PROJECT REPORT

ON

ELECTRONIC RECORDING SYSTEM

SUBMITTED TO THE

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FOR THE DEGREE OF

BACHELOR OF ENGINEERING

IN

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Submitted by
Shreerang Paradkar
Kedar Patil
Amit Sawant

UNDER THE GUIDANCE OF
Ms. Sana Shaikh

DEPARTMENT OF COMPUTER ENGINEERING
DON BOSCO INSTITUTE OF TECHNOLOGY
(ENGINEERING COLLEGE)
PREMIER AUTOMOBILES ROAD, KURLA (W) – 400070

ELECTRONIC RECORDING SYSTEM

Submitted in partial fulfilment of the requirement for the Degree of
BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

by

Shreerang Paradkar Roll no – 42

Kedar Patil Roll no – 44

Amit Sawant Roll no - 57

Under the guidance of:

Ms. Sana Shaikh

DEPARTMENT OF COMPUTER ENGINEERING

DON BOSCO INSTITUTE OF TECHNOLOGY
(ENGINEERING COLLEGE) PREMIER AUTOMOBILES ROAD,
KURLA (W) – 400070

2014-2015

CERTIFICATE

This is to certify that the project report entitled "**Electronic Recording System"** is a bonafide work of

Shreerang Paradkar Roll no – 42
Kedar Patil Roll no – 44
Amit Sawant Roll no – 57

submitted to the University of Mumbai in partial fulfilment of the requirement for the award of the Degree of **Bachelor of Engineering** in the **Computer Engineering.**

Ms. Sana Shaikh
GUIDE

Dr. Amiya Kumar Tripathy

Mr. Imran Mirza
H. O. D. (COMPS)

Dr. P. Nambiar
PRINCIPAL

Project Report Approval for B.E

This project report entitled **Electronic Recording System** by **Shreerang Paradkar, Kedar Patil, Amit Sawant** is approved for the degree of Computer Engineering course of Bachelor of Engineering.

Examiners

1.----------

2.----------

Date: April 29, 2015

Place: DBIT, Kurla

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Shreerang Paradkar, Roll No: 42)

(Kedar Patil, Roll No: 44)

(Amit Sawant, Roll No: 57)

Date: April 29, 2015

ABSTRACT

In medical field there is a growing need for development of software to be used for practical applications rather than only in research field. It is necessary to have a proper health care management system which should be 100% accurate but also should be portable so that every person carries with it as personalized health care system. Doctors need not only to know the main symptoms in a patient but also the other factors in life and surrounding that lead to disease in the patient. For collecting all the necessary information about the patient, the doctors need to spend a lot of time with the patient asking necessary questions to get the important details. The doctor needs to document all the data for further use and needs to remember all the patient details and remedies. The proposed system is intended to develop an Intelligent System using data mining modelling technique, namely, Naive Bayes. It is implemented as Java application in which user answers the predefined questions. It retrieves hidden data from stored database and compares the user values with trained data set. It can answer complex queries for diagnosing heart disease and thus assist healthcare practitioners to make intelligent clinical decisions which traditional decision support systems cannot.

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ABBREVIATION

HDPS	Heart Disease Prediction System
IOS	iPhone Operating System
JDK	Java Development Kit

1. INTRODUCTION

1.1 Introduction

Nowadays to live luxurious life people work like machine in order to earn lot of money hence they forget to take care of their health. Because of this, there is change in the food which they consume, their lifestyle changes. They are more tensed and in very much pressure to earn money so this leads to blood pressure, diabetes and various other diseases at young age. All these reasons lead to negligence of their health which increases the chances of heart disease. Heart is the most essential organ of the human body and if it gets affected then it also affects the other major organs of the body. The aim of proposed system is to design an automated system which would manage complete clinical details, patient's history and their appointment details in a single database. Doctors will use this system to keep track of the patient consulting to them. The intentions of the proposed system are to reduce over-time pay and increase the number of patients that can be treated accurately. Many hospital information systems are designed to support patient billing, inventory management and generation of simple statistics. Some hospitals use decision support systems but are largely limited. They can answer simple queries like "What is the average age of patients who have heart disease?", "How many surgeries had resulted in hospital stays longer than 10 days?", "Identify the female patients who are single, above 30 years old, and who have been treated for cancer." However, they cannot answer complex queries like "Given patient records, predict the probability of patients getting a heart disease." Clinical decisions are often made based on doctors' 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. The proposed system 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 modelling 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. Quality service implies diagnosing patients correctly and administering treatments that are effective. Poor clinical decisions can lead to disastrous consequences which are therefore unacceptable. Hospitals must also minimize the cost of clinical tests. They can achieve these results by employing appropriate computer-based information and/or decision support systems. The healthcare industry collects huge amounts of healthcare data which, unfortunately, are not "mined" to discover hidden information for effective decision making. Discovery of hidden patterns and relationships often goes unexploited. Advanced data mining techniques can help remedy this situation. It is a prototype Heart Disease Prediction System (HDPS) using data mining techniques, namely, Decision Trees, Naïve Bayes. After successfully predicting whether the patient is prone to heart disease or not, the proposed system will provide with the set of questions which the patient will have to answer. Depending upon the answers given by the patient the pattern matching algorithm will generate the corresponding remedy.

1.2 Aim and Objectives

The main objectives of the proposed System are

- The main aim of the proposed System is to reduce the paper work and to avoid missing of data.
- To design a Heart Disease Prediction System which will provide automated medical diagnosis of the patient.
- Storage of patient's medical history into Database.
- Generating different Diagnosis using Data Mining technique.
- To calculate probabilities for a patient about the chances of Heart Disease.
- To provide remedies depending upon the symptoms specified by the patient.

1.3 Organization of Report

Chapter 1 of the report contains Introduction to this project which explains why this project is undertaken and the concepts associated with it. Chapter 2 of the report consists of Literature survey where key for improvements in existing technologies is determined. Chapter 3 explains problem statement, Chapter 4 deals with designing of the system. Chapter 5 is divided into two phases, Module-I deals job recommendations and module-II deals with skills recommendation for the listed jobs. Chapter 6 discusses results in detail. Rest of the report deals with conclusion and future scope

2. LITERATURE SURVEY

According to literature - 3, An Intelligent Heart Disease Prediction System (IHDPS) is developed by using data mining techniques Naive Bayes, Neural Network, and Decision Trees was proposed by Sellappan Palaniappan [3]. Each method has its own strength to get appropriate results. To build this system hidden patterns and relationship between them is used. It is web-based, user friendly & expandable.

According to literature - 1, The System can discover and extract hidden knowledge associated with diseases (heart attack, cancer and diabetes) from a historical heart disease database. It can answer complex queries for diagnosing disease and thus assist healthcare practitioners to make intelligent clinical decisions which traditional decision support systems cannot. By providing effective treatments, it also helps to reduce treatment costs. To enhance visualization and ease of interpretation, it displays the results in tabular and PDF forms [1].

According to literature - 4, This System helps us to understand data extraction using lookup tables by different techniques. Various Notations are used to denote different combinations. Data extraction can be done by performing logical operations on one or more variables in the records, or by comparing variables to values contained in a lookup table [4]. This study focuses on using a lookup table to extract records.

3. PROBLEM STATEMENT

- Development of software to be used for practical applications rather than only in research field.
- Doctors need not only to know the main symptoms in a patient but also the other factors in life and surrounding that lead to disease in the patient.
- The proposed system is intended to develop an Intelligent System using data mining modeling technique, namely, Naive Bayes. It retrieves hidden data from stored database and compares the user values with trained data set.
- It can answer complex queries for diagnosing heart disease and thus assist healthcare practitioners to make intelligent clinical decisions which traditional decision support systems cannot.
- The goal is to develop an automated system, which will facilitate the doctor to have health records of patients and generate e-prescriptions using data mining techniques.
- Once the data is extracted, cleaned and stored in the database, pattern matching is done with the medicine database to analyze the symptoms and provide a list of probable remedies. This will help the doctor to treat the patients.
- The doctor can enter his observations into the database using a desktop application. This will make it easier for him to keep track of all his patients' recovery processes.

4. SYSTEM ANALYSIS

4.1. Existing System

abc Homeopathy (abchomeopathy.com) [5]

abc Homeopathy is a free online homeopathic tool suggests homeopathic remedies based on the symptoms you enter. Homeopathy relies on gathering a detailed picture of your complaint before Homeopathic Remedies can be correctly prescribed. Therefore, for this homeopathic remedy finder software to work properly, you should enter all your symptoms, using the search or the tick categories, or both. You can add symptoms at any stage; you do not have to add them all at the beginning. [5]

Working of abc Homeopathy:

Enter your symptoms

The home page of the homeopathic remedy finder offers you a choice of Searching or Browsing to find your symptoms. If you choose to search, bear in mind that you are searching for symptoms, not a condition. (Search for headache, sore throat, exhaustion, sneezing, coughing and running nose rather than flu). It also allows users to group a symptom set by the name of a condition but be aware that these conditions will not be exhaustive lists of possible symptoms. Although these are quicker and more convenient to use, you should supplement them with other symptoms specific to your case. The more symptoms you include, the more accurate the final result will be

Refine your symptoms

In most cases, the results of searching or ticking boxes produce more options such as exactly where, when and how symptoms occur. Depending on the precision of your search, you may also be presented with more options after that, as sub options from what you have already ticked. Homeopathy requires exact definitions of your symptoms to be useful. Therefore, there will be a maximum of 5 screens of tick-boxes to refine your symptoms. You can choose to ignore them, and just press next at any time to see the best remedy matches up to that point; you can of course then use the back button on your browser to resume ticking. If none apply, just press next.

Select a remedy

The aim is to find the one remedy which best matches all your symptoms. When there are no more questions to be asked, you will be presented with a screen showing details of the best remedy for your complaint. Usually the remedy will not be appropriate for all the symptoms you enter, and often there are other equally likely remedies. To differentiate between the most likely remedies, you can also see the remedy grid, with the symptoms down the left and the remedies across the top, by pressing the next button again. They are arranged with the best match on the left, and then less likely remedies to the right. A maximum of 12 remedies are shown at any time. With the remedy grid, you can easily compare remedies, and even rearrange the grid, prioritizing any symptom and discarding others.

4.2 Proposed System

The Proposed system consists of the following modules:

Module – 1 :- Registration and Data collection

- The patient needs to have his/her account. For that the patient needs to enter his personal details and create an account.
- The patient will have to fill the forms containing questionnaires. After the completion of forms, the proposed system database will be updated with the patient records.

Module – 2 :- Finding the Probability

- After the collection of the data entered by the patient, the proposed system will generate the probability whether the patient is in risk of a heart disease or not.

Module – 3 :- Generating the Remedy

- Depending upon the probability of the heart disease of the patient, the further questions will appear.
- The symptoms will be entered by the patients and depending upon the probability and the symptoms, the remedy will be generated and will be displayed.

4.3 Analysis

Analysis on classification algorithms

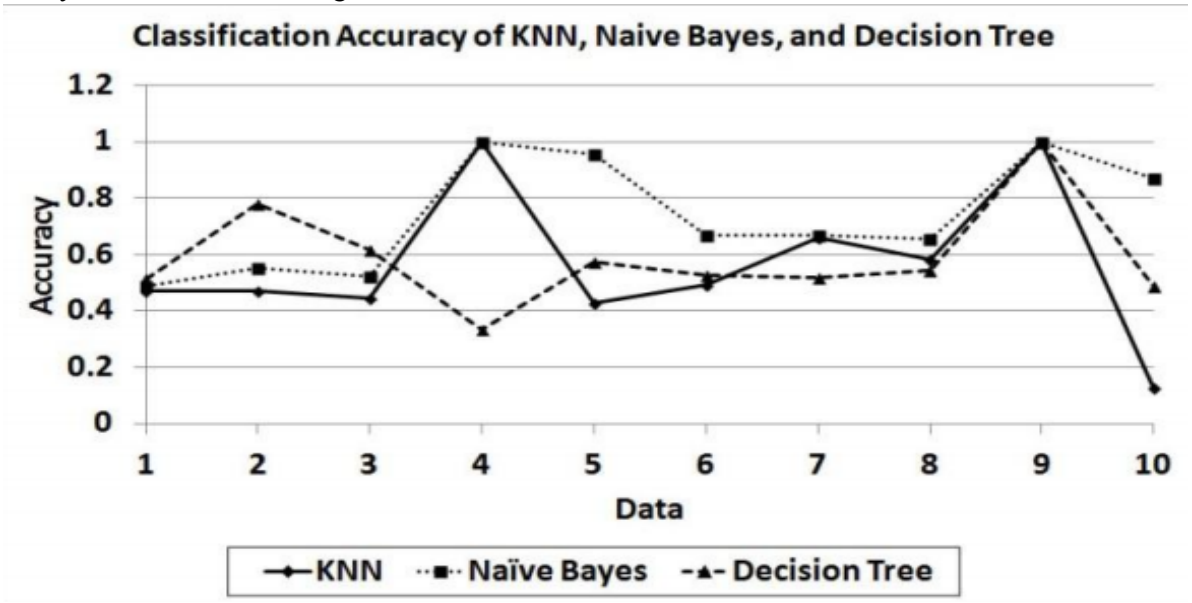


Fig 4.1 Classification of different algorithm

Although it is a simple method, Naïve Bayes can outperform more sophisticated classification methods. In this experiment, Naïve Bayes outperforms Decision Tree and k-Nearest Neighbor. The reason for Naïve Bayes good performance is not because there are no attribute dependences in the data. In fact, its good performance is caused by the zero-one loss function used in the classification.

4.4. Hardware and software details

4.4.1 Software Required

- XAMPP
- Eclipse
- JDK
- NetBeans
- MySQL

4.4.2 Hardware Required

- Server to connect to the database
- 2 GB Ram
- Pentium processor

4.5 Methodology

The Heart Disease Prediction System (HDPS) is done using Naïve Bayes Data mining technique [1].

Record set with medical attributes was obtained from the Cleveland Heart Disease database. With the help of the dataset, the patterns significant to the heart attack prediction are extracted.

Questionnaires are also sharply limited by the fact that respondents must be able to read the questions and respond to them.

The records are split equally into two datasets:

- Training dataset.
- Testing dataset.

The attribute "Diagnosis" is identified as the predictable attribute with value "1" for patients with heart disease and value "0" for patients with no heart disease. "PatientId" is used as the key; the rest are input attributes. It is assumed that problems such as missing data, inconsistent data, and duplicate data have all been resolved.

Table 4.1 Attributes of Naive Bayes

Serial No.	Attribute	Description
1	Sex	value 1: Male value 0: Female
2	Chest Pain Type	value 1: typical type 1 angina value 2: typical type angina value 3: non-angina pain value 4: asymptomatic
3	Fasting Blood Sugar	value 1: > 120 mg/dl value 0:< 120 mg/dl
4	RestECG	resting electrographic results value 0: normal value 1: 1 having ST-T wave abnormality value 2: showing probable/definite left ventricular hypertrophy
5	Exang	exercise induced angina value 1: yes value 0: no
6	Slope	the slope of the peak exercise ST segment value 1: unsloping value 2: flat value 3: downsloping
7	CA	number of major vessels colored by floursopy (value 0 – 3)
8	Thal	value 3: normal value 6: fixed defect value 7: reversible defect
9	Trest Blood Pressure	(mm Hg on admission to the hospital)
10	Serum Cholesterol	(mg/dl)
11	Thalach	maximum heart rate achieved
12	Oldpeak	ST depression induced by exercise
13	Age	In year
14	Height	In cms
15	Weight	In kgs

Table 4.5 Attributes of Naive Bayes

4.5.1 Bayes Rule

A conditional probability is the likelihood of some conclusion, *C*, given some evidence/observation, *E*, where a dependence relationship exists between *C* and *E*.

This probability is denoted as P *(C |E)* where $P(A/B) = \frac{P(B/A)P(A)}{P(B)}$ ..... (I)

For proposition A and evidence B

- P(A), the prior, is the initial degree of belief in A.
- P (A | B), the posterior, is the degree of belief having accounted for B.
- P (B | A) / P(B) represents the support B provides for A [1].

4.6. Design details

4.6.1 Architecture of the proposed System

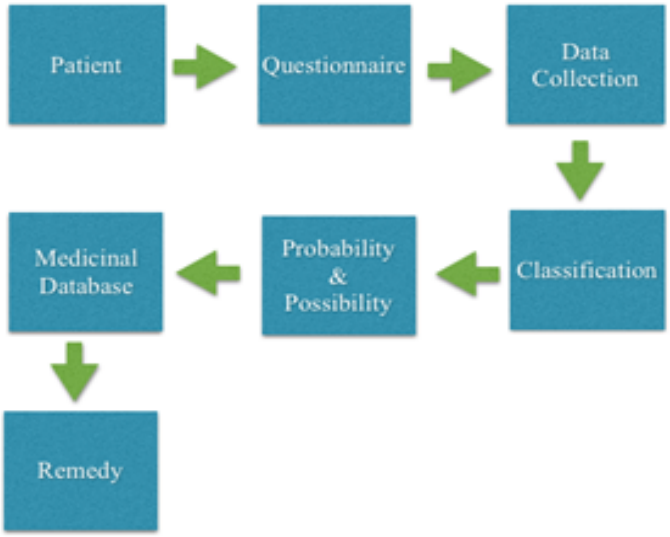


Figure 4.2 Architecture of the proposed System

The proposed system is done as Java Application. The patients need to answer various questions and the data is collected and then stored in the database. The data is classified (Figure - 4.2) based on the different possibilities. The patient can check whether he is prone to heart attack or not. The data entered by the patient is considered and the probability is generated whether the patient is in risk of getting the heart attack or not. Further questions are asked to the patient and depending upon the answers, remedy is generated. The medicine corresponding to a particular symptom is displayed. The doctors can view the patient details as well as the medicine database.

The proposed system is divided into two parts

- Data collection
- Probability generation
- Generation of remedies

4.6.2 Data Collection

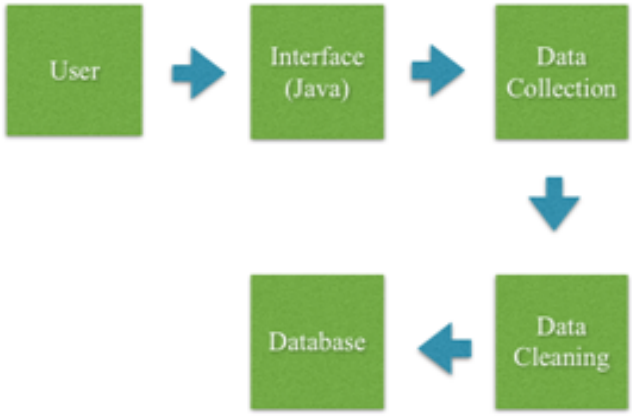


Figure 4.3 Data Collection

Data collection (Figure – 4.3) is meant to be used by the patients and the probability generation to be used by doctors or patients. In Data collection the main functionality of the system is carried out. The system would direct the patients to answer a few questions in order to get necessary diagnosis. The information collected from the patient includes personal details, associated complaints and reactions experienced. The symptom file is generated from the medicine database. The symptoms from the segregated sections are pattern matched with symptoms present in the symptom file. The matched symptoms are then used to generate remedies from the medicine database and the probability of the remedies. The symptoms are segregated depending upon the attributes (Figure – 4.4).

Figure 4.4 Segregation the symptoms

4.6.3 Probability Generation

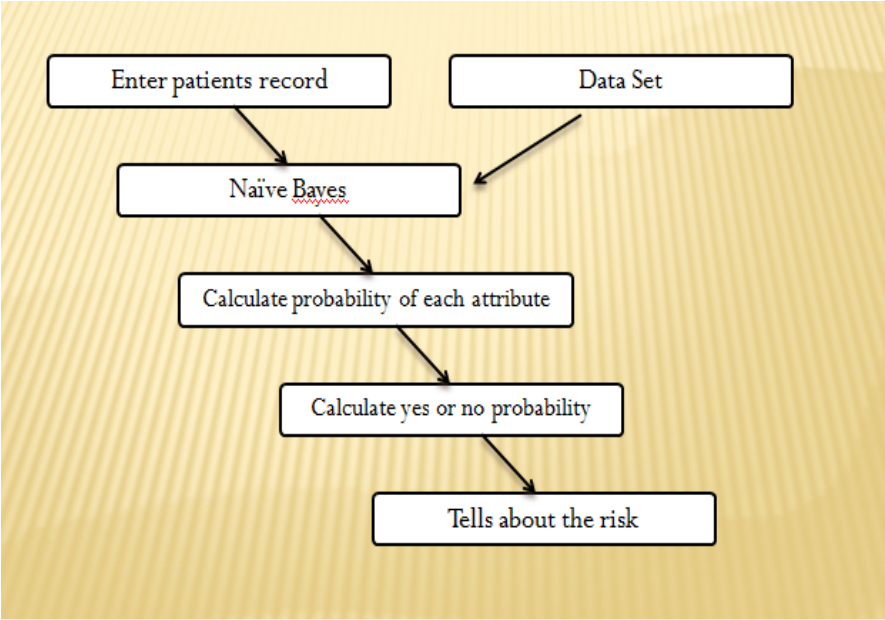


Fig 4.5 Probability Generation

In the above Fig 4.5, the patient will enter his records and the algorithm will generate the probability depending upon the following steps

- The values in data set will be filtered in order to get discrete values.
- Then probability of each attribute will be calculated and then the combined probability will be shown.

4.6.4 Remedy generation of proposed system

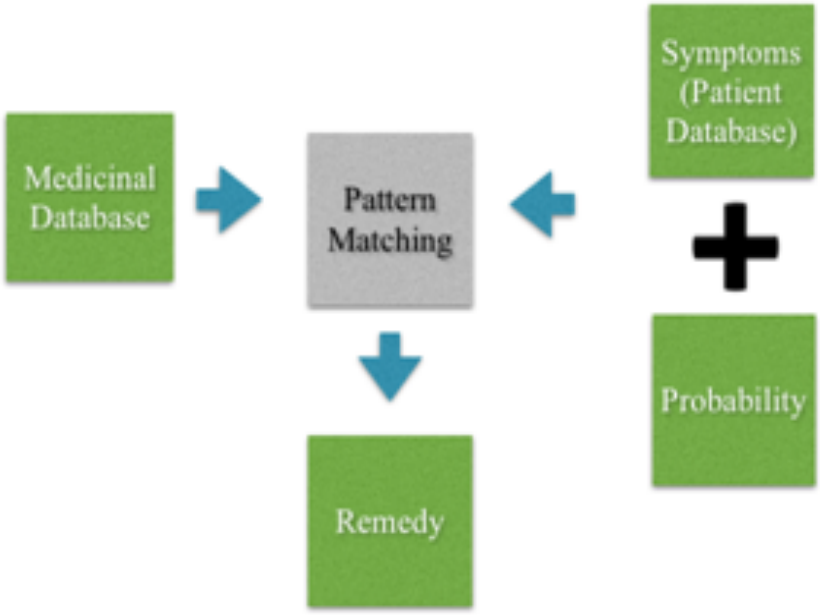


Figure 4.6 - Remedy generation

The symptoms are taken from the patient database and segregated into categories. These symptoms categories are matched with the symptom file created from the medicine database. After pattern matching the necessary remedies with their probability is displayed (Figure – 4.6).

5. IMPLEMENTATION

5.1 Module-I Data Collection and Registration

The first module i.e Data Collection and Registration consists of registration page where the patient's data is collected and stored in the database.

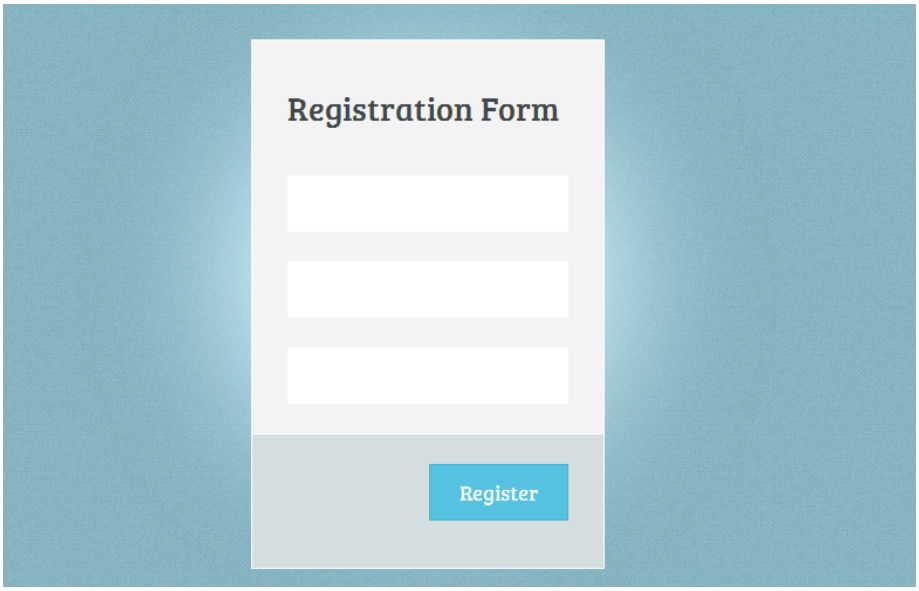
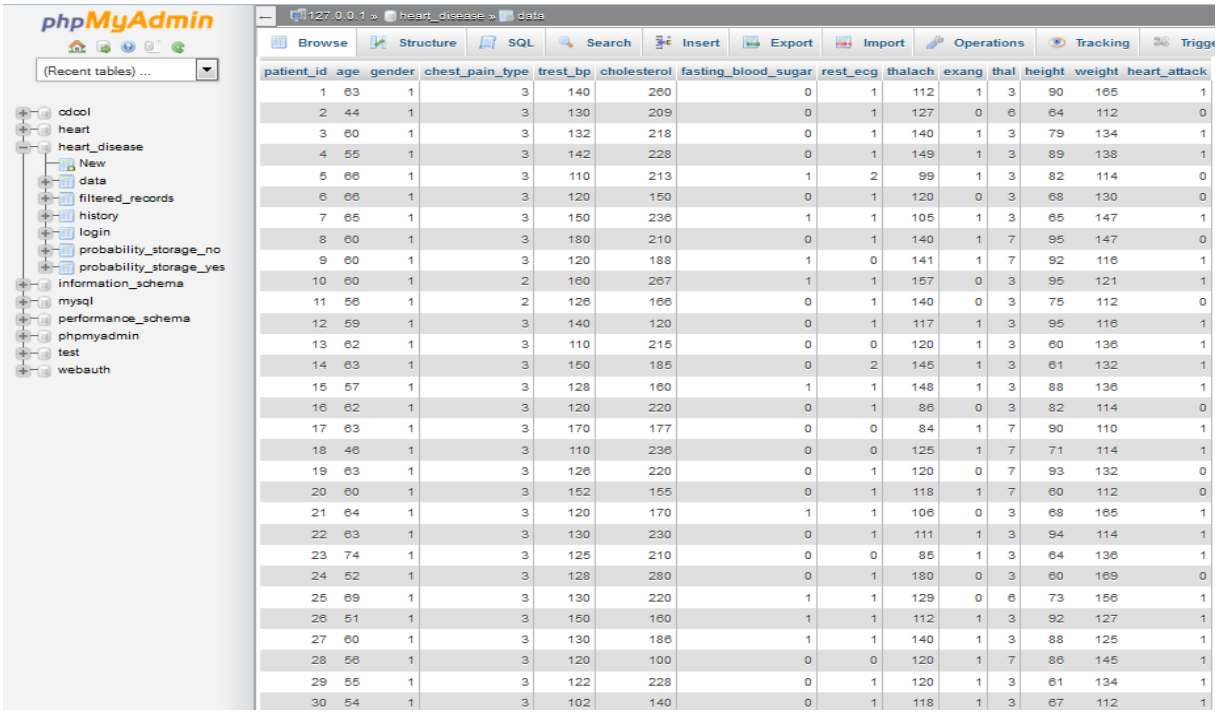


Fig. 5.1 Registration Form

In the above figure 5.1, there are 3 fields which consists of username, password and confirm password. The patient while creating a new account has to enter the desired username which the patient wants, enter the password, and then again, he will have to enter the password to confirm whether the password enter previously matches with the password entered now.



patient_id	age	gender	chest_pain_type	trest_bp	cholesterol	fasting_blood_sugar	rest_ecg	thalach	exang	thal	height	weight	heart_attack
1	63	1	3	140	260	0	1	112	1	3	90	165	1
2	44	1	3	130	209	0	1	127	0	6	64	112	0
3	60	1	3	132	218	0	1	140	1	3	79	134	1
4	55	1	3	142	228	0	1	149	1	3	89	138	1
5	66	1	3	110	213	1	2	99	1	3	82	114	0
6	66	1	3	120	150	0	1	120	0	3	68	130	0
7	65	1	3	150	236	1	1	105	1	3	65	147	1
8	60	1	3	180	210	0	1	140	1	7	95	147	0
9	60	1	3	120	188	1	0	141	1	7	92	116	1
10	60	1	2	160	267	1	1	157	0	3	95	121	1
11	56	1	2	126	166	0	1	140	0	3	75	112	0
12	59	1	3	140	120	0	1	117	1	3	95	116	1
13	62	1	3	110	215	0	0	120	1	3	60	136	1
14	63	1	3	150	185	0	2	145	1	3	61	132	1
15	57	1	3	128	160	1	1	148	1	3	88	136	1
16	62	1	3	120	220	0	1	86	0	3	82	114	0
17	63	1	3	170	177	0	0	84	1	7	90	110	1
18	46	1	3	110	236	0	0	125	1	7	71	114	1
19	63	1	3	126	220	0	1	120	0	7	93	132	0
20	60	1	3	152	155	0	1	118	1	7	60	112	0
21	64	1	3	120	170	1	1	106	0	3	68	165	1
22	63	1	3	130	230	0	1	111	1	3	94	114	1
23	74	1	3	125	210	0	0	85	1	3	64	136	1
24	52	1	3	128	280	0	1	180	0	3	60	169	0
25	69	1	3	130	220	1	1	129	0	6	73	156	1
26	51	1	3	150	160	1	1	112	1	3	92	127	1
27	60	1	3	130	186	1	1	140	1	3	88	125	1
28	56	1	3	120	100	0	0	120	1	7	86	145	1
29	55	1	3	122	228	0	1	120	1	3	61	134	1
30	54	1	3	102	140	0	1	118	1	3	67	112	1

Fig 5.2 Database Details

In the above figure 5.2, the database details have been specified. Different attributes, their corresponding values etc have been specified.

5.2 Module-II Probability Finder

In the second module, i.e the probability finder, the patient will have to enter the values of the attributes which are specified in the form (Fig 5.3). The algorithm will accept the data from the patient; it will check in the database and then show the result.

The steps are as follows

- Once the data has been entered, depending upon the different conditions, the data will be filter.
- After the data is filtered, it will be classified into 2 different things i.e probabilities with yes as result and no as the result.
- The probability of each attribute will be calculated
- In the end, the net probability will be calculated depending upon the individual probability
- In this way the probability whether he is suffering from heart disease or not will be shown.

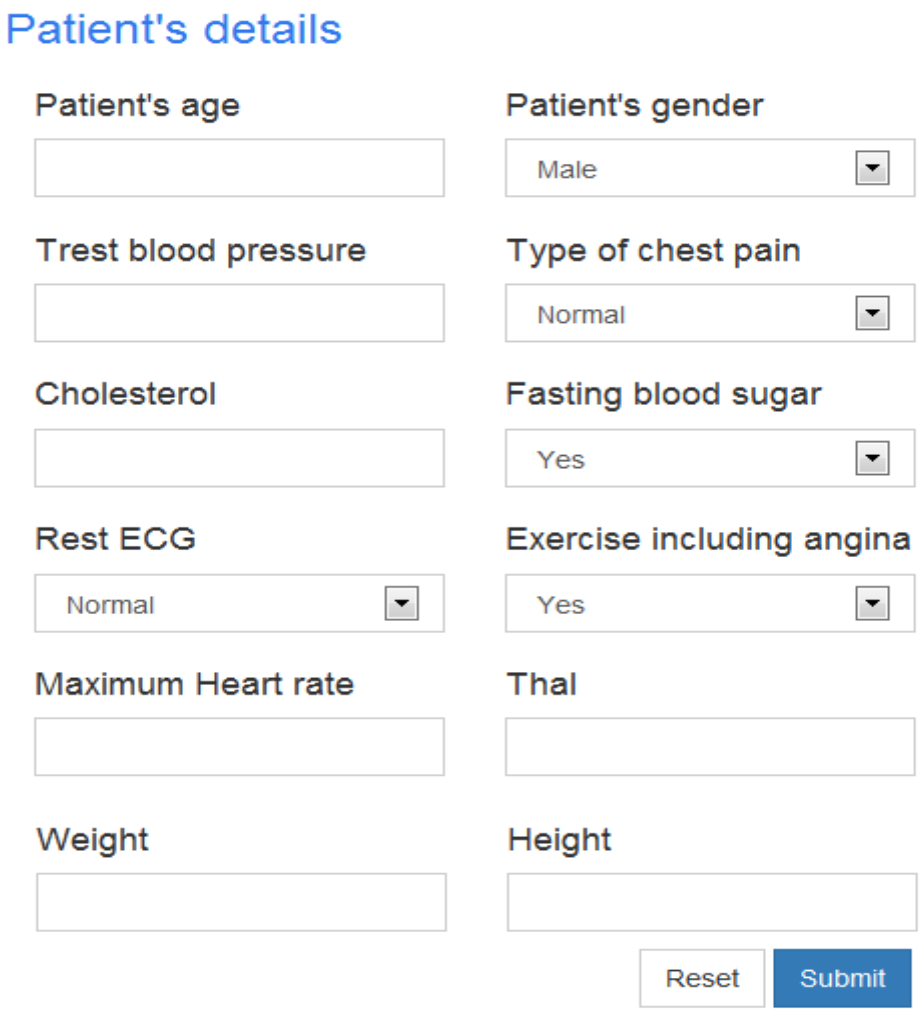


Fig 5.3 Probability Finder form

5.3 Module-III Remedy Generation

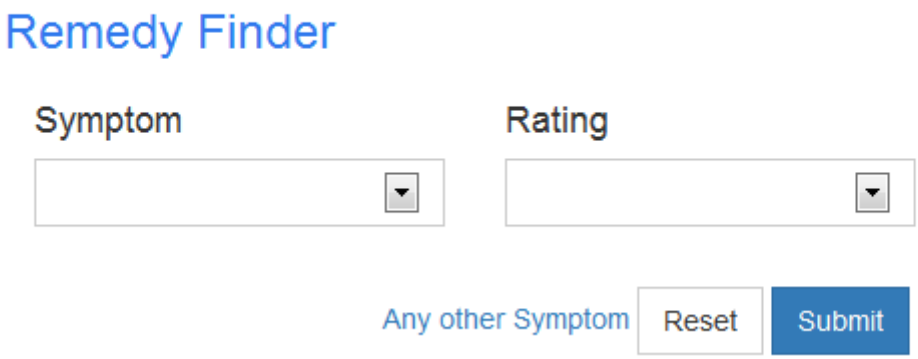


Fig 5.4 Remedy Generation Form

In the third module, i.e. the remedy generation module, the patient will have to enter the symptoms which he/she is facing. Also, the patient will have to enter the rating i.e. the scale of the symptom (from 0-9). Depending on it the patient will be shown with the proper remedy.

6. RESULTS

6.1 Data Collection and Registration

A new patient is registered successfully. The data is collected and stored in the database which is used for further classification and filtering of records to make the output more efficient and proper.

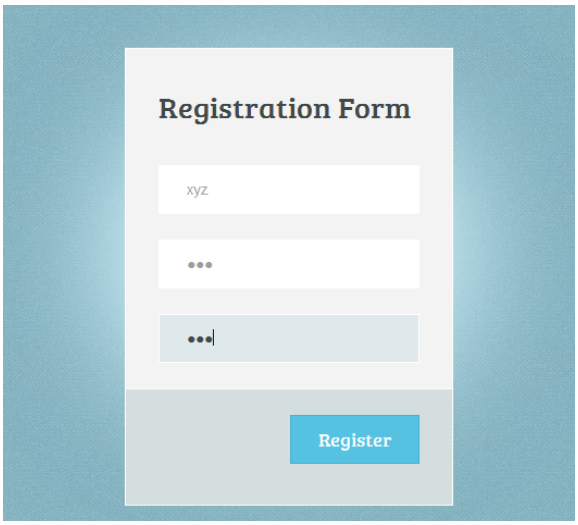


Fig 6.1 Registration Form

In the above figure 6.1, there are 3 fields which consists of username, password and confirm password. The patient while creating a new account has to enter the desired username which the patient wants, enter the password, and then again, he will have to enter the password to confirm whether the password enter previously matches with the password entered now.

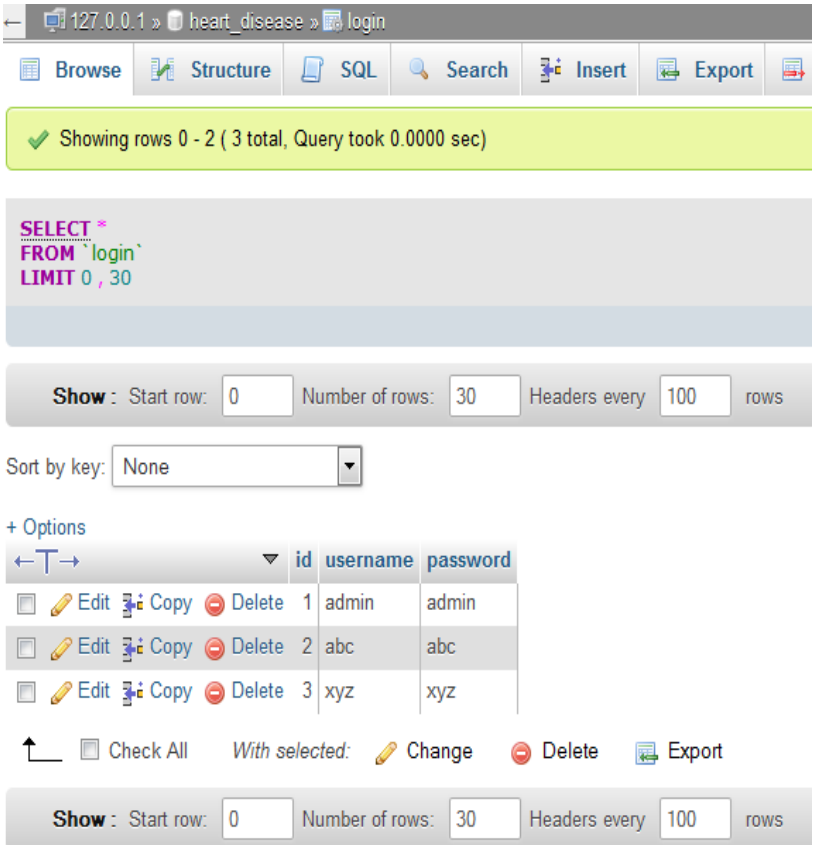


Fig 6.2 Registration Result

In the above Fig 6.2, the patient who entered the value for registering his account has successfully registered and the data is stored in the database.

6.2 Probability Finder

The form consists of various attributes which are supposed to be filled by the patient in order to check for the probability whether he is suffering from heart disease or not. Once he has entered the data, the dataset present in the database is filtered and then the probability is calculated of each attribute and then combined probability is generated.

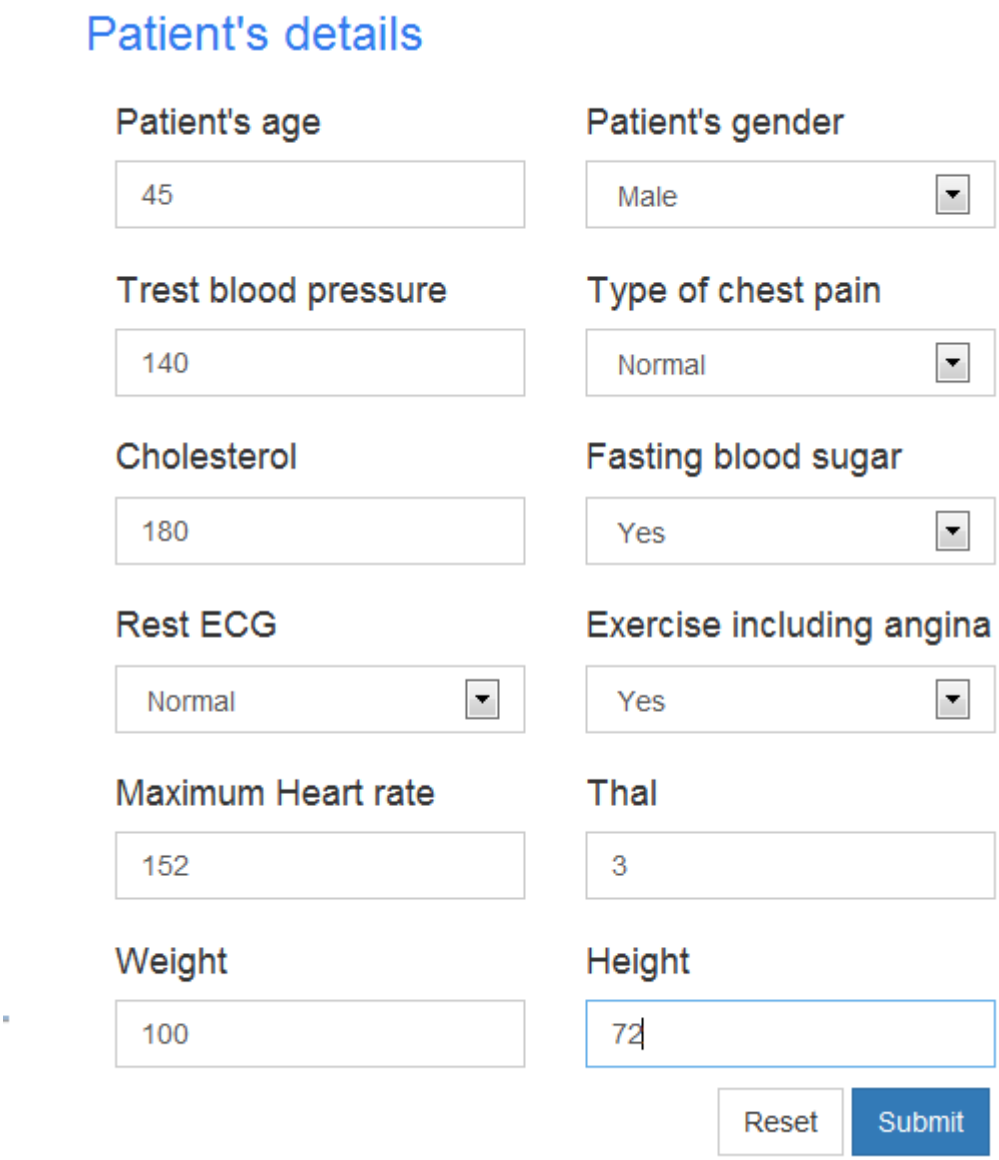


Fig 6.3 Details Form

User having heart disease
Yes Probability:3.0393838E-5
No Probability2.2323697E-5
Go back to main page? Click here

Fig 6.4 Heart Disease Result

In the above Fig 6.3, the patient answers to the various answers which are asked for checking whether he is suffering from heart disease or not. In the Fig 6.4, the patient is shown the probability of his disease in terms of yes or no.

6.3 Remedy Generation

The form consists of 2 attributes which are supposed to be filled. The 2 attributes are Symptom and Ratings. The patient will have to enter the symptom which he/she is facing and also the rating of it. The symptom will be searched in the database and remedy will be provided.

Fig 6.5 Remedy Finder Form

The above Fig 6.5 shows the remedy finder form where the patient needs to enter the symptom and scale the level of symptom from 0-9.

7. PROJECT TIMELINE AND TASK DISTRIBUTION

Table 1: Project Timeline

Month	Work to be done
June-July	Study and understand the working of different attributes which are directly or indirectly involved in Heart Disease
August-September	Research on methods to be applied
October	Data collection, identification of open source
January-February	Coding, Implementation and final testing.
March-April	Delivery/Deployment of project with documentation

Table 7.1 Project Timeline

Table 2: Task Distribution

Name	Data Collection	Probability Finder	Remedy Generation	Black Book	Weekly Report	IEEE Paper
Shreerang Paradkar	No	Yes	Yes	Yes	Yes	Yes
Kedar Patil	Yes	No	Yes	Yes	Yes	Yes
Amit Sawant	Yes	Yes	No	Yes	Yes	Yes

Table 7.2 Task Distribution

8. CONCLUSION

Decision Support in Heart Disease Prediction System is a Java Application which is intended to be done using Data mining technique "Naive Bayesian Classification technique". The system extracts hidden knowledge from the database. HDPS can be further enhanced and expanded. It can also incorporate other data mining techniques. Another area is to use Text Mining to mine the vast amount of unstructured data available in healthcare databases.

FUTURE WORK

1. Mobile Application
   - We can develop mobile application on Android and IOS platforms for making the system easily available.
   - We can provide a SMS facility that will send a message to the patient regarding his heart condition and how to take effective measures to reduce the danger.

2. Pacemaker
   - We can integrate the system with pacemaker. A pacemaker is a small device that's placed in the chest or abdomen to help control abnormal heart rhythms.
   - This device uses electrical pulses to prompt the heart to beat at a normal rate.

9. REFERENCES

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(Signature)

(Shreerang Paradkar, Roll No: 42)

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