the likelihood of patients getting a heart disease. It enables significant knowledge, e.g. patterns, relationships between medical factors related to heart disease. As a Data source a total weightage. The neural network is trained with the selected significant patterns for the effective prediction of heart attack. Multi-layer Perceptron Neural Network with Back-propagation is being used as the training algorithm. In feed-forward neural networks the neurons of the first layer forward their output to the neurons of the second layer, in a unidirectional fashion, which explains that the neurons are not

received from the reverse direction. A kind of feed forward neural network mechanism is the Multi-layer Perceptron Neural Networks (MLPNN) .

2.2 Disadvantages

- In existing system , we don’t know how the algorithms are working.
- In existing System ,practical use of various collected data is time consuming.

2.3 Proposed System

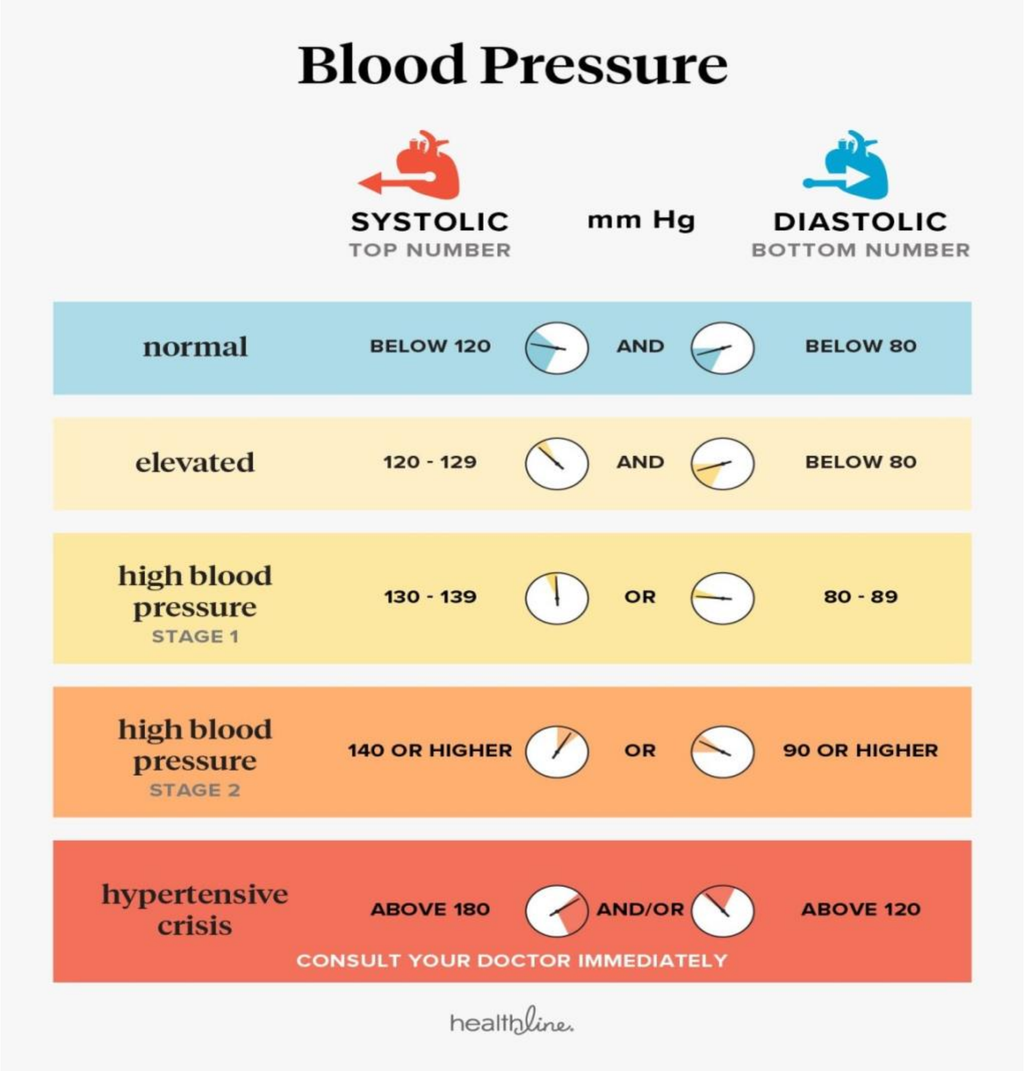
- Developing a new algorithm for Heart Disease Prediction System.
- We are taking the input parameters like age ,gender ,BP ,Cholesterol and Sugar.
- The BP parameter is again divided into Systolic_BP and Diastolic_BP.
- Cholesterol is divided into LDL_Cholesterol and HDL_Cholesterol.
- Checking Heart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

Systolic BP

- The pressure exerted by your blood flowing through your arteries is not constant but is dynamic, and constantly reflects what the heart is doing at a given moment.
- When the heart is actively beating (an event called “systole”), it is ejecting blood out into the arteries. This dynamic ejection of blood into the arteries causes the pressure within the arteries to rise. The peak blood
- pressure reached during active cardiac contraction is called the systolic blood pressure.

Diastolic BP

- The diastolic blood pressure is the pressure the blood exerts within the arteries in between heartbeats, that is, when the heart is not actively ejecting blood .



Blood Pressure

	SYSTOLIC TOP NUMBER	mm Hg	DIASTOLIC BOTTOM NUMBER
normal	BELOW 120	AND	BELOW 80
elevated	120 - 129	AND	BELOW 80
high blood pressure STAGE 1	130 - 139	OR	80 - 89
high blood pressure STAGE 2	140 OR HIGHER	OR	90 OR HIGHER
hypertensive crisis	ABOVE 180	AND/OR	ABOVE 120

CONSULT YOUR DOCTOR IMMEDIATELY

healthline.

LDL Cholesterol and HDL Cholesterol

LDL and HDL are the two main types of cholesterol (blood fats, or lipids) that make up your total cholesterol.

- HDL (high-density lipoproteins), or “good” cholesterol, may protect the body against narrowing blood vessels
- LDL (low-density lipoproteins), or “bad” cholesterol, may make arterial narrowing worse.

2.4 Advantages

- This System is used to predict the heart diseases at early stage.

- As, we are creating our own algorithm it can be understood easily.
- We can create our own database by using this system.

2.5 System Requirements

2.5.1 Functional Requirements

- Developing an algorithm for Classification/Prediction for Heart Disease**.**
- Predicting Class Label related to Heart Disease with existing algorithm.
- Predicting Class Label related to Heart Disease with new algorithm.
- Analyzing results of test data between existing and new algorithm.

2.5.2 Non Functional Requirements

- Will be provided login to authorize the users in the system.
- Data Backup will be implemented using SQL Scripts.

2.5.3 Software Requirements

1. Operating System	:	Windows
2. Database	:	MySql
3. Server	:	Glassfish Server
4. Languages	:	Java html,css,JavaScript

2.5.4 Hardware Requirements

The minimum hardware requirement specifications for developing this project are:

Processor	:	Standard processor with speed of 1.6GHz
RAM	:	256 MB RAM or higher
Hard disk	:	20GB or more
Monitor	:	Standard color monitor

Keyboard	:	Standard keyboard
Mouse	:	Standard mouse

2.6 Language Specification

- MySQL used for both small and large applications.
- MySQL is a relational database management system *(RDBMS).*
- MySQL is fast, reliable, and flexible and easy to use.
- MySQL supports standard SQL *(Structured Query Language).*
- MySQL is free to download and use.
- MySQL was developed by Michael Widenius and David Axmark in 1994.
- MySQL is presently developed, distributed, and supported by Oracle Corporation.
- MySQL Written in C, C++.
- MySQL server design is multi-layered with independent modules.
- MySQL is fully multithreaded by using kernel threads. It can handle multiple CPUs if they are available.
- MySQL provides transactional and non-transactional storage engines.
- MySQL has a high-speed thread-based memory allocation system.
- MySQL supports in-memory heap table.
- MySQL Handles large databases.
- MySQL Server works in client/server or embedded systems.
- MySQL Works on many different platforms.

2.6.1 Main Features of MySQL:

- MySQL server design is multi-layered with independent modules.
- MySQL is fully multithreaded by using kernel threads. It can handle multiple CPUs if they are available.
- MySQL provides transactional and non-transactional storage engines.
- MySQL has a high-speed thread-based memory allocation system.
- MySQL supports in-memory heap table.
- MySQL Handles large databases.

- MySQL Server works in client/server or embedded systems.
- MySQL Works on many different platforms.

2.6.2 Java

Java is a programming language first released by sun microsystems in 1995. Nowadays few websites made on Java but mostly made on frameworks. But Java is speedy, secure and reliable. Java needs in every laptop, cellphones, game applications and more.

The Java latest version contains significant enhancement to develop performance, constancy, and safety of java applications which helps sprint on your machine. The Java runtime environments what you got when you downloaded Java software.

The JRE consists of java virtual machine, Java stage core classes and sustaining Java platform libraries. The JRE is the runtime section of Java software, which is all you need to run it on your web browser.

2.6.2.1 Importance of Java

Java is Mature and Keeps Evolving

Java is one of the natural world and stable programming language. But Oracle Corporation often updates the programming language with the help of a vibrant society. Each latest edition of java comes with several new features and improved performance. For example, the latest version of Java supports both practical and concurrent programming.

Platform Independent

Nowadays, programmers have to write down applications by target many procedure and platform. This allows programmers to write down the application code once and deploy the appliance code address many platforms without any extra effort. The programmers can compile the java code into byte code and use that byte code address to many platforms without collect the system again.

The syntax regulations of java on the syntax of C and C++. Hence, the beginners find it easier to study and use java within a shorter amount of time. At the same time, java is a concurrent, class-based and object-oriented programming language.

Java is a Simplify Development of Real-Time Software

The popularity rate of real-time software has been growing. It is important for sending information or outcome within the less period. At present, real-time software applications are being used by mobile devices, automobiles, medical devices, and factories.

Java is to Facilitates Embedded Computing

Java planned for embedded programming. But many developers choose C and python over java which increases embedded applications for the systems with constraints memory. They now have to decide to take benefit of the Java 'I' stage to standard runtime atmosphere for build a variety of embedded application.

Supports Internet of Things

Java is one of the programming languages that support internet things. The project Jigsaw desire to create the programming language run in a broader variety of little and portable devices. But, the scheme still aims to preserve Java's networking scalability maintainability, safety, performance, and other features. While making it run on slighter and newer devices.

Simplify the improvement of Custom Big Data Solutions

At current, big data is one of the newest trends in appliance development. Many companies want the custom application to store, access, collect and divide a vast amount of planned and unstructured data . Java does not come with built-in features to make accessible the improvement of custom big data solutions.

Curtails Project Overheads

Java developed by Sun Microsystems and was so acquired by Oracle Corporation. Before the achievement, Sun Microsystems made a vast percentage of java implementations existing. Below the GNU General Community license. This license enables both individuals and enterprise to run divide and change the correct java execution without paying any fees.

Loads of IDEs, Libraries Frameworks and Development Tools

The developers also have the choice to avail a selection of libraries, frameworks, IDEs and improvement tools for Java. They can take benefit of robust IDEs like Net beans and Eclipse to write down comprehensible and quality Java code. They can even benefit the superior debugging capability and code finishing point features provide by the IDEs to plan the Java core maintainable.

Java is a rich Set of API

Java beats other programming languages in the class of moneyed application programming interface. The programmers have the choice to use a variety of Java APIs to achieve everyday improvement tasks exclusive of writing extra code. Some of these APIs shared by the big enterprise, while members of the society upload others.

Google recommend for Android App growth

While building mobile apps, no developers are able to ignore. The programmers have to write android apps in C, C++ or Java. But Google recommends mobile app developers to write down Android apps in Java.

2.6.2.2 Applications

1. Desktop Applications such as acrobat reader, media player, antivirus, etc.
2. Web Applications such as irctc.co.in, javatpoint.com, etc.
3. Enterprise Applications such as banking applications.
4. Mobile
5. Embedded System
6. Smart Card
7. Robotics
8. Games, etc.

2.6.2.3 Features of Java

Object Oriented

In Java, everything is an Object. Java can be easily extended since it is based on the Object model.

Platform Independent

Unlike many other programming languages including C and C++, when Java is compiled, it is not compiled into platform specific machine, rather into platform-independent byte code. This byte code is distributed over the web and interpreted by the Virtual Machine (JVM) on whichever platform it is being run on.

Simple

Java is designed to be easy to learn. If you understand the basic concept of OOP Java, it would be easy to master.

Secure

With Java's secure feature it enables to develop virus-free, tamper-free systems. Authentication techniques are based on public-key encryption.

Architecture Neutral

Java compiler generates an architecture-neutral object file format, which makes the compiled code executable on many processors, with the presence of Java runtime system.

Portable

Being architecture-neutral and having no implementation dependent aspects of the specification makes Java portable. The compiler in Java is written in ANSI C with a clean portability boundary, which is a POSIX subset.

Robust

Java makes an effort to eliminate error-prone situations by emphasizing mainly on compile time error checking and runtime checking.

Multithreaded

With Java's multithreaded feature it is possible to write programs that can perform many tasks simultaneously. This design feature allows the developers to construct interactive applications that can run smoothly.

Interpreted

Java byte code is translated on the fly to native machine instructions and is not stored anywhere. The development process is more rapid and analytical since the linking is an incremental and light-weight process.

High Performance

With the use of Just-In-Time compilers, Java enables high performance.

Distributed

Java is designed for the distributed environment of the internet.

Dynamic

Java is considered to be more dynamic than C or C++ since it is designed to adapt to an evolving environment. Java programs can carry an extensive amount of run-time information that can be used to verify and resolve accesses to objects at run-time.

2.6.3 Java Virtual Machine

JVM(Java Virtual Machine) acts as a run-time engine to run Java applications. JVM is the one that actually calls the main method present in a java code. JVM is a part of JRE(Java Runtime Environment).

Java applications are called Write Once Run Anywhere. This means a programmer can develop Java code on one system and can expect it to run on any other Java enabled system without any adjustment. This is all possible because of JVM.

When we compile .java file class files(contains byte-code) with the same class names present in .java file are generated by the Java compiler. This .class file goes into various steps when we run it. These steps together describe the whole JVM.

2.6.4 Java Script

JavaScript is a light-weight object-oriented programming language which is used by several websites for scripting the web pages. It is an interpreted, full-fledged programming language that enables dynamic interactivity on websites when applied to an HTML document. It was introduced in the year 1995 for adding programs to the web pages in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide several forms of interactivity and simplicity.

Although, JavaScript has no connectivity with Java programming language. The name was suggested and provided in the times when Java was gaining popularity in the market. In addition to web browsers, databases such as Couch DB and Mongo DB uses JavaScript as their scripting and query language.

There are following features of JavaScript:

- All popular web browsers support JavaScript as they provide built-in execution environments.
- JavaScript follows the syntax and structure of the C programming language. Thus, it is a structured programming language.
- JavaScript is a weakly typed language, where certain types are implicitly cast (depending on the operation).
- JavaScript is an object-oriented programming language that uses prototypes rather than using classes for inheritance.
- It is a light-weighted and interpreted language.
- It is a case-sensitive language.
- JavaScript is supportable in several operating systems including, Windows, mac OS, etc.
- It provides good control to the users over the web browsers.
- JavaScript is weakly typed language and have more relaxed syntax and rules.
- JavaScript code run on browser only as JavaScript is developed for browser only.
- JavaScript file has file extension and it is interpreted but not compiled ,every browser has the JavaScript interpreter to execute JS code.
- JavaScript requires less memory therefore it is used in web pages.
- JavaScript has event based approach to concurrency.
- JavaScript is an object based scripting language.

2.6.5 Hypertext Mark up Language

Hypertext Mark up Language is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets(CSS) and scripting languages such as JavaScript.

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags, written using angle brackets, directly introduce content into the page. Other tags surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags, but use them to interpret the content of the page.

HTML can embed programs written in a scripting language such as JavaScript, which affects the behavior and content of web pages. Inclusion of CSS defines the look and layout of content. The World Wide Web Consortium (W3C), former maintainer of the HTML and current maintainer of the CSS standards, has encouraged the use of CSS over explicit presentational HTML since 1997.

2.6.5.1 Basic HTML Tags

Line Break Tag

Whenever you use the <br /> element, anything following it starts from the next line. This tag is an example of an empty element, where you do not need opening and closing tags, as there is nothing to go in between them.

The <br /> tag has a space between the characters br and the forward slash. If you omit this space, older browsers will have trouble rendering the line break, while if you miss the forward slash character and just use <br> it is not valid in XHTML.

Paragraph Tag

The **<p>** tag offers a way to structure your text into different paragraphs. Each paragraph of text should go in between an opening <p> and a closing </p>.

Horizontal Lines

Horizontal lines are used to visually break-up sections of a document. The <hr> tag creates a line from the current position in the document to the right margin and breaks the line accordingly.

Preserve Formatting

Sometimes, you want your text to follow the exact format of how it is written in the HTML document. In these cases, you can use the preformatted tag <pre>.

Any text between the opening <pre> tag and the closing </pre> tag will preserve the formatting of the source document.

2.6.5.2 Advantages of HTML

- HTML is very easy to learn and understand. For the one who is learning web development, HTML is the first and foremost language that the person will go through. It has simple tags and there is no hectic of case sensitivity in HTML. It simply has some tags that serve a specific purpose and that's it. One can easily understand other's code and can make changes in it if required as there is not a lot more to understand in it. Moreover, it does not throw any error or create any problem like other programming languages if the developer forgets to close the tags or make some mistakes in code.

- One of the biggest advantages of HTML is that it is free of cost and there is no need to purchase specific software. One should not have to deal with different plugins required to work on any software as HTML does not require any plugins. So it is very cost effective as per business perspective as there is no cost of purchasing the license if the whole website is developed in HTML language.

- Almost all the browsers around the globe are supported by HTML. So there is no need to worry about the website written in HTML for the browser support as the website would easily show up in all the browsers if the program keeps in mind to optimize the website for the different browsers. HTML provides an easy way to optimize the website in HTML according to browsers to the web developers.

- HTML is one of the most friendly search engines in comparison to all the programming languages available in the market (Search Engine friendly means delivering users quality websites with relevant information when searched for a particular one). It is quite easier to create SEO compliant websites using HTML than other programming languages. HTML websites are easier to read and accessed by web crawlers and hence reduces parsing time and the page load time of the website hence improving its performance.

- Lets us Move to the next Advantages of HTML.

- HTML is very easy to edit as there is no need to have a special interface or platform to edit it. It is written in simple Notepad and hence can be simply edited in any text editor like Notepad, Notepad++, etc.

- HTML can be easily integrated with multiple languages and does not create any issues in it. For example in Javascript, Php, node.js, CSS and many more, we write the code of these languages between the HTML and it mixes with them very easily.

- HTML is lightweight language. It has a high signal to noise ratio as compared to other forms of communication. It is also faster to download HTML code, which means it is highly compressive also.

- For the programmer to be either frontend or backend developer, one must have knowledge of HTML as it is the basic language and all the other languages integrate with it while coding like JavaScript, JSP, Php, etc. Similarly, XML syntax is just like HTML and XML which is used widely these days for data storage. If one has good knowledge of HTML, it is easy working with XML too for him.

- One of the biggest advantages of HTML is that one can see the changes instantly just by saving it and reload the previous HTML page. Unlike other programming languages, there is no need to run the whole code and finding out where the error is. For example, if you have made the word italic it will show up instantly on the page once saved and reload.

- HTML is a user-friendly programming language. One does not need to have any prior knowledge of any language. Understanding of simple English is sufficient to work with it.

2.6.6 CSS

- CSS stands for Cascading Style Sheets
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media
- CSS saves a lot of work. It can control the layout of multiple web pages all at once

- External stylesheets are stored in CSS files
- CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, and reduce complexity and repetition in the structural content.
- Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

Syntax

CSS has a simple syntax and uses a number of English keywords to specify the names of various style properties.

A style sheet consists of a list of *rules*. Each rule or rule-set consists of one or more selectors and a declaration block.

Selector

In CSS, sectors declare which part of the markup a style applies to by matching tags and attributes in the markup itself.

Selectors may apply to the following:

- all elements of a specific type, e.g. the second-level headers h2
- elements specified by attribute, in particular:
- id: an identifier unique within the document
- class: an identifier that can annotate multiple elements in a document
- elements depending on how they are placed relative to others in the document tree.

2.6.7 Glassfish Server

Glassfish Server Glassfish is an open-source application server project started by Sun Microsystems for the Java EE platform, then sponsored by Oracle Corporation, and now living at the Eclipse Foundation and supported by Payara, Oracle and Red Hat. The supported version under Oracle was called Oracle Glassfish Server. Glassfish is free software and was initially dual-licensed under two free software licences: the Common Development and Distribution License (CDDL) and the GNU General Public License (GPL) with the class path exception. After having been transferred to Eclipse, Glassfish remained dual-licensed, but the CCDL license was replaced by the Eclipse Public License (EPL).

Glassfish is the reference implementation of Java EE and as such supports Enterprise JavaBeans, JPA, Java Server Faces, JMS, RMI, Java Server Pages, Servlets, etc. This allows developers to create enterprise applications that are portable and scalable, and that integrate with legacy technologies. Optional components can also be installed for additional services.

Built on a modular kernel powered by OSGi, Glassfish runs straight on top of the Apache Felix implementation. It also runs with Equinox OSGi or Knopflerfish OSGi runtimes. HK2 abstracts the OSGi module system to provide components, which can also be viewed as services. Such services can be discovered and injected at runtime.

Glassfish is based on source code released by Sun and Oracle Corporation's Top Link persistence system. It uses a derivative of Apache Tomcat as the servlet container for serving Web content, with an added component called Grizzly which uses Java New I/O (NIO) for scalability and speed.

Sun Microsystems launched the Glassfish project on 6 June 2005. On 4 May 2006, Project Glassfish released the 1.0 version (a.k.a. Sun Java System Application Server 9.0) that supports the Java EE 5 specification.

2.6.8 WEKA Tool

To install WEKA on your machine, visit WEKA’s official website and download the installation file. WEKA supports installation on Windows, Mac OS X and Linux. You just need to follow the instructions on this page to install WEKA for your OS.

The steps for installing on Mac are as follows −

- Download the Mac installation file.
- Double click on the download WEKA 3.9.

The GUI Chooser application allows you to run five different types of applications as listed here −

- Explorer
- Experimenter
- Knowledge Flow
- Workbench
- Simple CLI

In this chapter, let us look into various functionalities that the explorer provides for working with big data. On the top, you will see several tabs as listed here −

Preprocess

Classify

Cluster

Associate

Select Attributes

Visualize

Under these tabs, there are several pre-implemented machine learning algorithms. Let us look into each of them in detail now.

Preprocess Tab

Initially as you open the explorer, only the preprocess tab is enabled. The first step in machine learning is to preprocess the data. Thus, in the Preprocess option, you will select the data file, process it and make it fit for applying the various machine learning algorithms.

Classify Tab

The Classify tab provides you several machine learning algorithms for the classification of your data. To list a few, you may apply algorithms such as Linear Regression, Logistic Regression, Support Vector Machines, Decision Trees, Random Tree, Random Forest, Naïve Bayes, and so on. The list is very exhaustive and provides both supervised and unsupervised machine learning algorithms.

Cluster Tab

Under the Cluster tab, there are several clustering algorithms provided - such as Simple K-Means, Filtered Cluster, Hierarchical Cluster, and so on.

Associate Tab

Under the Associate tab, you would find Apriori, Filtered Associator and FP Growth.

Select Attributes Tab

Select Attributes allows you feature selections based on several algorithms such as Classifier Subset Eval, Principle Components, etc.

Visualize Tab

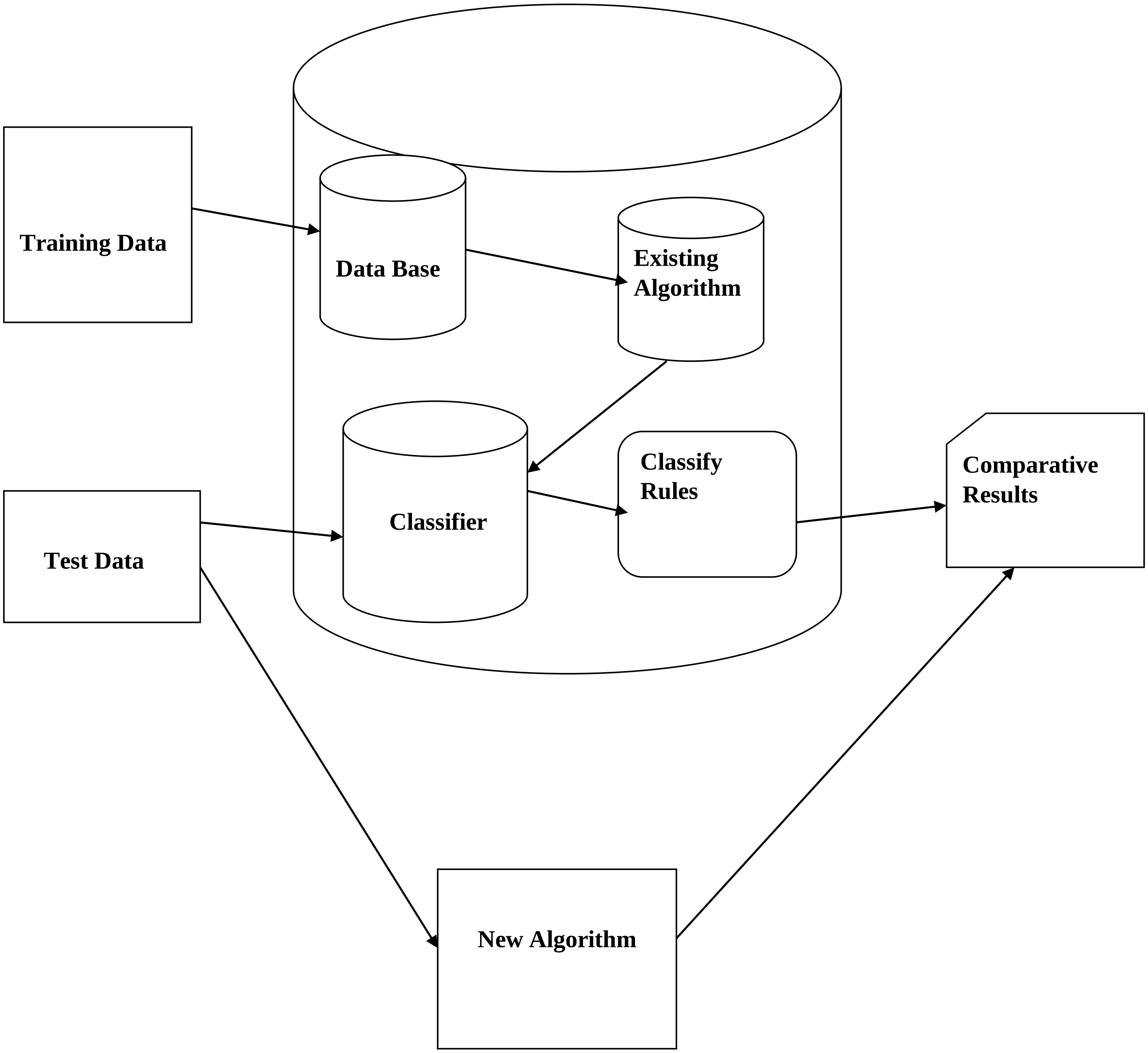
Lastly, the Visualize option allows you to visualize your processed data for analysis.

As you noticed, WEKA provides several ready-to-use algorithms for testing and building your machine learning applications. To use WEKA effectively, you must have a sound knowledge of these algorithms, how they work, which one to choose under what circumstances, what to look for in their processed output, and so on. In short, you must have a solid foundation in machine learning to use WEKA effectively in building your apps.

3. SYSTEM DESIGN

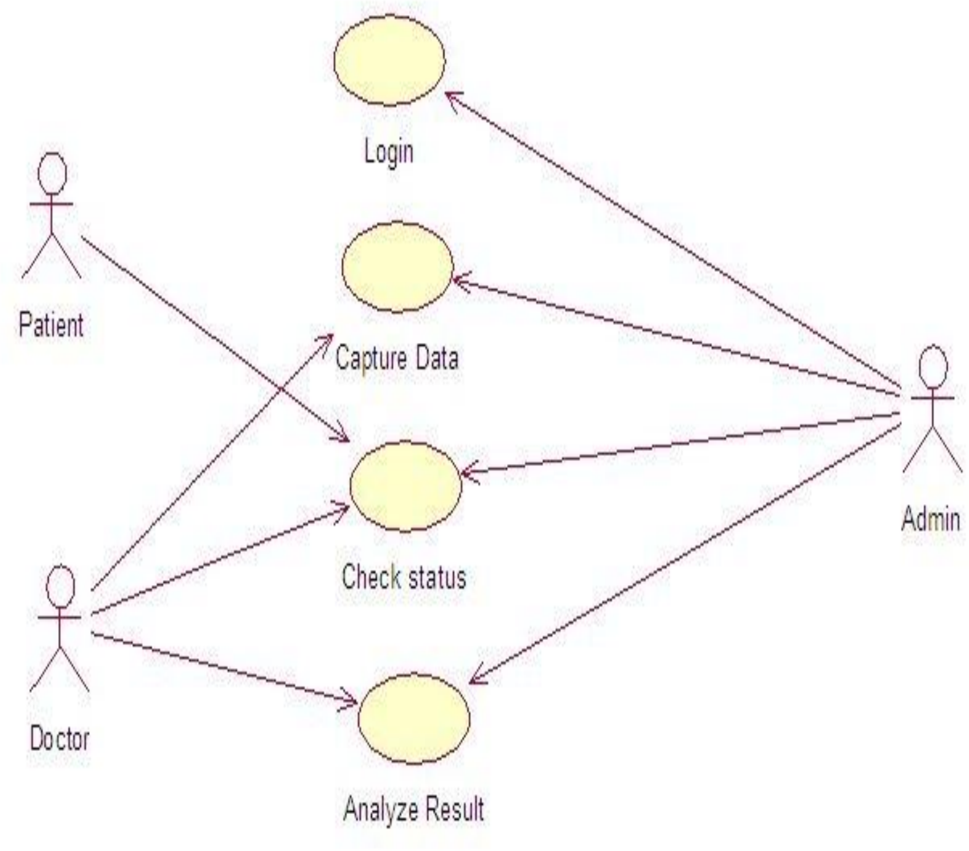
3.1 Architecture

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.

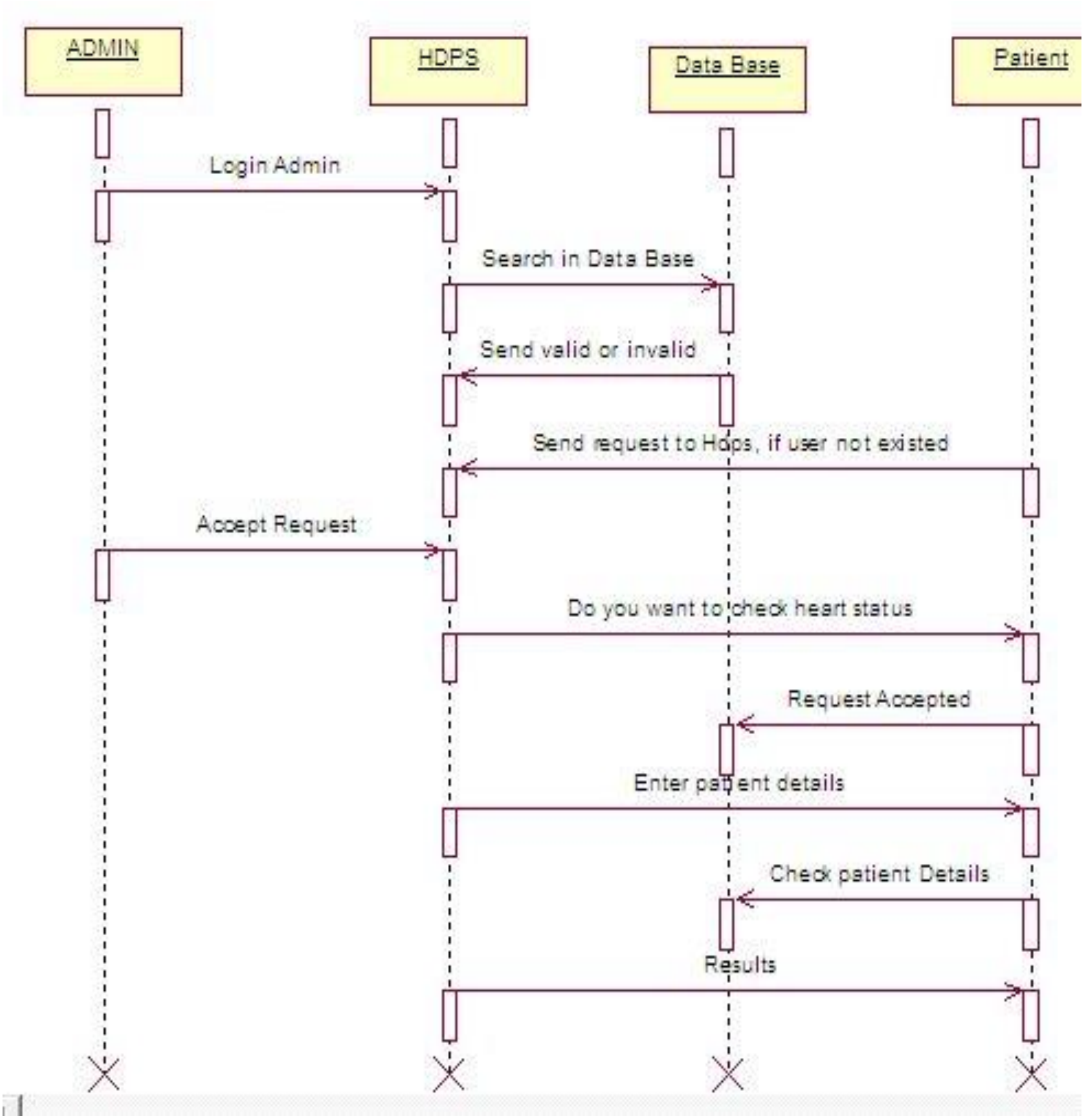


3.2 UML Diagrams

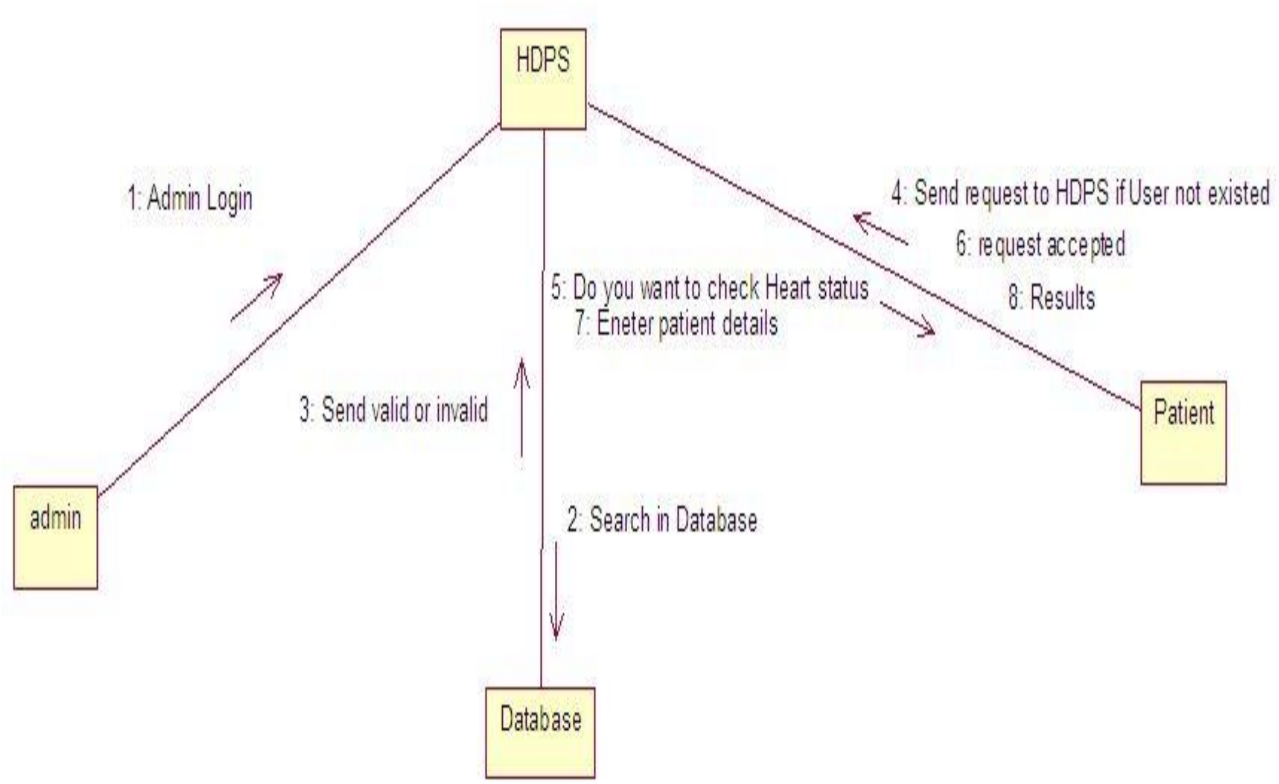
3.2.1 Use Case Diagram



3.2.2 Sequence Diagram



3.2.3 Collaboration Diagram

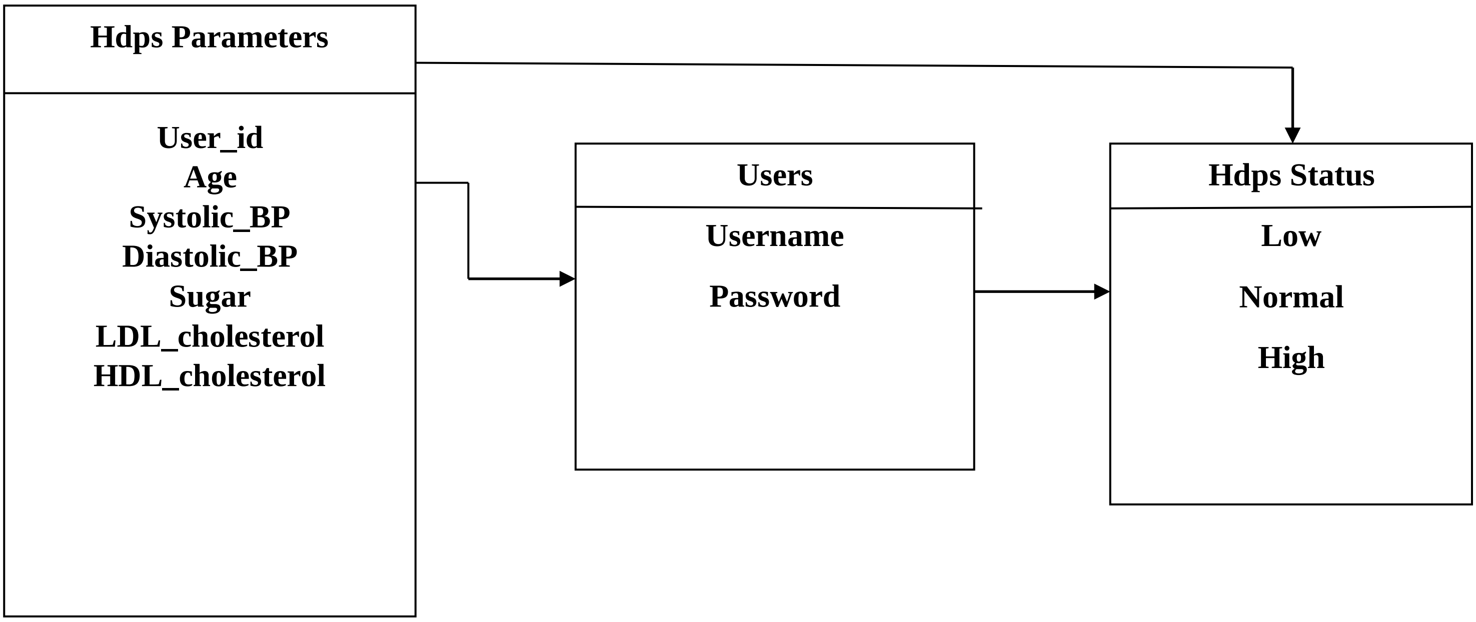


3.3 Logical Model

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.

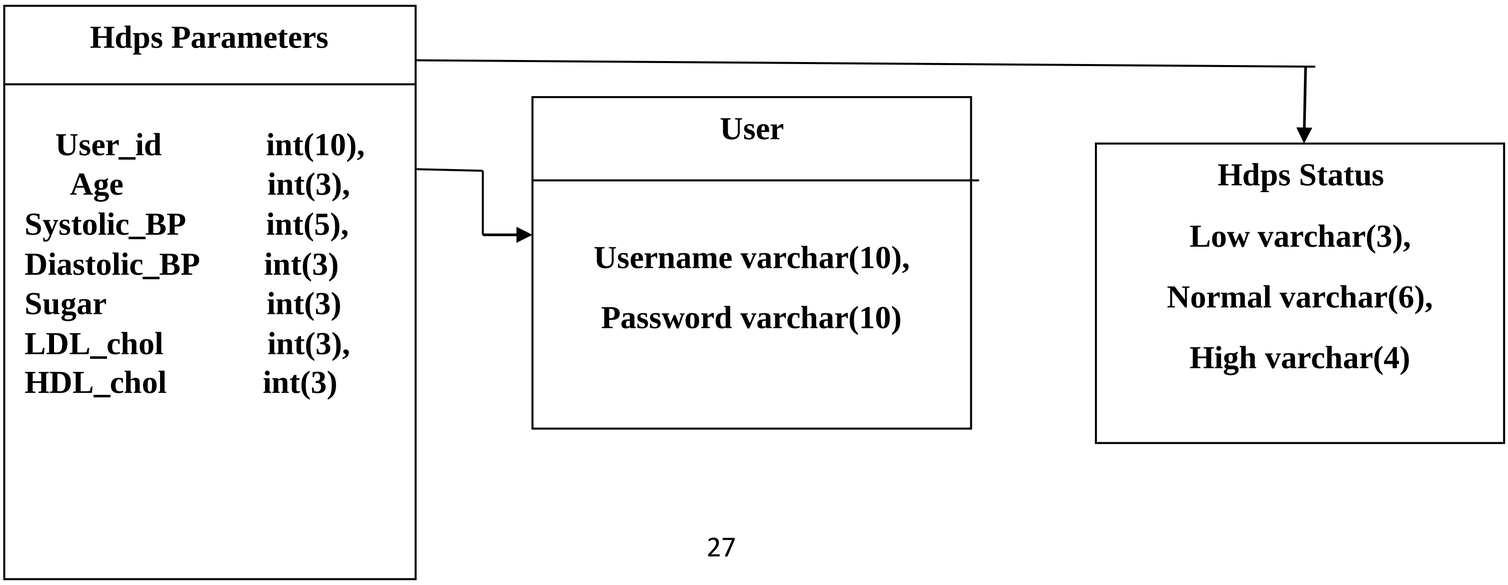
At this Data Modeling level, no primary or secondary key is defined. At this Data modeling level, you need to verify and adjust the connector details that were set earlier for relationships.



3.4 Physical Model

A Physical Data Model describes the database specific implementation of the data model. It offers an abstraction of the database and helps generate schema. This is because of the richness of meta-data offered by a Physical Data Model.

This type of Data model also helps to visualize database structure. It helps to model database columns keys, constraints, indexes, triggers, and other RDBMS features.



4. DEVELOPMENT

4.0 Introduction

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}
@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

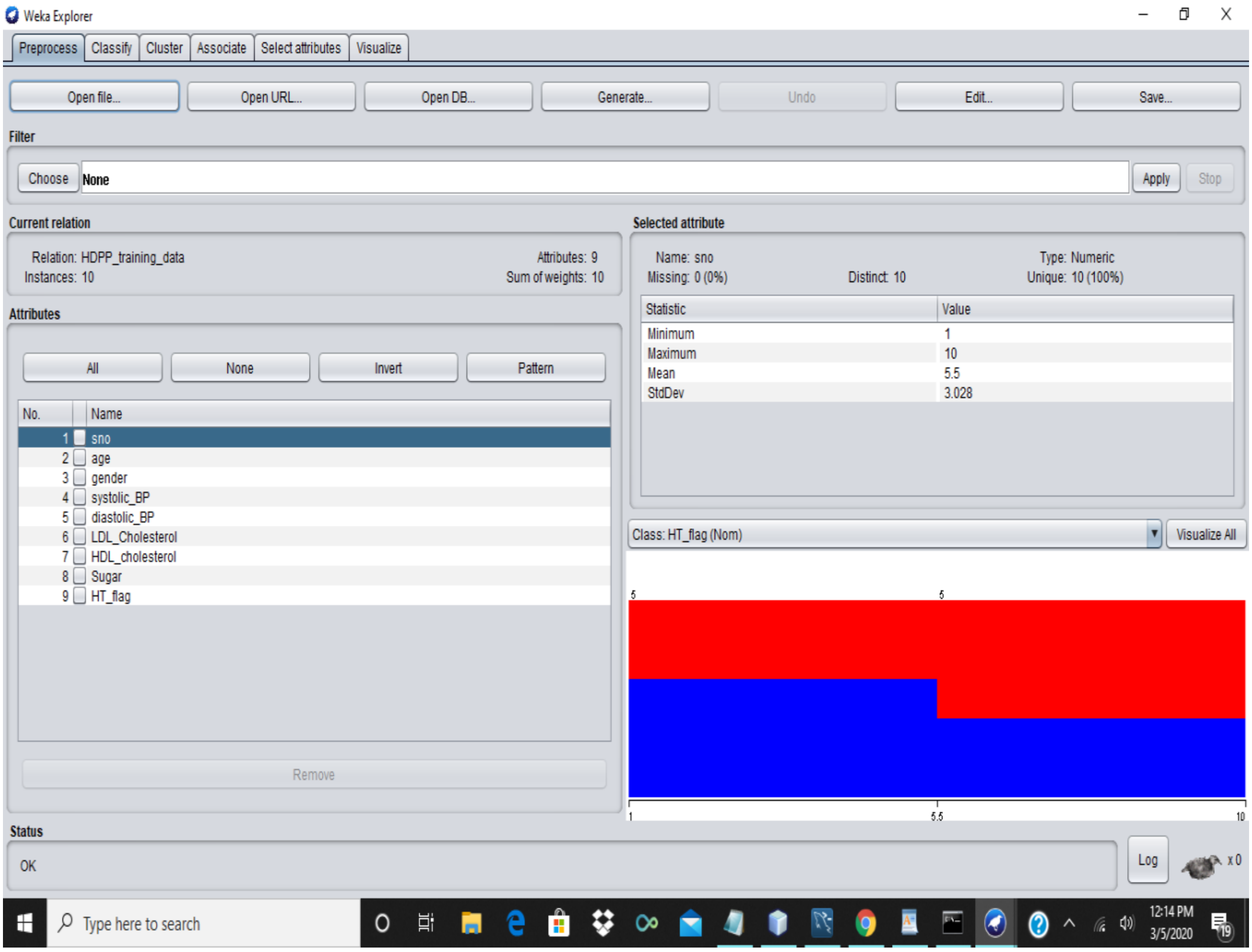
7,>60,male,high_BP_stage1,high_BP_stage1,good,good,diabetic,high

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

%

Below Screens shows some results of those data.

Screen 1:Preprocessing the data



Filter: None

Current relation

Relation: HDPP_training_data
Instances: 10
Attributes: 9
Sum of weights: 10

Attributes

No.	Name
1	sno
2	age
3	gender
4	systolic_BP
5	diastolic_BP
6	LDL_Cholesterol
7	HDL_cholesterol
8	Sugar
9	HT_flag

Selected attribute

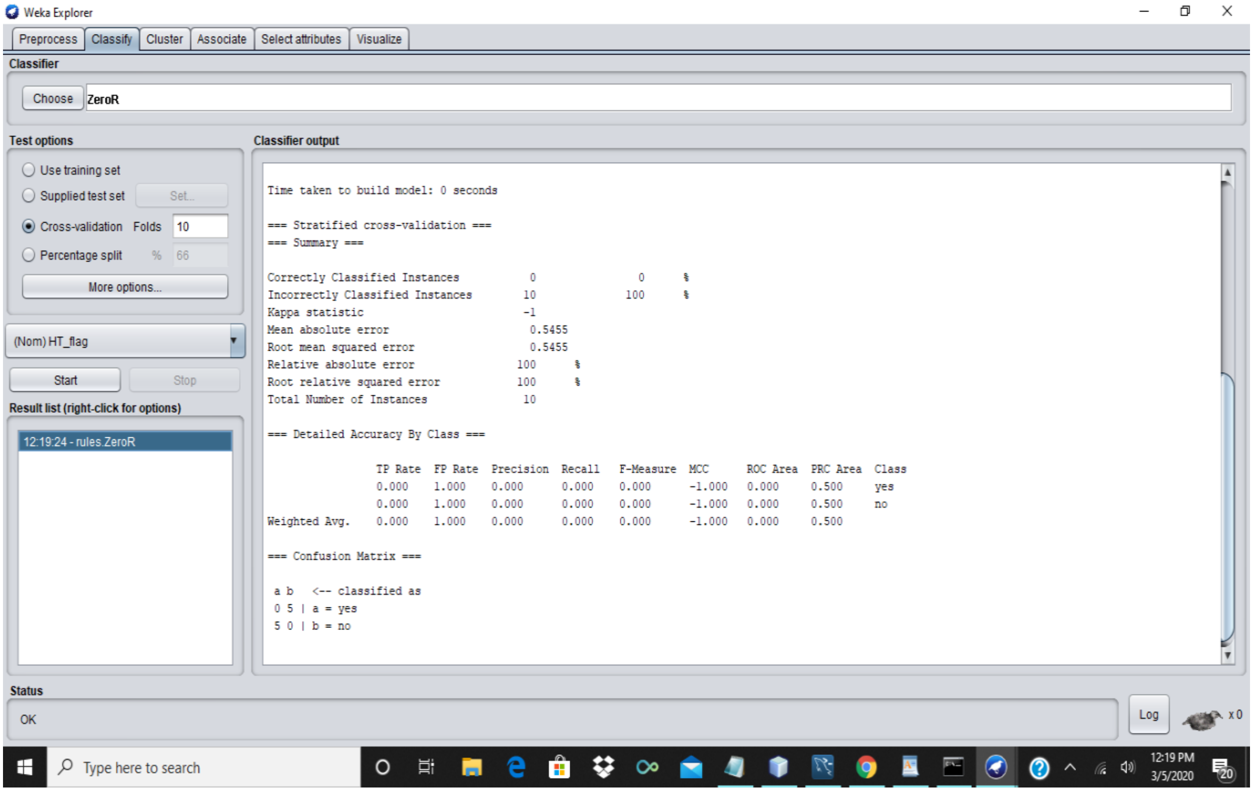
Name: sno
Missing: 0 (0%)
Distinct: 10
Type: Numeric
Unique: 10 (100%)

Statistic	Value
Minimum	1
Maximum	10
Mean	5.5
StdDev	3.028

Class: HT_flag (Nom)

Status

OK



Classifier: ZeroR

Test options:
○ Use training set
○ Supplied test set
● Cross-validation Folds 10
○ Percentage split % 66

(Nom) HT_flag

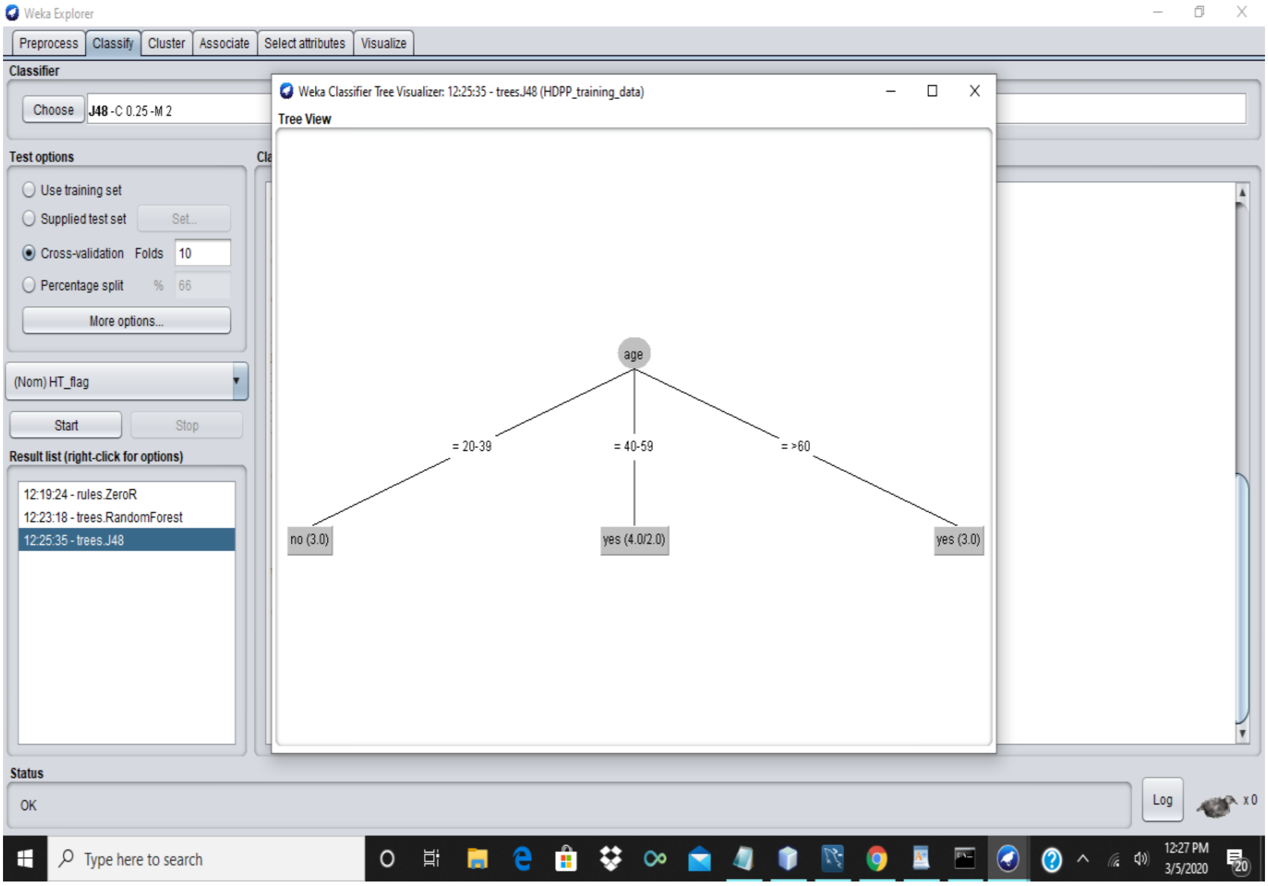
Result list (right-click for options): 12:19:24 - rules.ZeroR

Classifier output

```
Time taken to build model: 0 seconds

=== Stratified cross-validation ===
=== Summary ===

Correctly Classified Instances           0                0      %
Incorrectly Classified Instances        10              100      %
Kappa statistic                         -1
Mean absolute error                      0.5455
Root mean squared error                  0.5455
Relative absolute error                100      %
Root relative squared error            100      %
Total Number of Instances               10

=== Detailed Accuracy By Class ===

                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
                 0.000    1.000    0.000      0.000    0.000      -1.000   0.000     0.500     yes
                 0.000    1.000    0.000      0.000    0.000      -1.000   0.000     0.500     no
Weighted Avg.    0.000    1.000    0.000      0.000    0.000      -1.000   0.000     0.500

=== Confusion Matrix ===

 a b   <-- classified as
 0 5 | a = yes
 5 0 | b = no
```

Status: OK

Screen 2:Visualize tree by using J48 algorithm



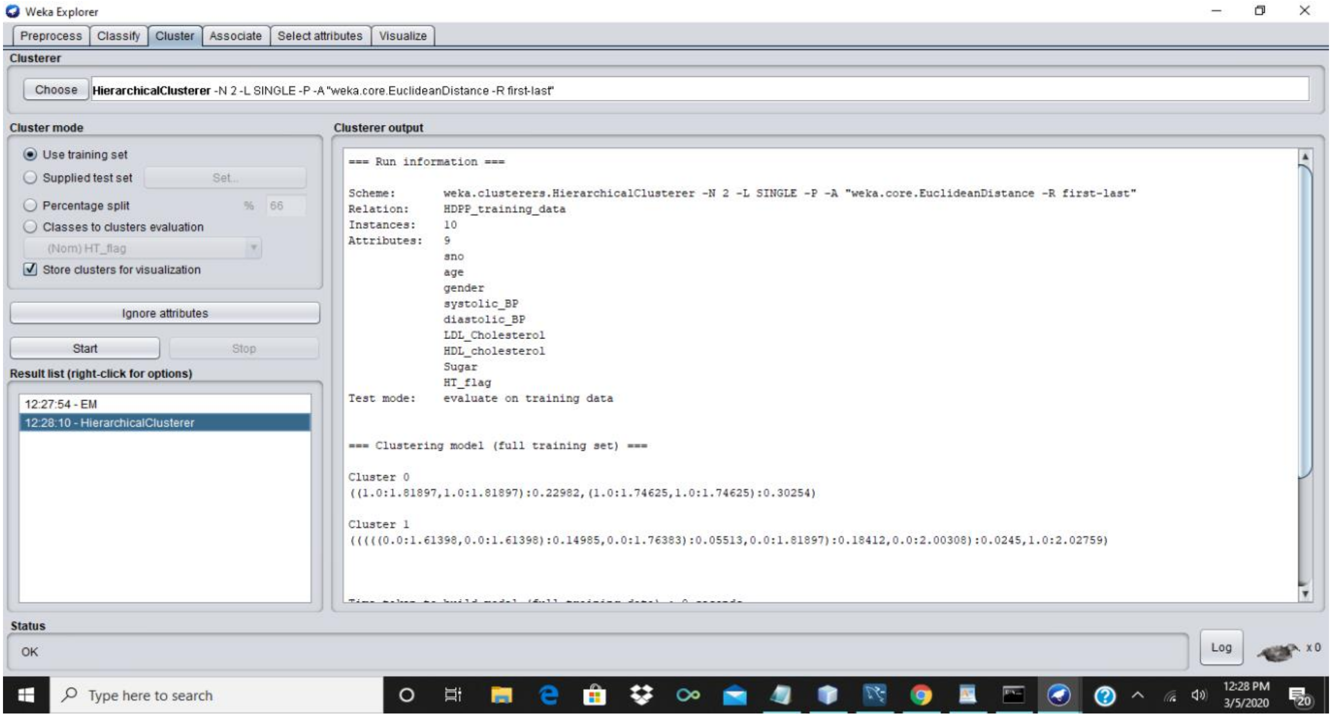
Classifier: J48 -C 0.25 -M 2

Test options:
○ Use training set
○ Supplied test set
● Cross-validation Folds 10
○ Percentage split % 66

(Nom) HT_flag

Result list (right-click for options):
12:19:24 - rules.ZeroR
12:23:18 - trees.RandomForest
12:25:35 - trees.J48

Status: OK



HierarchicalClusterer -N 2 -L SINGLE -P -A "weka.core.EuclideanDistance -R first-last"

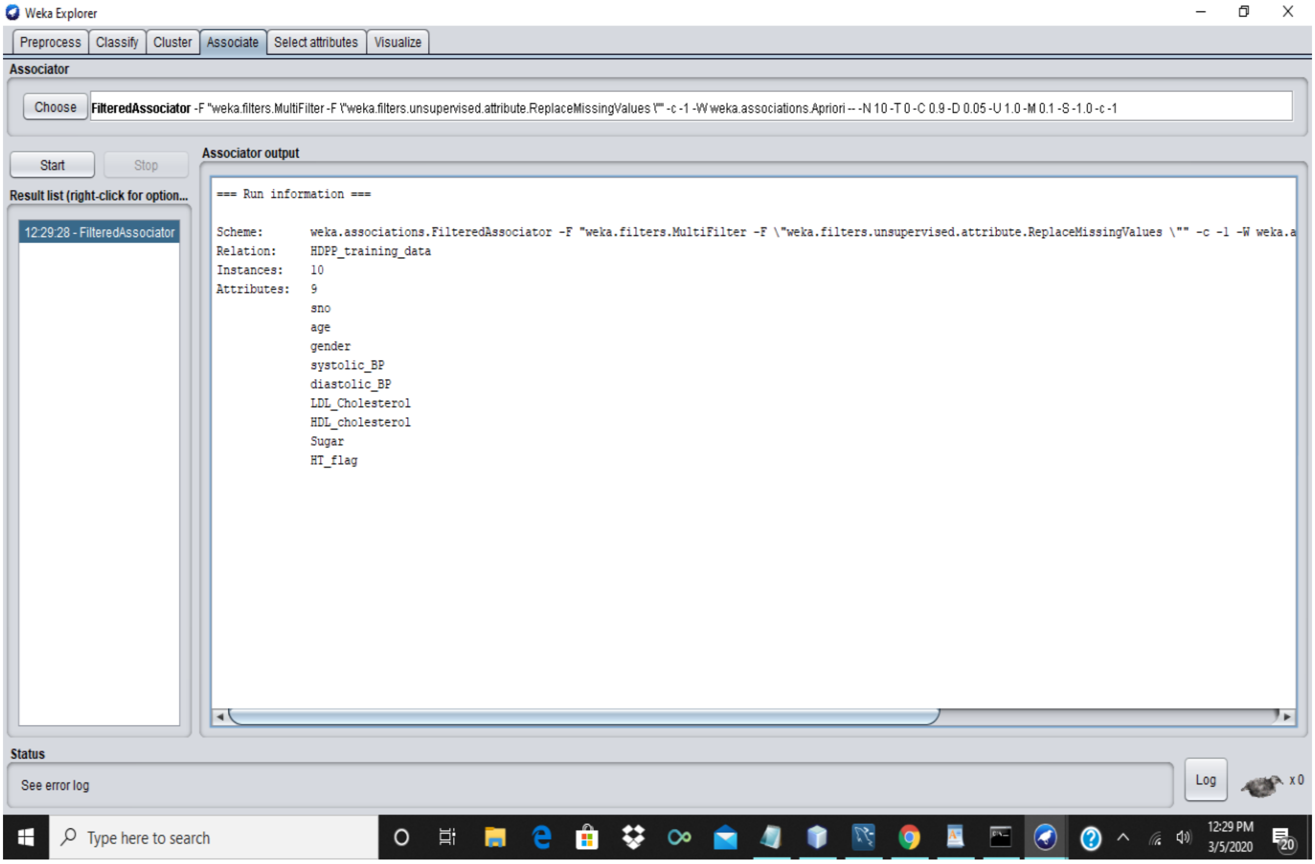
● Use training set
○ Supplied test set
○ Percentage split
○ Classes to clusters evaluation
☑ Store clusters for visualization

12:27:54 - EM
12:28:10 - HierarchicalClusterer

```
=== Run information ===

Scheme:       weka.clusterers.HierarchicalClusterer -N 2 -L SINGLE -P -A "weka.core.EuclideanDistance -R first-last"
Relation:     HDPP_training_data
Instances:    10
Attributes:   9
              sno
              age
              gender
              systolic_BP
              diastolic_BP
              LDL_Cholesterol
              HDL_cholesterol
              Sugar
              HT_flag
Test mode:    evaluate on training data


=== Clustering model (full training set) ===

Cluster 0
((1.0:1.81897,1.0:1.81897):0.22982,(1.0:1.74625,1.0:1.74625):0.30254)

Cluster 1
(((((0.0:1.61398,0.0:1.61398):0.14985,0.0:1.76383):0.05513,0.0:1.81897):0.18412,0.0:2.00308):0.0245,1.0:2.02759)
```

Status: OK

Screen 3:Classify data by using Hierarchal Cluster



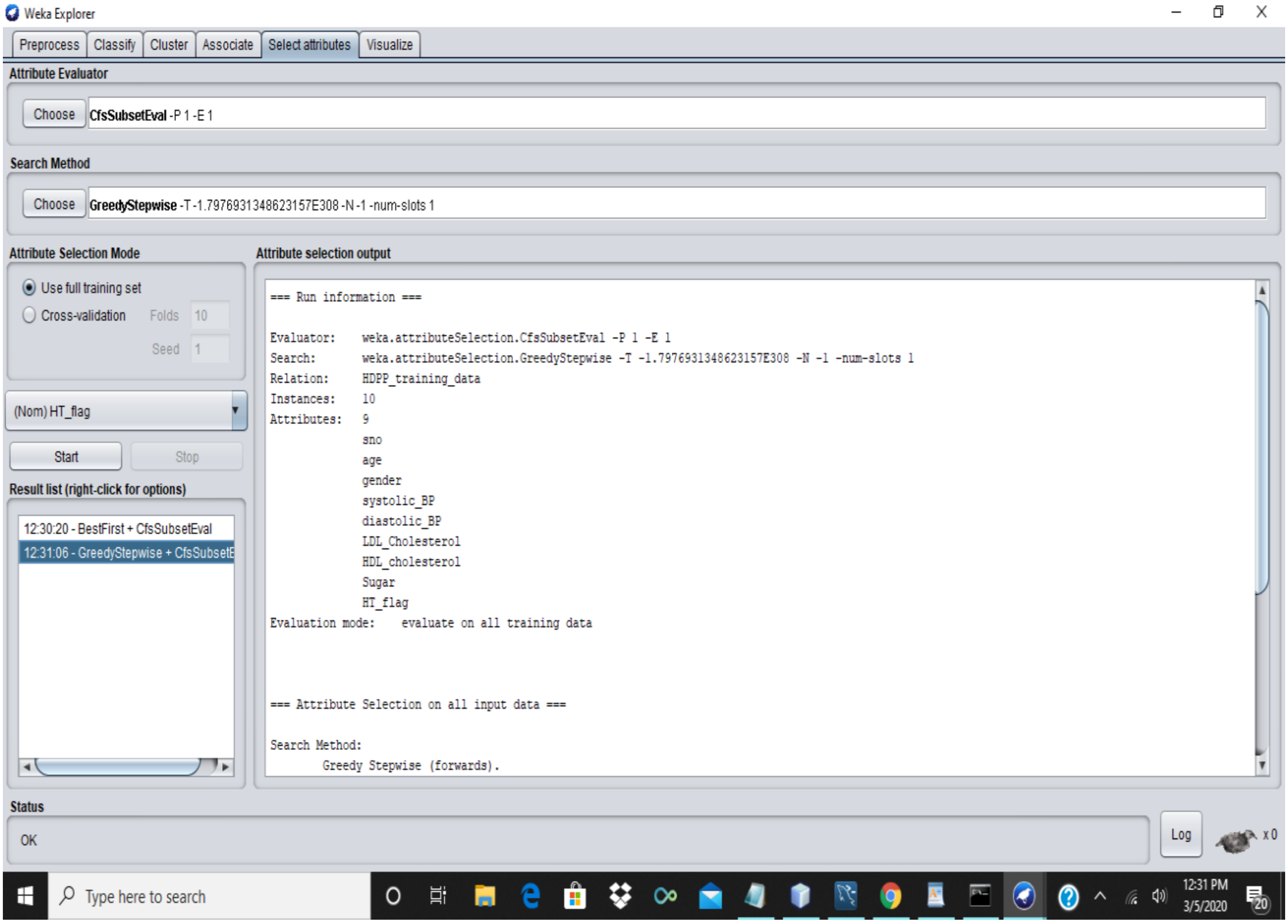
FilteredAssociator -F "weka.filters.MultiFilter -F \"weka.filters.unsupervised.attribute.ReplaceMissingValues \"" -c -1 -W weka.associations.Apriori -- -N 10 -T 0 -C 0.9 -D 0.05 -U 1.0 -M 0.1 -S -1.0 -c -1

12:29:28 - FilteredAssociator

```
=== Run information ===

Scheme:       weka.associations.FilteredAssociator -F "weka.filters.MultiFilter -F \"weka.filters.unsupervised.attribute.ReplaceMissingValues \"" -c -1 -W weka.a
Relation:     HDPP_training_data
Instances:    10
Attributes:   9
              sno
              age
              gender
              systolic_BP
              diastolic_BP
              LDL_Cholesterol
              HDL_cholesterol
              Sugar
              HT_flag
```

Status: See error log

Screen 4: Associate output by using Filter Associater



Attribute Evaluator: CfsSubsetEval -P 1 -E 1

Search Method: GreedyStepwise -T -1.7976931348623157E308 -N -1 -num-slots 1

Attribute Selection Mode: ● Use full training set ○ Cross-validation Folds 10 Seed 1

(Nom) HT_flag

Result list: 12:30:20 - BestFirst + CfsSubsetEval
12:31:06 - GreedyStepwise + CfsSubsetE

```
=== Run information ===

Evaluator:    weka.attributeSelection.CfsSubsetEval -P 1 -E 1
Search:       weka.attributeSelection.GreedyStepwise -T -1.7976931348623157E308 -N -1 -num-slots 1
Relation:     HDPP_training_data
Instances:    10
Attributes:   9
              sno
              age
              gender
              systolic_BP
              diastolic_BP
              LDL_Cholesterol
              HDL_cholesterol
              Sugar
              HT_flag
Evaluation mode:    evaluate on all training data



=== Attribute Selection on all input data ===

Search Method:
        Greedy Stepwise (forwards).
```

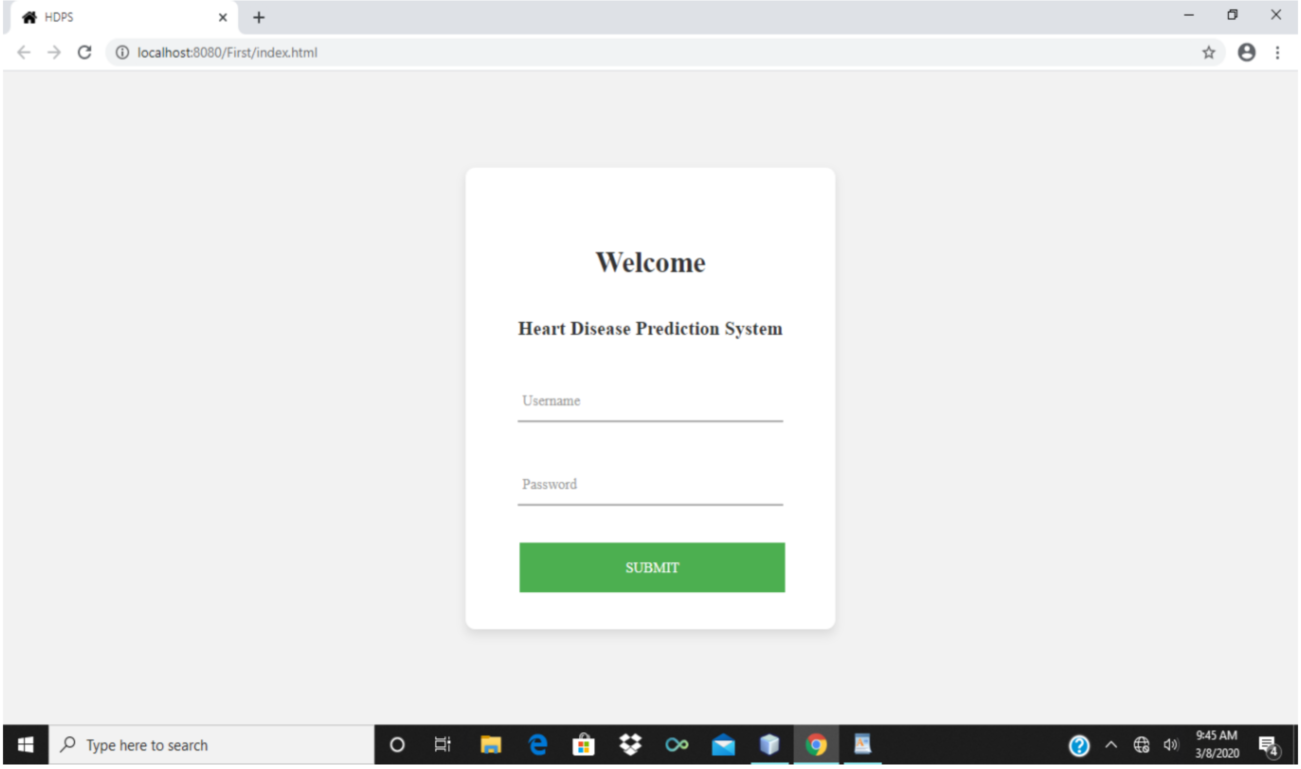
Status: OK

Screen 5:Classify subsets by using Greedy Stepwise Techniques.

4.2 New Algorithm Screens

4.2.1 Input Screens

Screen 1: Login Screen For HDPS



Welcome

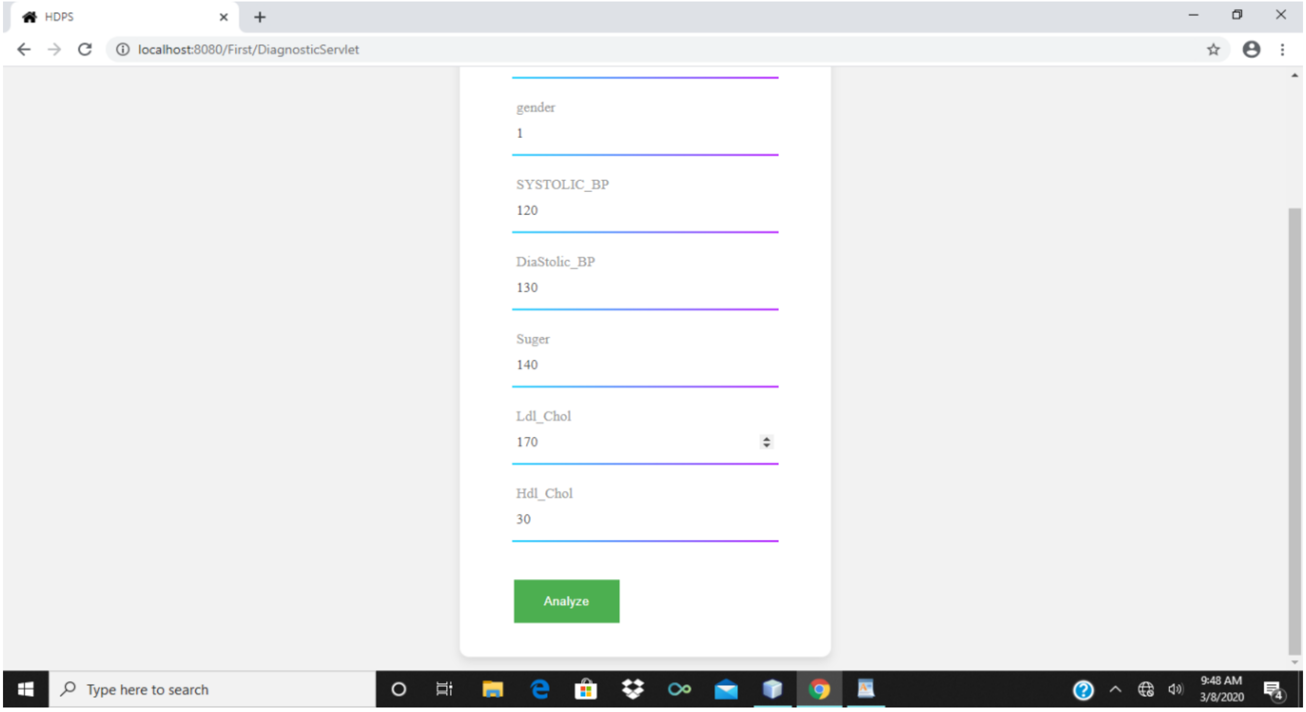
Heart Disease Prediction System

Username

Password

SUBMIT

Screen 2: checking Heart Status



gender
1

SYSTOLIC_BP
120

DiaStolic_BP
130

Suger
140

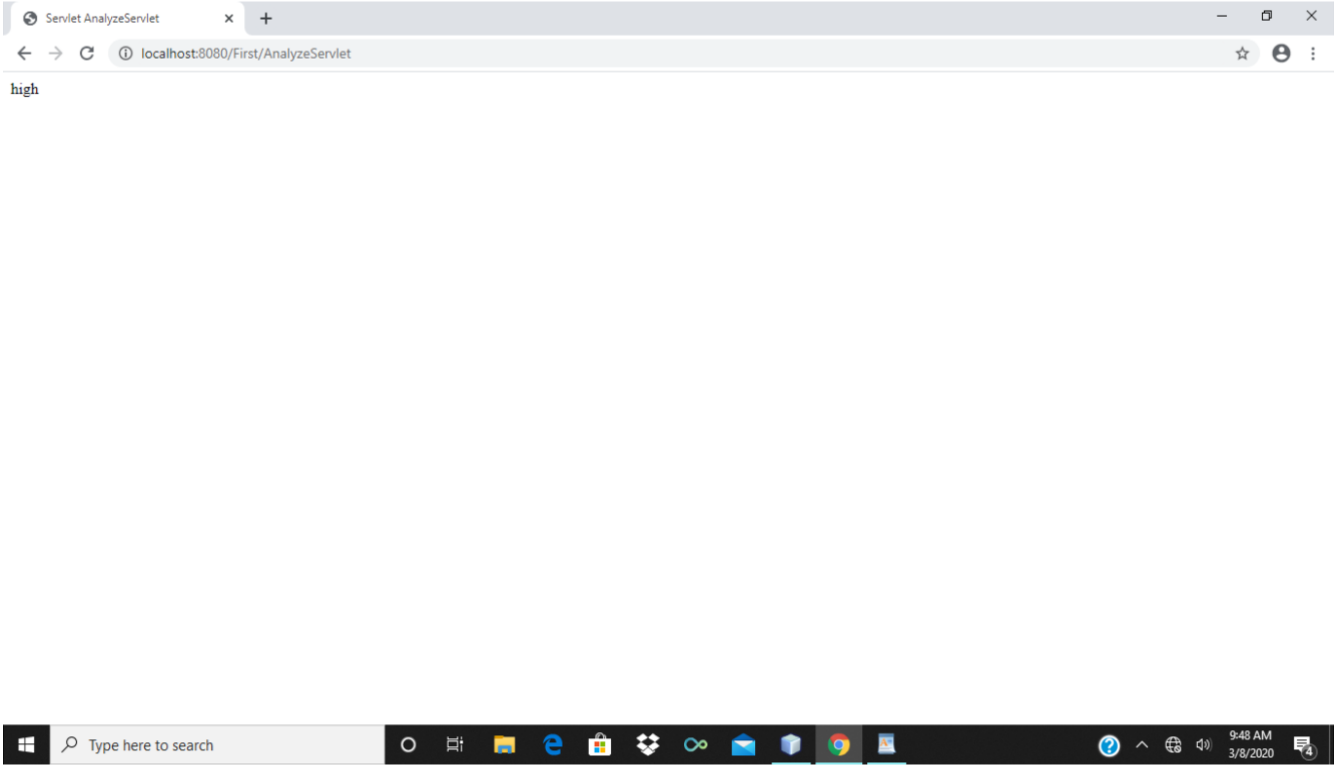
Ldl_Chol
170

Hdl_Chol
30

Analyze

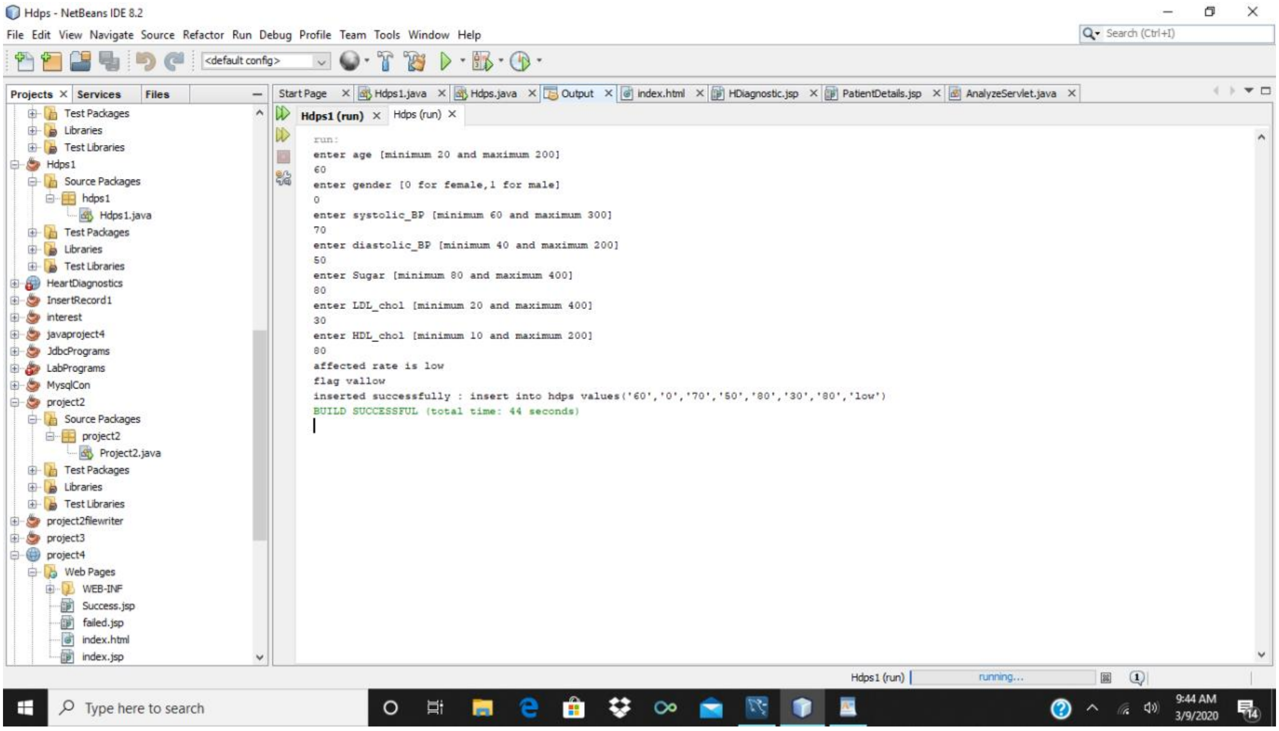
4.2.2 Output Screen

Screen 3: Result for HDPS



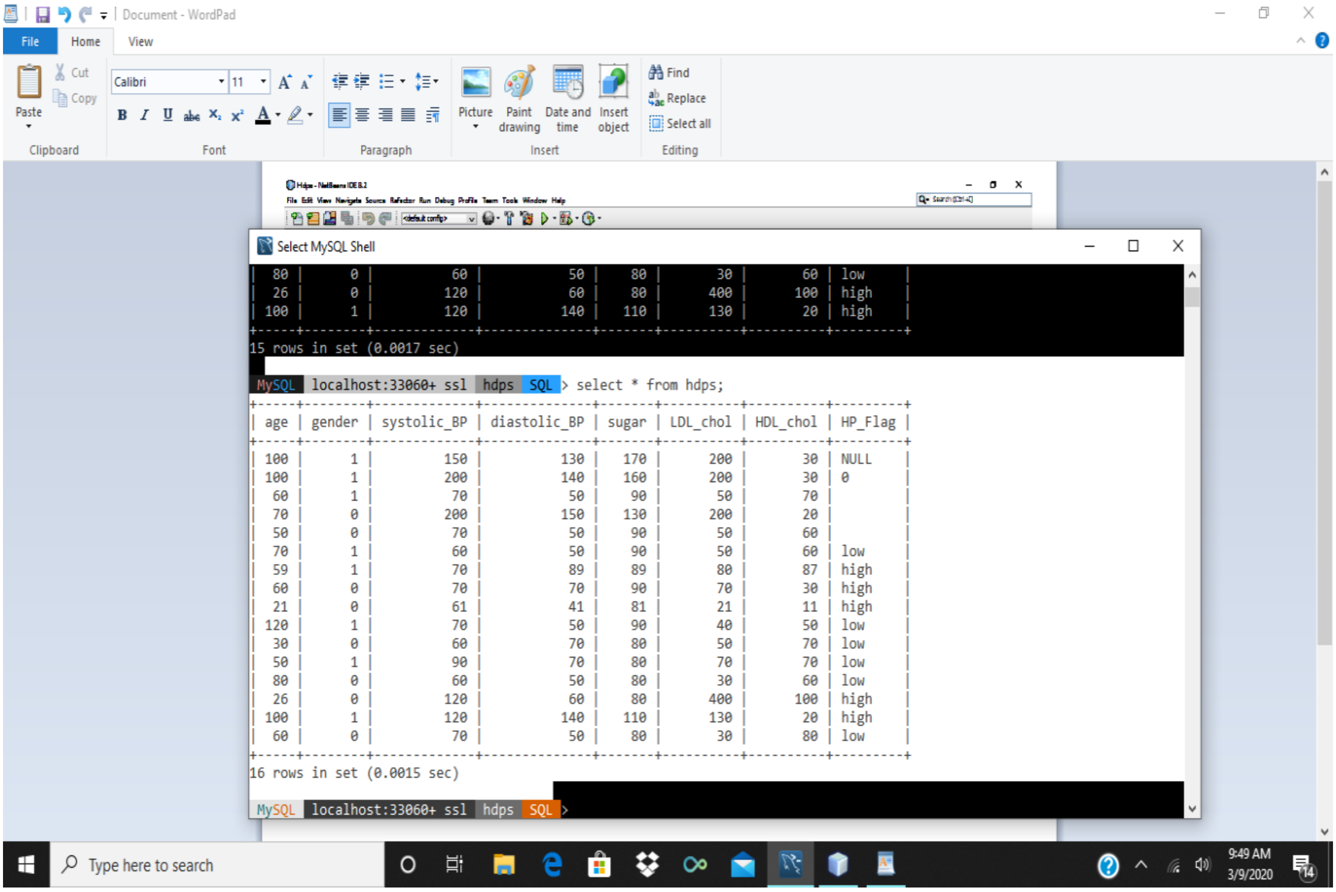
high

Screen 4: Result for HDPS JDBC Connection



```
run:
enter age [minimum 20 and maximum 200]
60
enter gender [0 for female,1 for male]
0
enter systolic_BP [minimum 60 and maximum 300]
70
enter diastolic_BP [minimum 40 and maximum 200]
50
enter Sugar [minimum 80 and maximum 400]
80
enter LDL_chol [minimum 20 and maximum 400]
30
enter HDL_chol [minimum 10 and maximum 200]
80
affected rate is low
flag vallow
inserted successfully : insert into hdps values('60','0','70','50','80','30','80','low')
BUILD SUCCESSFUL (total time: 44 seconds)
```

Screen 5: Insertion of HDPS data into Data Base.



```
| 80 |      0 |         60 |           50 |    80 |       30 |       60 | low     |
| 26 |      0 |        120 |           60 |    80 |      400 |      100 | high    |
| 100 |     1 |        120 |          140 |   110 |      130 |       20 | high    |
+-----+--------+-------------+--------------+-------+----------+----------+---------+
15 rows in set (0.0017 sec)

MySQL  localhost:33060+ ssl  hdps  SQL > select * from hdps;
+-----+--------+-------------+--------------+-------+----------+----------+---------+
| age | gender | systolic_BP | diastolic_BP | sugar | LDL_chol | HDL_chol | HP_Flag |
+-----+--------+-------------+--------------+-------+----------+----------+---------+
| 100 |      1 |         150 |          130 |   170 |      200 |       30 | NULL    |
| 100 |      1 |         200 |          140 |   160 |      200 |       30 | 0       |
|  60 |      1 |          70 |           50 |    90 |       50 |       70 |         |
|  70 |      0 |         200 |          150 |   130 |      200 |       20 |         |
|  50 |      0 |          70 |           50 |    90 |       50 |       60 |         |
|  70 |      1 |          60 |           50 |    90 |       50 |       60 | low     |
|  59 |      1 |          70 |           89 |    89 |       80 |       87 | high    |
|  60 |      0 |          70 |           70 |    90 |       70 |       30 | high    |
|  21 |      0 |          61 |           41 |    81 |       21 |       11 | high    |
| 120 |      1 |          70 |           50 |    90 |       40 |       50 | low     |
|  30 |      0 |          60 |           70 |    80 |       50 |       70 | low     |
|  50 |      1 |          90 |           70 |    80 |       70 |       70 | low     |
|  80 |      0 |          60 |           50 |    80 |       30 |       60 | low     |
|  26 |      0 |         120 |           60 |    80 |      400 |      100 | high    |
| 100 |      1 |         120 |          140 |   110 |      130 |       20 | high    |
|  60 |      0 |          70 |           50 |    80 |       30 |       80 | low     |
+-----+--------+-------------+--------------+-------+----------+----------+---------+
16 rows in set (0.0015 sec)

MySQL  localhost:33060+ ssl  hdps  SQL >
```

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';
        }
        is_valid='n';
           while(is_valid=='n')
        {
        System.out.println("enter gender [0 for female,1 for male]");
        Scanner sc=new Scanner(System.in);
        gender=sc.nextInt();
        if(gender == 0 || gender == 1)
            is_valid='y';
        }
        is_valid='n';
          while(is_valid=='n')
        {
        System.out.println("enter systolic_BP [minimum 60 and maximum 300]");
        Scanner sc=new Scanner(System.in);
        systolic_BP=sc.nextInt();
if(systolic_BP >= 60 && systolic_BP <= 300)
    is_valid='y';
}
is_valid='n';
while(is_valid=='n')
{
System.out.println("enter diastolic_BP [minimum 40 and maximum 200]");
Scanner sc=new Scanner(System.in);
diastolic_BP=sc.nextInt();
if(diastolic_BP >= 40 && diastolic_BP <= 200)
is_valid='y';
}
is_valid='n';
   while(is_valid=='n')
{
System.out.println("enter Sugar [minimum 80 and maximum 400]");
Scanner sc=new Scanner(System.in);
sugar=sc.nextInt();
if(sugar >= 80 && sugar <=400)
    is_valid='y';
}
is_valid='n';
    while(is_valid=='n')
{
System.out.println("enter LDL_chol [minimum 20 and maximum 400]");
Scanner sc=new Scanner(System.in);
LDL_chol=sc.nextInt();
if(LDL_chol >= 20 && LDL_chol <= 400)
    is_valid='y';
}
is_valid='n';
    while(is_valid=='n')
    {
    System.out.println("enter HDL_chol [minimum 10 and maximum 200]");
    Scanner sc=new Scanner(System.in);
    HDL_chol=sc.nextInt();
    if(HDL_chol >= 10 && HDL_chol <= 200)
       is_valid='y';
    }
    is_valid='n';
      if(gender == 1){
    if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>40))
    {
       System.out.println("affected rate is low");
    }
    else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==40))
    {
       System.out.println("affected rate is normal");
    }
    else
    {
       System.out.println("affected rate is high");
    }
    }
    else
     {
       if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>50))
    {
       System.out.println("affected rate is low");
    }
    else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==50))
    {
       System.out.println("affected rate is normal");
    }
    else
    {
       System.out.println("affected rate is high");
    }
            }

    }
}
```

HDPS JDBC Connection

```
package hdps;
import java.sql.*;
import java.util.Scanner;
import java.io.*;
public class Hdps {
    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;
        String HP_Flag=" ";
        Scanner sc = new Scanner(System.in);
        String sql;
        Connection con = null;
         try
        {
            Class.forName("com.mysql.cj.jdbc.Driver");

con=DriverManager.getConnection("jdbc:mysql://localhost:3306/hdps","root","nsrit");
         }
        catch(Exception ex)
        {
            System.err.println(ex);
        }
```

```
try{
 char is_valid='n';
 while(is_valid=='n')
 {
 System.out.println("enter age [minimum 20 and maximum 200]");
 age=sc.nextInt();
 if(age >= 20 && age <=120)
    is_valid='y';
 }
 is_valid='n';
 while(is_valid=='n')
 {
 System.out.println("enter gender [0 for female,1 for male]");
 gender=sc.nextInt();
 if(gender == 0 || gender == 1)
    is_valid='y';
 }
 is_valid='n';
 while(is_valid=='n')
 {
 System.out.println("enter systolic_BP [minimum 60 and maximum 300]");
 systolic_BP=sc.nextInt();
 if(systolic_BP >= 60 && systolic_BP <= 300)
    is_valid='y';
 }
 is_valid='n';
 while(is_valid=='n')
 {
 System.out.println("enter diastolic_BP [minimum 40 and maximum 200]");
 diastolic_BP=sc.nextInt();
 if(diastolic_BP >= 40 && diastolic_BP <= 200)
 is_valid='y';
```

```
}
is_valid='n';
while(is_valid=='n')
{
System.out.println("enter Sugar [minimum 80 and maximum 400]");
sugar=sc.nextInt();
if(sugar >= 80 && sugar <=400)
    is_valid='y';
}
is_valid='n';
while(is_valid=='n')
{
System.out.println("enter LDL_chol [minimum 20 and maximum 400]");
LDL_chol=sc.nextInt();
if(LDL_chol >= 20 && LDL_chol <= 400)
    is_valid='y';
}
is_valid='n';
while(is_valid=='n')
{
System.out.println("enter HDL_chol [minimum 10 and maximum 200]");
HDL_chol=sc.nextInt();
if(HDL_chol >= 10 && HDL_chol <= 200)
    is_valid='y';
}
is_valid='n';
try
{
    FileWriter fw = new FileWriter("D://hdps.txt",true);
    BufferedWriter br = new BufferedWriter(fw);
    br.write(age);
    br.write(gender);
```

```
            br.write(systolic_BP);
            br.write(diastolic_BP);
            br.write(sugar);
            br.write(LDL_chol);
            br.write(HDL_chol);
            br.flush();
        }
        catch(Exception e)
        {System.out.println(e);}
        if(gender == 1){
        if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>40))
        {
            System.out.println("affected rate is low");
            HP_Flag="low";
        }
        else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==40))
        {
            System.out.println("affected rate is normal");
            HP_Flag="normal";
        }
        else
        {
            System.out.println("affected rate is high");
            HP_Flag="high";
         }
        }
        else
         {
            if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>50))
        {
            System.out.println("affected rate is low");
            HP_Flag="low";
        }
        else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==50))
        {
            System.out.println("affected rate is normal");
         HP_Flag="normal";
        }
        else
        {
            System.out.println("affected rate is high");
          HP_Flag="high";
        }
}
   System.out.println("flag val"+HP_Flag);
        sql =  "insert into hdps
values('"+age+"','"+gender+"','"+systolic_BP+"','"+diastolic_BP+"','"+sugar+"','"+LDL_chol
+"','"+HDL_chol+"','"+HP_Flag+"')";
           Statement st = con.createStatement();
            int m = st.executeUpdate(sql);
            if (m == 1)
                System.out.println("inserted successfully : "+sql);
            else
                System.out.println("insertion failed");
            con.close();
            }catch(Exception e)
                {System.out.println(e);}
    }
    }
```

HDPS Index.html

```
<!DOCTYPE html>
```

```
<html lang="en">
<head>
        <title>HDPS</title>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1">
<style>
input[type=submit]{
  background-color: #4CAF50;
  border: none;
  color: white;
  padding: 16px 32px;
  text-decoration: none;
  margin: 4px 2px;
  cursor: pointer;
}
</style>
</head>
<body>

<div class="limiter">
<div class="container-login100">
<div class="wrap-login100">
<form class="login100-form validate-form" method="post" action="MyServlet">
<span class="login100-form-title p-b-26">
 <h4>Welcome</h4><br>
   <h6>Heart Disease Prediction System</h6>
</span>
<br><br>
<div class="wrap-input100 validate-input" data-validate = "Valid user name">
<input class="input100" type="text" name="user">
<span class="focus-input100" data-placeholder="Username"></span>
</div>
```

```
<div class="wrap-input100 validate-input" data-validate="Enter password">
<input class="input100" type="password" name="pass">
<span class="focus-input100" data-placeholder="Password"></span>
</div>
<input class="login100-form-btn" type="submit" value="Submit"/>
</form>
</div>
</div>
</div>
<script src="js/main.js"></script>
</body>
</html>
```

HDPS HDiagnostic.jsp

```
<html>
    <head>
        <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
        <title>HDPS</title>
<style>
input[type=submit]{
  background-color: #4CAF50;
  border: none;
  color: white;
  padding: 16px 32px;
  text-decoration: none;
  margin: 4px 2px;
  cursor: pointer;
}
</style>
    </head>
    <body>
    <center>
```

```
        <br><br><br><br><br>
           <form method="post" action="DiagnosticServlet">
              <input type="submit" value="Do You Want to Check Heart Status" />
           </form>
        </center>
     </body>
</html>
```

HDPS Patientdetails.jsp

```
<html lang="en">
<head>
         <title>HDPS</title>
         <meta charset="UTF-8">
         <meta name="viewport" content="width=device-width, initial-scale=1">
<style>
input[type=submit]{
  background-color: #4CAF50;
  border: none;
  color: white;
  padding: 16px 32px;
  text-decoration: none;
  margin: 4px 2px;
  cursor: pointer;
}
</style>
</head>
<body>
<div class="limiter">
<div class="container-login100">
<div class="wrap-login100">
<form class="login100-form validate-form" method="post" action="AnalyzeServlet">
<span class="login100-form-title p-b-26">
```

```
 <h6>Heart Disease Prediction System</h6>
</span>
 <br><br>
<div class="wrap-input100 validate-input" data-validate = "Valid age">
<input class="input100" type="number" name="age" min="20" max="120">
<span class="focus-input100" data-placeholder="Age"></span>
</div>
<div class="wrap-input100 validate-input" data-validate="Enter gender">
<input class="input100" type="number" name="gender" min="0" max="1">
<span class="focus-input100" data-placeholder="gender"></span>
</div>
<div class="wrap-input100 validate-input" data-validate="Enter SYSTOLIC_BP">
<input class="input100" type="number" name="SYSTOLIC_BP" min="60" max="300">
<span class="focus-input100" data-placeholder="SYSTOLIC_BP"></span>
</div>
<div class="wrap-input100 validate-input" data-validate="Enter DiaStolic_BP">
<input class="input100" type="number" name="DiaStolic_BP" min="40" max="200">
<span class="focus-input100" data-placeholder="DiaStolic_BP"></span>
</div>
<div class="wrap-input100 validate-input" data-validate="Enter Sugar">
<input class="input100" type="number" name="Sugar" min="80" max="400">
span class="focus-input100" data-placeholder="Suger"></span>
</div>
<div class="wrap-input100 validate-input" data-validate="Enter Ldl_Chol">
<input class="input100" type="number" name="Ldl_Chol" min="20" max="400">
<span class="focus-input100" data-placeholder="Ldl_Chol"></span>
</div>
  <div class="wrap-input100 validate-input" data-validate="Enter Hdl_Chol">
<input class="input100" type="number" name="Hdl_Chol" min="10" max="200">
<span class="focus-input100" data-placeholder="Hdl_Chol"></span>
</div>
<input type="submit" value="Analyze" />
```

```
  </form>
</div>
</div>
</div>
</body>
</html>
```

AnalyzeServlet.java

```
import java.sql.*;
import java.io.IOException;
import java.io.PrintWriter;
import java.sql.Connection;
import java.sql.DriverManager;
import java.util.Scanner;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
@WebServlet(urlPatterns = {"/AnalyzeServlet"})
public class AnalyzeServlet extends HttpServlet {
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        System.out.println("qqeqeqeqe");
       response.setContentType("text/html;charset=UTF-8");
        try (PrintWriter out = response.getWriter()) {
             int
age=0,gender=0,systolic_BP=0,diastolic_BP=0,sugar=0,LDL_chol=0,HDL_chol=0;
        age=Integer.parseInt(request.getParameter("age"));
        gender=Integer.parseInt(request.getParameter("gender"));
        systolic_BP=Integer.parseInt(request.getParameter("SYSTOLIC_BP"));
        diastolic_BP=Integer.parseInt(request.getParameter("DiaStolic_BP"));
```

```
         sugar=Integer.parseInt(request.getParameter("Sugar"));
         LDL_chol=Integer.parseInt(request.getParameter("Ldl_Chol"));
         HDL_chol=Integer.parseInt(request.getParameter("Hdl_Chol"));
        String HP_Flag=" ";
        String sql;
         Connection con = null;
          try
         {
            Class.forName("com.mysql.cj.jdbc.Driver");

con=DriverManager.getConnection("jdbc:mysql://localhost:3306/hdps","root","nsrit");
          }
         catch(Exception ex)
         {           System.err.println(ex);
         }
        try{
         char is_valid='n';

         while(is_valid=='n')
         {
         System.out.println("enter age [minimum 20 and maximum 200]");
         if(age >= 20 && age <=120)
            is_valid='y';
         }
         is_valid='n';

         while(is_valid=='n')
         {
         System.out.println("enter gender [0 for female,1 for male]");
         if(gender == 0 || gender == 1)
            is_valid='y';
         }
         is_valid='n';
```

```
  while(is_valid=='n')
  {
  System.out.println("enter systolic_BP [minimum 60 and maximum 300]");
  if(systolic_BP >= 60 && systolic_BP <= 300)
      is_valid='y';
  }
  is_valid='n';

  while(is_valid=='n')
  {
  System.out.println("enter diastolic_BP [minimum 40 and maximum 200]");
  if(diastolic_BP >= 40 && diastolic_BP <= 200)
  is_valid='y';
  }
  is_valid='n';

   while(is_valid=='n')
  {
  System.out.println("enter Sugar [minimum 80 and maximum 400]");
          if(sugar >= 80 && sugar <=400)
      is_valid='y';
  }
  is_valid='n';
  while(is_valid=='n')
  {
  System.out.println("enter LDL_chol [minimum 20 and maximum 400]");
          if(LDL_chol >= 20 && LDL_chol <= 400)
      is_valid='y';
  }
  is_valid='n';
while(is_valid=='n')
  {
        System.out.println("enter HDL_chol [minimum 10 and maximum 200]");
        if(HDL_chol >= 10 && HDL_chol <= 200)
            is_valid='y';
        }
        is_valid='n';
        if(gender == 1){
        if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>40))
        {
            System.out.println("affected rate is low");
            HP_Flag="low";
    }
        else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==40))
        {
            System.out.println("affected rate is normal");
            HP_Flag="normal";
   }
        else
        {
            System.out.println("affected rate is high");
            HP_Flag="high";
    }
        }
        else
         {
            if((age<=120 ) && (systolic_BP<129) && (diastolic_BP<89) && (sugar<100) &&
(LDL_chol<129) && (HDL_chol>50))
        {
            System.out.println("affected rate is low");
            HP_Flag="low";
}
        else if((age<=120 ) && (systolic_BP==129) && (diastolic_BP==89) && (sugar==100)
&& (LDL_chol==129) && (HDL_chol==50))
```

```
        {
           System.out.println("affected rate is normal");
         HP_Flag="normal";
        }
        else
        {
           System.out.println("affected rate is high");
          HP_Flag="high";
        }

values('"+age+"','"+gender+"','"+systolic_BP+"','"+diastolic_BP+"','"+sugar+"','"+LDL_chol
+"','"+HDL_chol+"','"+HP_Flag+"')";
          Statement st = con.createStatement();
           int m = st.executeUpdate(sql);
           if (m == 1)
               System.out.println("inserted successfully : "+sql);
           else
               System.out.println("insertion failed");
           con.close();


           }
       }
       catch(Exception ex)
         {    System.err.println(ex)  }
           out.println("<!DOCTYPE html>");
           out.println("<html>");
           out.println("<head>");
           out.println("<title>Servlet AnalyzeServlet</title>");
           out.println("</head>");
           out.println("<body>");
           out.println("                        "+HP_Flag);
           out.println("</body>");
           out.println("</html>");
        }
    }
```

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 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.

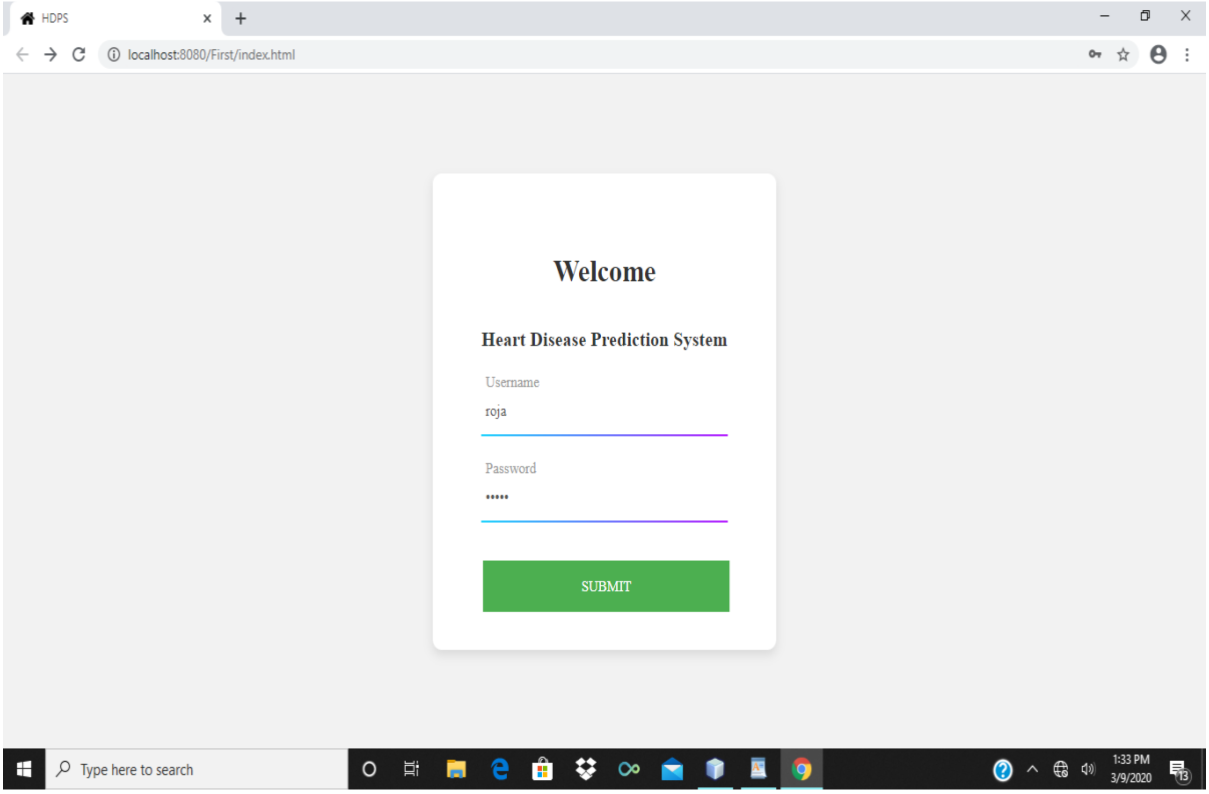
5.2 White Box Testing

- 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

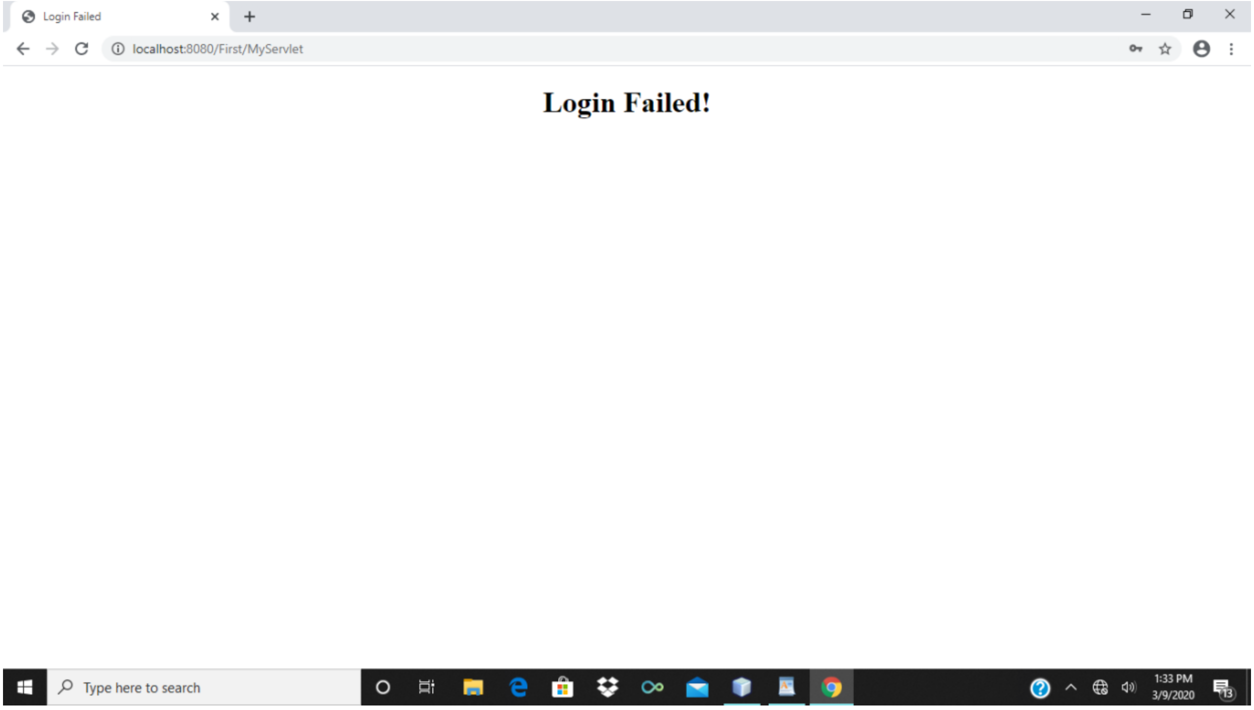


Welcome

Heart Disease Prediction System

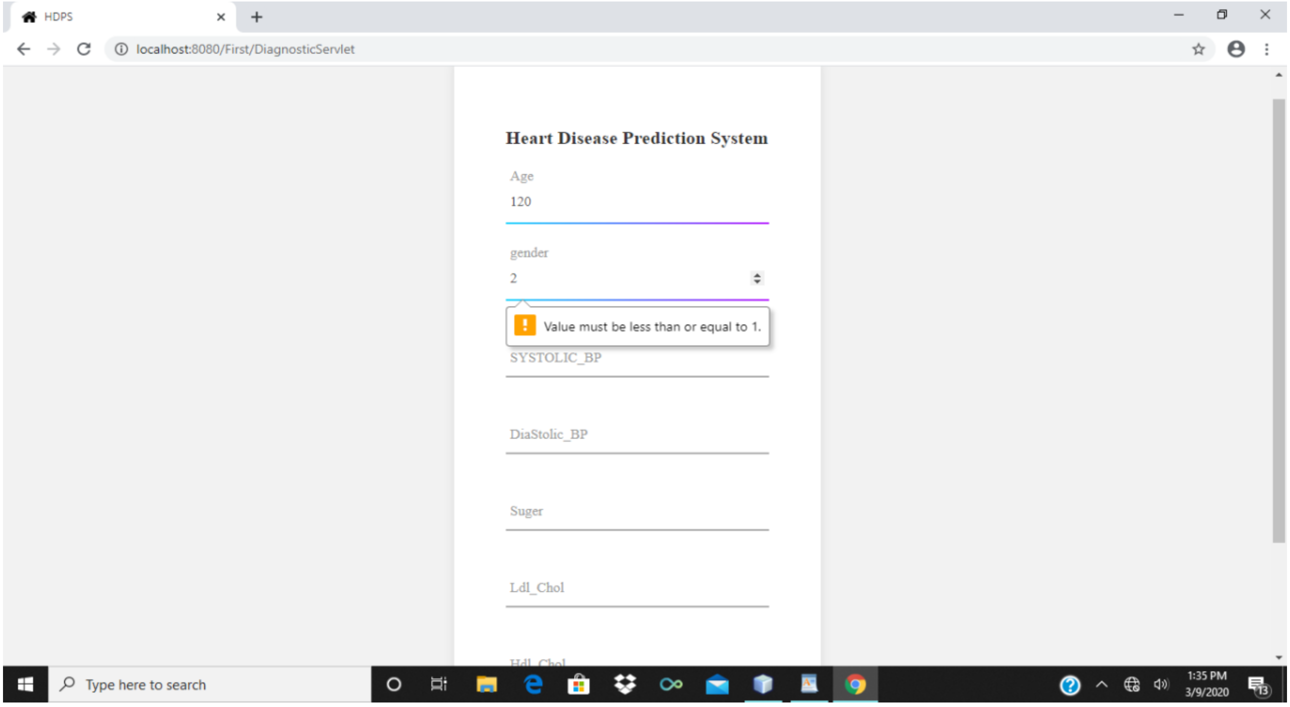
Username: roja

Password: •••••



Login Failed!

Test Case 2:



Heart Disease Prediction System

Age
120

gender
2

Value must be less than or equal to 1.

SYSTOLIC_BP

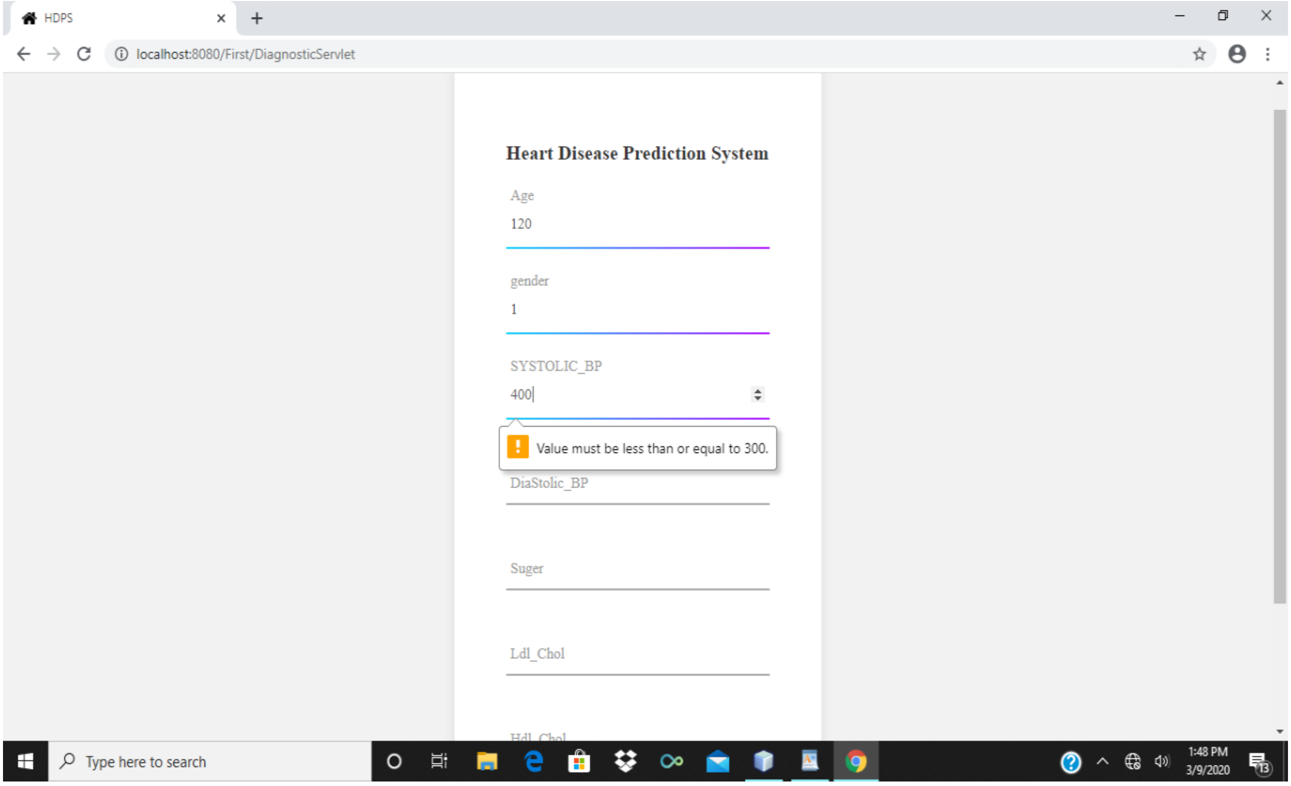
DiaStolic_BP

Suger

Ldl_Chol

Hdl_Chol

Test Case 3:



Heart Disease Prediction System

Age
120

gender
1

SYSTOLIC_BP
400

Value must be less than or equal to 300.

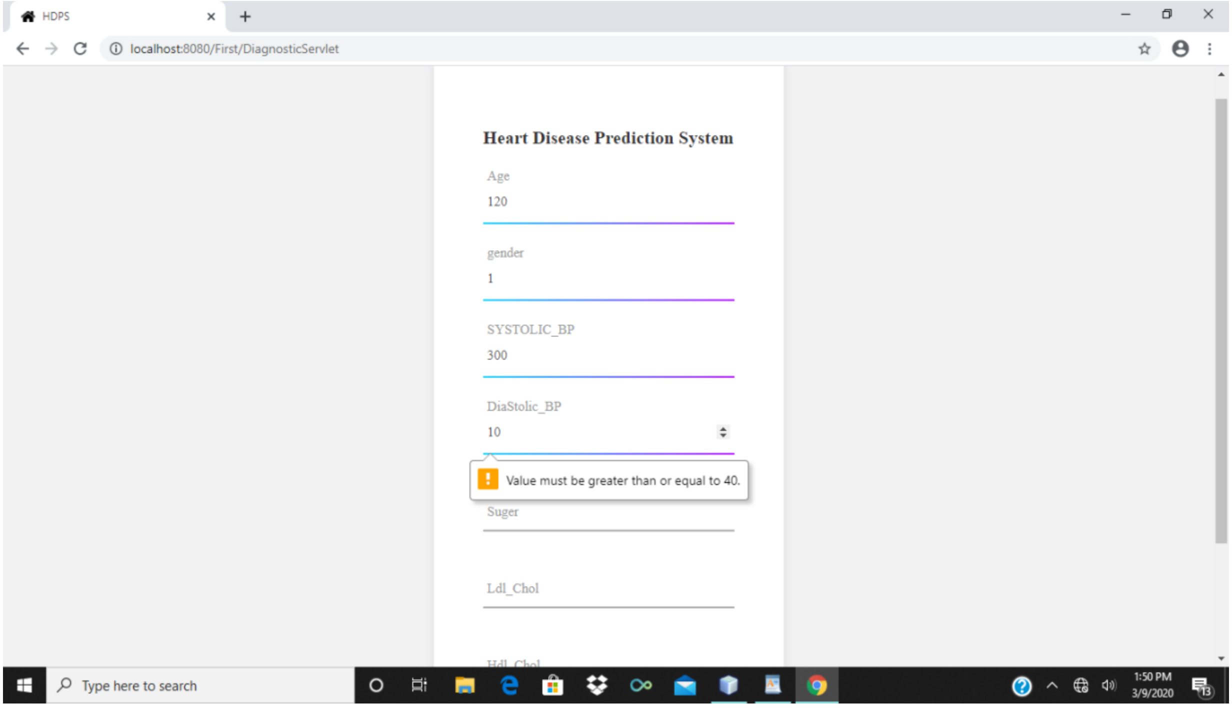
DiaStolic_BP

Suger

Ldl_Chol

Hdl_Chol

Test Case 4:



Heart Disease Prediction System

Age
120

gender
1

SYSTOLIC_BP
300

DiaStolic_BP
10

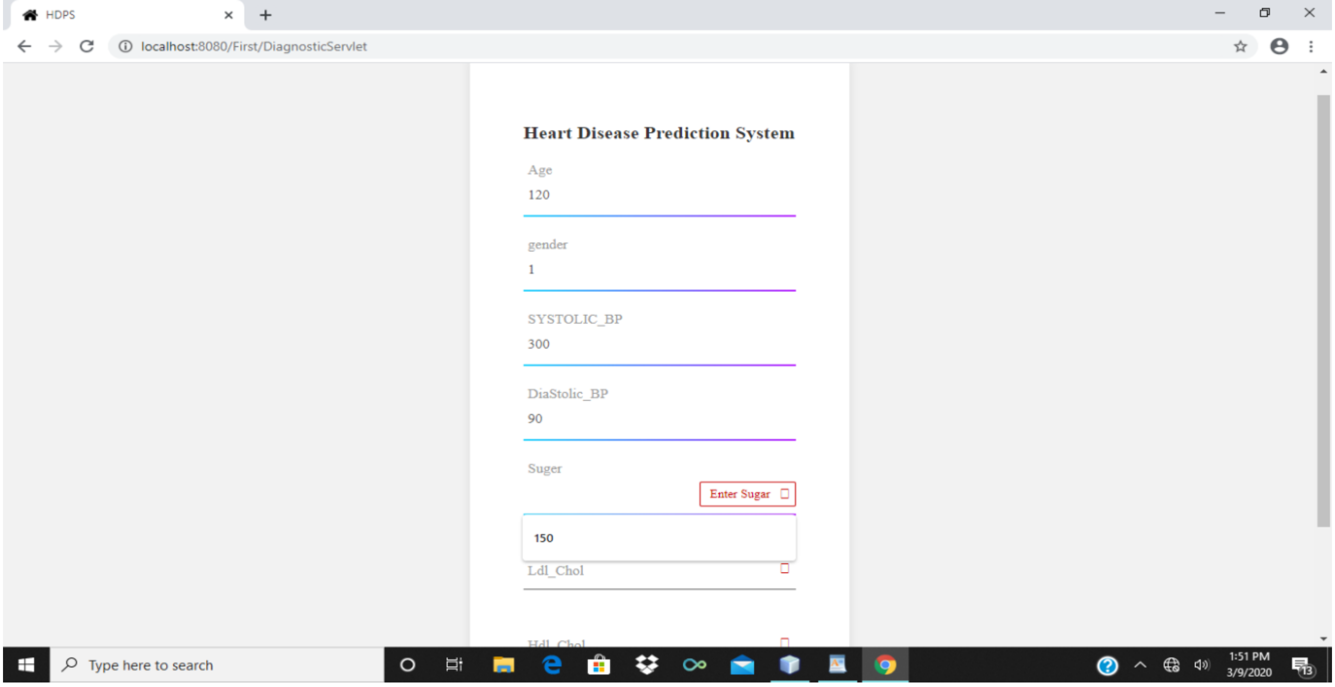
Value must be greater than or equal to 40.

Suger

Ldl_Chol

Hdl_Chol

Test Case 5:



Heart Disease Prediction System

Age
120

gender
1

SYSTOLIC_BP
300

DiaStolic_BP
90

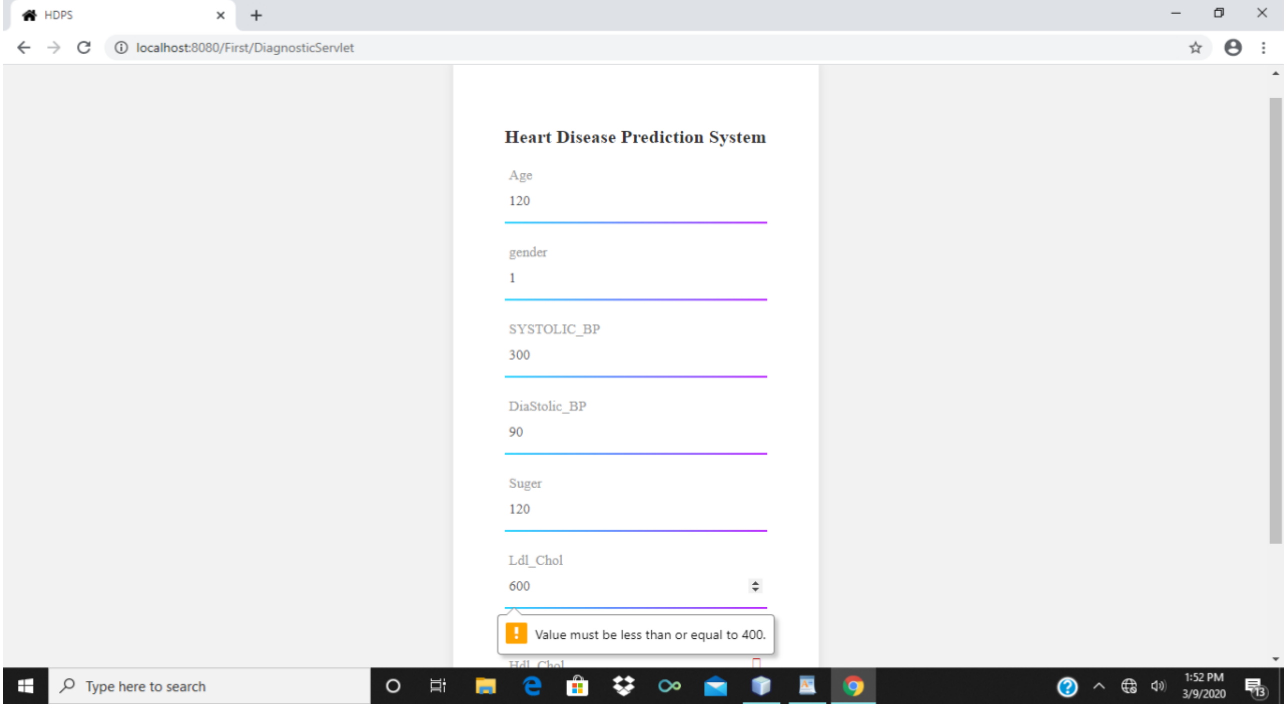
Suger
Enter Sugar

150

Ldl_Chol

Hdl_Chol

Test Case 6:



Heart Disease Prediction System

Age
120

gender
1

SYSTOLIC_BP
300

DiaStolic_BP
90

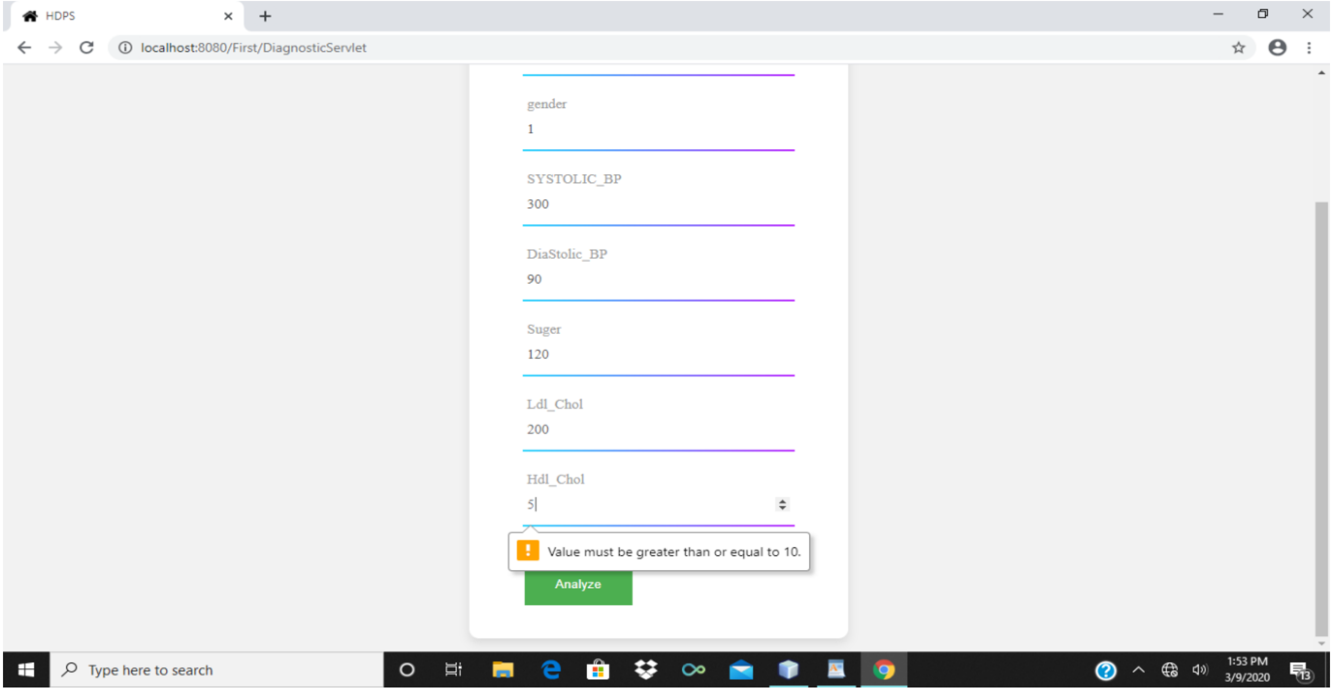
Suger
120

Ldl_Chol
600

Value must be less than or equal to 400.

Hdl_Chol

Test Case 7:



gender
1

SYSTOLIC_BP
300

DiaStolic_BP
90

Suger
120

Ldl_Chol
200

Hdl_Chol
5

Value must be greater than or equal to 10.

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.
- Ensuring that any unforeseen **conflicts** that might arise during this stage are resolved.
- Ensuring transparency with regard to **finances** .
- Major functional and operational bugs or errors can be known.

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
9) Do the Change Management.

10) Check the Knowledge Transfer.

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)

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".

References

Asha Rajkumar, G.Sophia Reena, Diagnosis Of Heart Disease Using Datamining Algorithm, Global Journal of Computer Science and Technology 38 Vol. 10 Issue 10 Ver. September 2010.

Sunita Soni, O.P.Vyas, Using Associative Classifiers for Predictive Analysis in Health Care Data Mining, International Journal of Computer Application (IJCA, 0975 –8887) Volume 4– No.5, July 2010, pages 33-**34.**

Text books:

Data warehousing and data mining:

1.introduction to data mining: pang-ning tan & Michael Steinbach , vipin kumar,pearson.

2.Data mining concepts and techniques, 3/e, jiawei han, Michael kamber, elsevier