

MULTIPLE DISEASE PREDICTION USING LOGISTIC REGRESSION

Submitted by

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**KIT-KALAIKARNANINIDHI INSTITUTE OF
TECHNOLOGY**

(An Autonomous Institution)

MAIN PROJECT REPORT

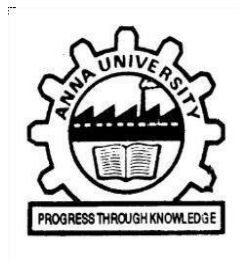
Submitted to the

**FACULTY OF INFORMATION AND COMMUNICATION
ENGINEERING**

In partial fulfillment of the award of the degree

of

MASTER OF COMPUTER APPLICATIONS



ANNA UNIVERSITY : CHENNAI - 600 025

JAN-2022

BONAFIDE CERTIFICATE

Certified that this project report “**MULTIPLE DISEASE PREDICTION USING LOGISTIC REGRESSION**” is the bonafide work of **Mr. DINESHKUMAR M(711520MMC004)** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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DECLARATION

I affirm that the project work titled “ **MULTIPLE DISEASE PREDICTION USING LOGISTIC REGRESSION**” being submitted in partial fulfillment for the award of **Mr.M.DINESHKUMAR (711520MMC004)** is the original work carried out by us . It has not formed the part of any other project work submitted for award of any degree or diploma, either in this or any other university.

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ACKNOWLEDGEMENT

My heart felt gratitude and thanks to the Almighty God, my parents and other family members and friends for providing the opportunity to undergo this project successfully in this esteemed institution.

At the outset, I would like to thank our **Founder and Chairman Thiru. PONGALUR N. PALANISAMY, KIT- Kalaigharkarunanidhi Institute of Technology**, who has given me an opportunity to undergo this Project Work, successfully in this esteemed Institution.

I express my sincere thanks to **Mrs. P. INDU MURUGESAN, Vice Chairperson, KIT- Kalaigharkarunanidhi Institute of Technology**, who encouraged me by giving her support and constant encouragement.

I extend my grateful thanks and wishes to **Dr. N. MOHANDAS GANDHI, ME.,MBA.,Ph.D., Principal KIT- Kalaigharkarunanidhi Institute of Technology**, for the valuable suggestion in framing my carrier towards the fulfillment of this Project work.

I express my sincere thanks to **Dr. M. RAMESH, ME., Ph.D., Vice Principal, KIT- Kalaigharkarunanidhi Institute of Technology**, who encouraged me by giving his valuable suggestion and constant encouragement.

I would like to acknowledge the respective **Mr. E. VIJAYAKUMAR MCA., (Ph.D .,) Associate and Head Department of Computer Applications, KIT- Kalaigharkarunanidhi Institute of Technology**, for spending the valuable time in guiding and supporting me to make this project a successful one.

I take the privilege to extend my hearty thanks to our project Coordinator and my internal guide **Mr. R. PUNITHAVEL M.C.A., Assistant professor, Department of Computer Applications** for spending his valuable time and energy in guiding, supporting and helping me in preparation of the project.

Finally with great enthusiasm I express my thanks to all the faculty members for providing necessary information and their sustained interest in my part of successful completion.

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ABSTRACT

Due to machine learning progress in biomedical and healthcare communities, accurate study of medical data benefits early disease recognition, patient care and community services. When the quality of medical data is incomplete the exactness of study is reduced. Moreover, different regions exhibit unique appearances of certain regional diseases, which may results in weakening the prediction of disease outbreaks. In the proposed system, it provides machine learning algorithms for effective prediction of various disease occurrences in disease-frequent societies. It experiment the altered estimate models over real-life hospital data collected. To overcome the difficulty of incomplete data, it use a latent factor model to rebuild the missing data. It experiment on a regional chronic illness of cerebral infarction. Using structured and unstructured data from hospital it use Machine Learning algorithm. It predicts probable diseases by mining data sets such as Covid-19, Chronic Kidney disease and heart Disease. To the best of our knowledge in the area of medical big data analytics none of the existing work focused on both data types. Compared to several typical estimate algorithms, the calculation exactness of our proposed algorithm reaches 94.8% with a convergence speed which is faster than that of the machine learning disease risk prediction algorithm.

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CHAPTER 1

INTRODUCTION

- The Earth is going through a purplish patch of technology where the demand of intelligence and accuracy is increasing behind it. Today's people are likely addicted to internet but they are not concerned about their physical health.
- People ignore the small problem and don't visit to visit hospital which turn into serious disease with time. Taking the advantage of this growing technology, our basis aim is to develop such a system that will predict the multiple diseases in accordance with symptoms put down by the patients without visiting the hospitals / physicians.
- Machine Learning is a subset of AI that is mainly deal with the study of algorithms which improve with the use of data and experience. Machine Learning has two phases i.e. Training and Testing. Machine Learning provides an efficient platform in medical field to solve various healthcare issues at a much faster rate.
- There are two kinds of Machine Learning – Supervised Learning and Unsupervised Learning. In supervised learning we frame a model with the help of data that is well labelled. On the other hand, unsupervised learning model learn from unlabeled data.
- The intent is to deduce a satisfactory Machine Learning algorithm which is efficient and accurate for the prediction of disease. In this paper, the supervised Machine Learning concept is used for predicting the diseases.
- The main feature will be Machine Learning in which we will be using machine learning algorithm which will help in early prediction of diseases accurately and better patient care.

1.1 ABOUT THE PROJECT

The smart health prediction system focused for optimally reducing the healthcare costs. There are several functionalities remain untouched into health prediction system. So by living in the edge of technology and still if we are not able to utilize it in efficient and proper manner then there is no use of it. To tackle this, research is carried out in health prediction system. There are several applications which use any one of the technology. This project shows the merging of both technologies to achieve efficient result.

OBJECTIVES:

Aim of the Project:

- The analysis accuracy is reduced when the quality of medical data is incomplete.
- Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks.
- However, those existing work mostly considered structured data.
- There is no proper methods to handle semi structured and unstructured.
- The proposed system will consider both structured and unstructured data.
- The analysis accuracy is increased by using Machine Learning algorithm.

Scope of the Project:

- In this work, our goal is to provide a tool to assist professionals and consumers in finding and choosing disease.
- To achieve this goal, we develop an approach that allows a user to query for disease that satisfy a set of conditions based on disease properties, such as disease indications and also takes into account patient profiles.

1.2 COMPANY PROFILE



About Us

Established in the year 2010, Green Tree Software Solutions in Tambaram West, Chennai is a top player in the category Tally Training Institutes in the Chennai. This well-known establishment acts as a one-stop destination servicing customers both local and from other parts of Chennai. Over the course of its journey, this business has established a firm foothold in it's industry. The belief that customer satisfaction is as important as their products and services, have helped this establishment garner a vast base of customers, which continues to grow by the day. This business employs individuals that are dedicated towards their respective roles and put in a lot of effort to achieve the common vision and larger goals of the company. In the near future, this business aims to expand its line of products and services and cater to a larger client base. In Chennai, this establishment occupies a prominent location in Tambaram West. It is an effortless task in commuting to this establishment as there are various modes of transport readily available. Green Tree Software Solutions in Tambaram West has a wide range of products and / or services to cater to the varied requirements of their customers. The staff at this establishment are courteous and prompt at providing any assistance.

CHAPTER 2

SYSTEM ANALYSIS

2.1 EXISTING SYSTEM

Machine can predict diseases but cannot predict the sub types of the diseases caused by occurrence of one disease. It fails to predict all possible conditions of the people. Existing system handles only structured data. The prediction system are broad and ambiguous. In current past, countless disease estimate classifications have been advanced and in procedure. The standing organizations arrange a blend of machine learning algorithms which are judiciously exact in envisaging diseases. However the restraint with the prevailing systems are speckled. First, the prevailing systems are dearer only rich people could pay for to such calculation systems. And also, when it comes to folks, it becomes even higher. Second, the guess systems are non-specific and indefinite so far. So that, a machine can envisage a positive disease but cannot expect the sub types of the diseases and diseases caused by the existence of one bug. For occurrence, if a group of people are foreseen with Diabetes, doubtless some of them might have complex risk for Heart viruses due to the actuality of Diabetes. The remaining schemes fail to foretell all possible surroundings of the tolerant.

2.1.1 Draw Backs

- Does not analyze the disease
- Less security
- There is no feedback system

2.2 PROPOSED SYSTEM

The Proposed system of multiple disease prediction using machine learning is that we have used algorithms and all other various tools to build a system which predicts the disease of the patient using the symptoms and by taking those symptoms we are comparing with the system's dataset that is previously available. By taking those datasets and comparing with the patient's disease we will predict the accurate percentage disease of the patient. The dataset and symptoms go to the prediction model of the system where the data is pre-processed for the future references and then the feature selection is done by the user where he will enter/select the various symptoms. Then the classification of those data is done with the help of machine learning algorithms such as Logistic regression. Then the data goes in the recommendation model, there it shows the risk analysis that is involved in the system and it also provides the probability estimation of the system such that it shows the various probability like how the

system behaves when there are n number of predictions are done and it also does the recommendations for the patients from their final result and also from their symptoms like it can show what to use and what not to use from the given datasets and the final results. It predicts probable diseases by mining data sets such as Covid-19, Chronic Kidney disease and heart Disease. To the best of our knowledge in the area of medical big data analytics none of the existing work focused on both data types.

ADVANTAGES OF PROPOSED SYSTEM

- Easily analyze the disease
- High Accuracy

PROPOSED ALGORITHM

- Logistic Regression

2.3 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

2.3.1 Economical Feasibility

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

2.3.2 Social Feasibility

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

2.3.3 Technical Feasibility

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

CHAPATER 3

SYSTEM SPECIFICATION

3.1 HARDWARE REQUIREMENTS

- Processor : Core i3/i5/i7
- RAM : 2-4 GB
- HDD : 500 GB

3.2 SOFTWARE REQUIREMENTS

- Platform : Windows Xp/7/8/10
- Coding Language : Python

.

CHAPTER 4

SOFTWARE DESCRIPTION

4.1 FRONT END

Python:

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

- **Python is Interpreted** – Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.
- **Python is Interactive** – You can actually sit at a Python prompt and interact with the interpreter directly to write your programs.
- **Python is Object-Oriented** – Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- **Python is a Beginner's Language** – Python is a great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

History of Python

Python was developed by Guido van Rossum in the late eighties and early nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands.

Python is derived from many other languages, including ABC, Modula-3, C, C++, Algol-68, SmallTalk, and Unix shell and other scripting languages.

Python is copyrighted. Like Perl, Python source code is now available under the GNU General Public License (GPL).

Python is now maintained by a core development team at the institute, although Guido van Rossum still holds a vital role in directing its progress.

Python Features

Python's features include –

- **Easy-to-learn** – Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly.
- **Easy-to-read** – Python code is more clearly defined and visible to the eyes.
- **Easy-to-maintain** – Python's source code is fairly easy-to-maintain.
- **A broad standard library** – Python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh.
- **Interactive Mode** – Python has support for an interactive mode which allows interactive testing and debugging of snippets of code.
- **Portable** – Python can run on a wide variety of hardware platforms and has the same interface on all platforms.
- **Extendable** – You can add low-level modules to the Python interpreter. These modules enable programmers to add to or customize their tools to be more efficient.
- **Databases** – Python provides interfaces to all major commercial databases.
- **GUI Programming** – Python supports GUI applications that can be created and ported to many system calls, libraries and windows systems, such as Windows MFC, Macintosh, and the X Window system of Unix.
- **Scalable** – Python provides a better structure and support for large programs than shell scripting.

Apart from the above-mentioned features, Python has a big list of good features, few are listed below –

- It supports functional and structured programming methods as well as OOP.
- It can be used as a scripting language or can be compiled to byte-code for building large applications.
- It provides very high-level dynamic data types and supports dynamic type checking.
- It supports automatic garbage collection.

- It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.

Python is available on a wide variety of platforms including Linux and Mac OS X. Let's understand how to set up our Python environment.

Getting Python

The most up-to-date and current source code, binaries, documentation, news, etc., is available on the official website of Python <https://www.python.org>.

Windows Installation

Here are the steps to install Python on Windows machine.

- Open a Web browser and go to <https://www.python.org/downloads/>.
- Follow the link for the Windows installer python-XYZ.msifile where XYZ is the version you need to install.
- To use this installer python-XYZ.msi, the Windows system must support Microsoft Installer 2.0. Save the installer file to your local machine and then run it to find out if your machine supports MSI.
- Run the downloaded file. This brings up the Python install wizard, which is really easy to use. Just accept the default settings, wait until the install is finished, and you are done.

What is Python?

Python is a popular programming language. It was created in 1991 by Guido van Rossum.

It is used for:

- web development (server-side),
- software development,
- mathematics,
- system scripting.

What can Python do?

- Python can be used on a server to create web applications.
- Python can be used alongside software to create workflows.
- Python can connect to database systems. It can also read and modify files.
- Python can be used to handle big data and perform complex mathematics.
- Python can be used for rapid prototyping, or for production-ready software development.

Why Python?

- Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc).
- Python has a simple syntax similar to the English language.
- Python has syntax that allows developers to write programs with fewer lines than some other programming languages.
- Python runs on an interpreter system, meaning that code can be executed as soon as it is written. This means that prototyping can be very quick.
- Python can be treated in a procedural way, an object-orientated way or a functional way.

Good to know

- The most recent major version of Python is Python 3, which we shall be using in this tutorial. However, Python 2, although not being updated with anything other than security updates, is still quite popular.
- In this tutorial Python will be written in a text editor. It is possible to write Python in an Integrated Development Environment, such as Thonny, Pycharm, Netbeans or Eclipse which are particularly useful when managing larger collections of Python files.

Python Syntax compared to other programming languages

- Python was designed to for readability, and has some similarities to the English language with influence from mathematics.
- Python uses new lines to complete a command, as opposed to other programming languages which often use semicolons or parentheses.
- Python relies on indentation, using whitespace, to define scope; such as the scope of loops, functions and classes. Other programming languages often use curly-brackets for this purpose.

HTML

HTML is a language for describing web pages. HTML stands for Hyper Text Markup Language. HTML is not a programming language, it is a markup language. A markup language is a set of markup tags. HTML uses markup tags to describe web pages. HTML markup tags are usually called HTML tags. HTML tags are keywords surrounded by angle brackets like `<html>`. HTML tags normally come in pairs like `` and ``. The first tag in a pair is the start tag, the second tag is the end tag. Start and end tags are also called opening tags and closing tags. HTML Documents. HTML documents describe web pages. HTML documents contain HTML tags and plain text. HTML documents are also called web pages.

CSS

A few words about CSS

- CSS stands for Cascading Style Sheets.
- Styles define how to display HTML elements.
- Styles are normally stored in Style Sheets.
- Styles were added to HTML 4.0 to solve a problem.
- External Style Sheets can save you a lot of work.
- External Style Sheets are stored in CSS files.
- Multiple style definitions will cascade into one CSS provides means to customize inbuilt HTML tags.
- HTML tags were originally designed to define the content of a document. They were supposed to say "This is a header", "This is a paragraph", "This is a table", by using tags like `<h1>`, `<p>`, `<table>`, and so on. The layout of the document was supposed to be taken care of by the browser, without using any formatting tags. As the two major browsers - Netscape and Internet Explorer - continued to add new HTML tags and attributes (like the `` tag and the color attribute) to the original HTML specification, it became more and more difficult to create Web sites where the content of HTML documents was clearly separated from the document's presentation layout.

To solve this problem, the World Wide Web Consortium (W3C) - the non profit, standard setting consortium, responsible for standardizing HTML - created STYLES in addition to HTML 4.0. All

major browsers support Cascading Style Sheets. Styles sheets define HOW HTML elements are to be displayed, just like the font tag and the color attribute in HTML 3.2. Styles are normally saved in external .css files. External style sheets enable you to change the appearance and layout of all the pages in your Web, just by editing one single CSS document.

Flask Framework:

Flask is a web application framework written in Python. Armin Ronacher, who leads an international group of Python enthusiasts named Pocco, develops it. Flask is based on Werkzeug WSGI toolkit and Jinja2 template engine. Both are Pocco projects. Http protocol is the foundation of data communication in world wide web. Different methods of data retrieval from specified URL are defined in this protocol.

CHAPTER 5

PROJECT DESCRIPTION

5.1 OVERVIEW OF THE PROJECT

- The analysis accuracy is reduced when the quality of medical data is incomplete.
- Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks.
- However, those existing works mostly considered structured data.
- There are no proper methods to handle semi-structured and unstructured data.
- The proposed system will consider both structured and unstructured data.
- The analysis accuracy is increased by using Machine Learning algorithms.

5.2 MODULE

- Data Collection Module
- Preparing the data Module
- Training a model
- Disease prediction Module

5.2.1 Module Description

Data Collection Module

Be it the raw data from excel, access, text files etc., this step (gathering past data) forms the foundation of the future learning. The better the variety, density and volume of relevant data, better the learning prospects for the machine becomes.

Preparing the data Module

Any analytical process thrives on the quality of the data used. One needs to spend time determining the quality of data and then taking steps for fixing issues such as missing data and treatment of outliers. Exploratory analysis is perhaps one method to study the nuances of the data in details thereby burgeoning the nutritional content.

Training a model

This step involves choosing the appropriate algorithm and representation of data in the form of the model. The cleaned data is split into two parts – train and test (proportion depending on the prerequisites); the first part (training data) is used for developing the model. The second part (test data), is used as a reference.

Disease prediction Module

Patient will specify the symptoms caused due to his illness. System will ask certain question regarding his illness and system predict the disease based on the symptoms specified by the patient.

5.4 DATA FLOW DIAGRAM

- The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
- The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
- DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output.
- DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

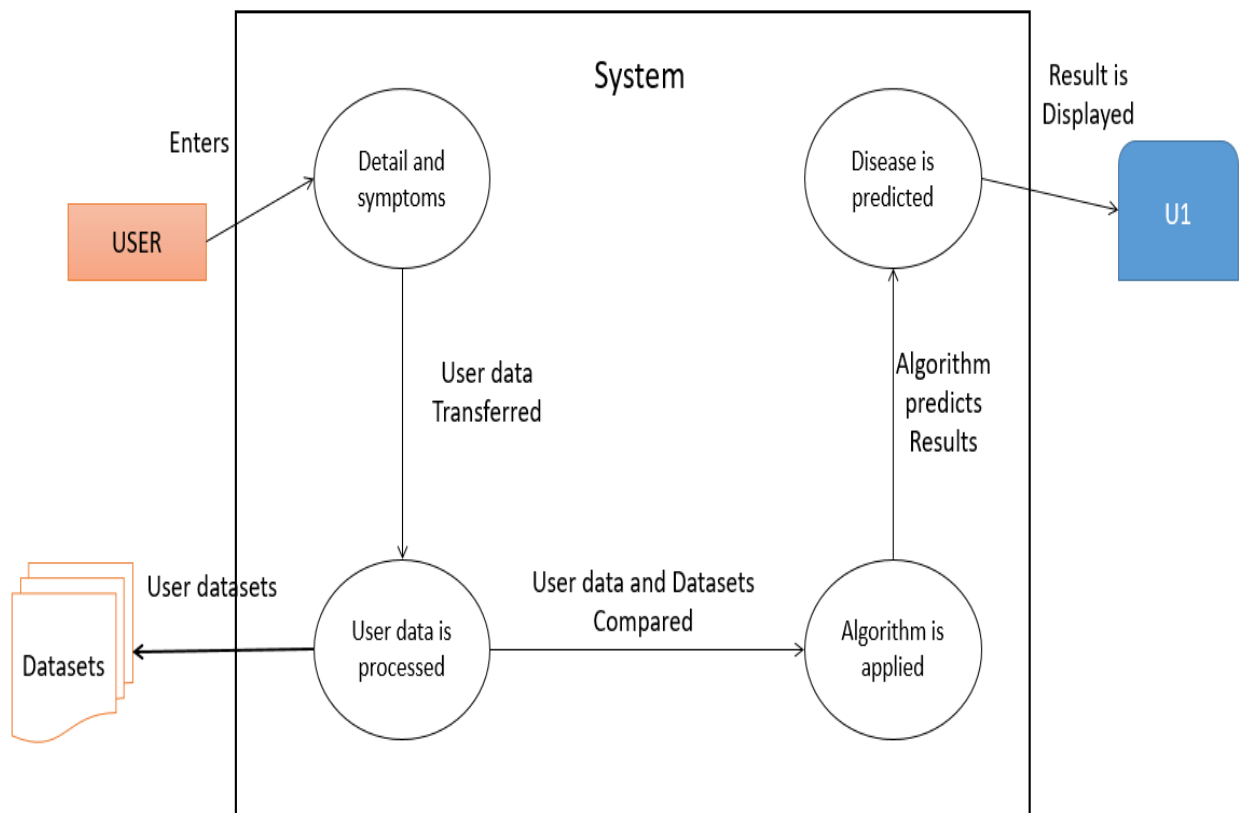


Fig-1-Dfd

5.5 E-R DAIGRAM

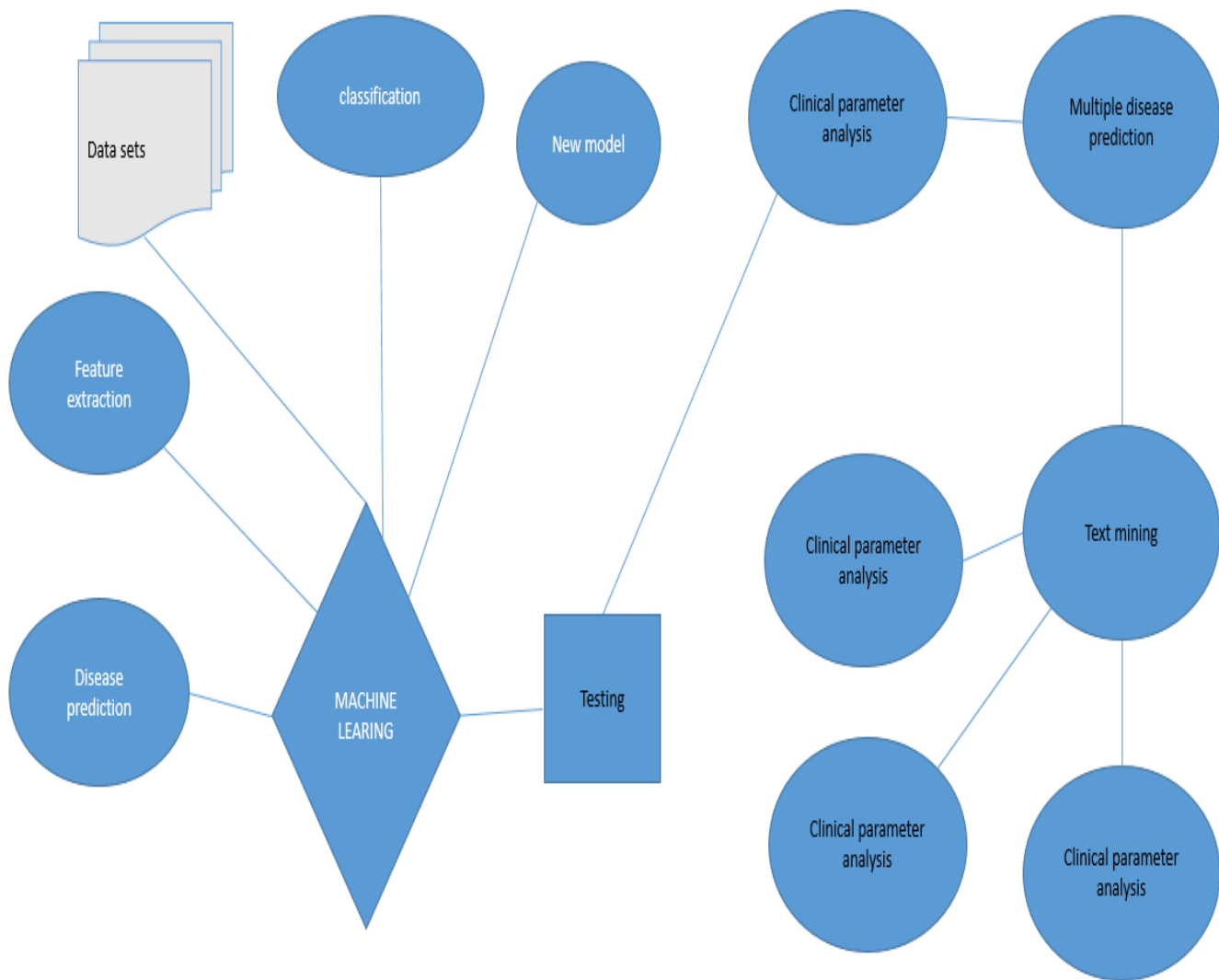


Fig-2- E-R Daigram

5.6 DATABASE DESIGN

5.6.1 Uml Diagram

UML is a method for describing the system architecture in detail using the blueprint. UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems. UML is a very important part of developing objects oriented software and the software development process. UML uses mostly graphical notations to express the design of software projects. Using the UML helps project teams communicate, explore potential designs, and validate the architectural design of the software.

5.6.2 Usecase Diagram

A use case is a set of scenarios that describing an interaction between a user and a system. A use case diagram displays the relationship among actors and use cases. The two main components of a use case diagram are use cases and actors. An actor is represents a user or another system that will interact with the system you are modeling. A use case is an external view of the system that represents some action the user might perform in order to complete a task.



Fig-3- Usecase Diagram

5.6.3 Class Diagram

Class diagrams are widely used to describe the types of objects in a system and their relationships. Class diagrams model class structure and contents using design elements such as classes, packages and objects. Class diagrams describe three different perspectives when designing a system, conceptual, specification, and implementation. These perspectives become evident as the diagram is created and help solidify the design. Class diagrams are arguably the most used UML diagram type. It is the main building block of any object oriented solution. It shows the classes in a system, attributes and operations of each class and the relationship between each class. In most modeling tools a class has three parts, name at the top, attributes in the middle and operations or methods at the bottom. In large systems with many classes related classes are grouped together to create class diagrams. Different relationships between diagrams are show by different types of Arrows. Below is a image of a class diagram. Follow the link for more class diagram examples.

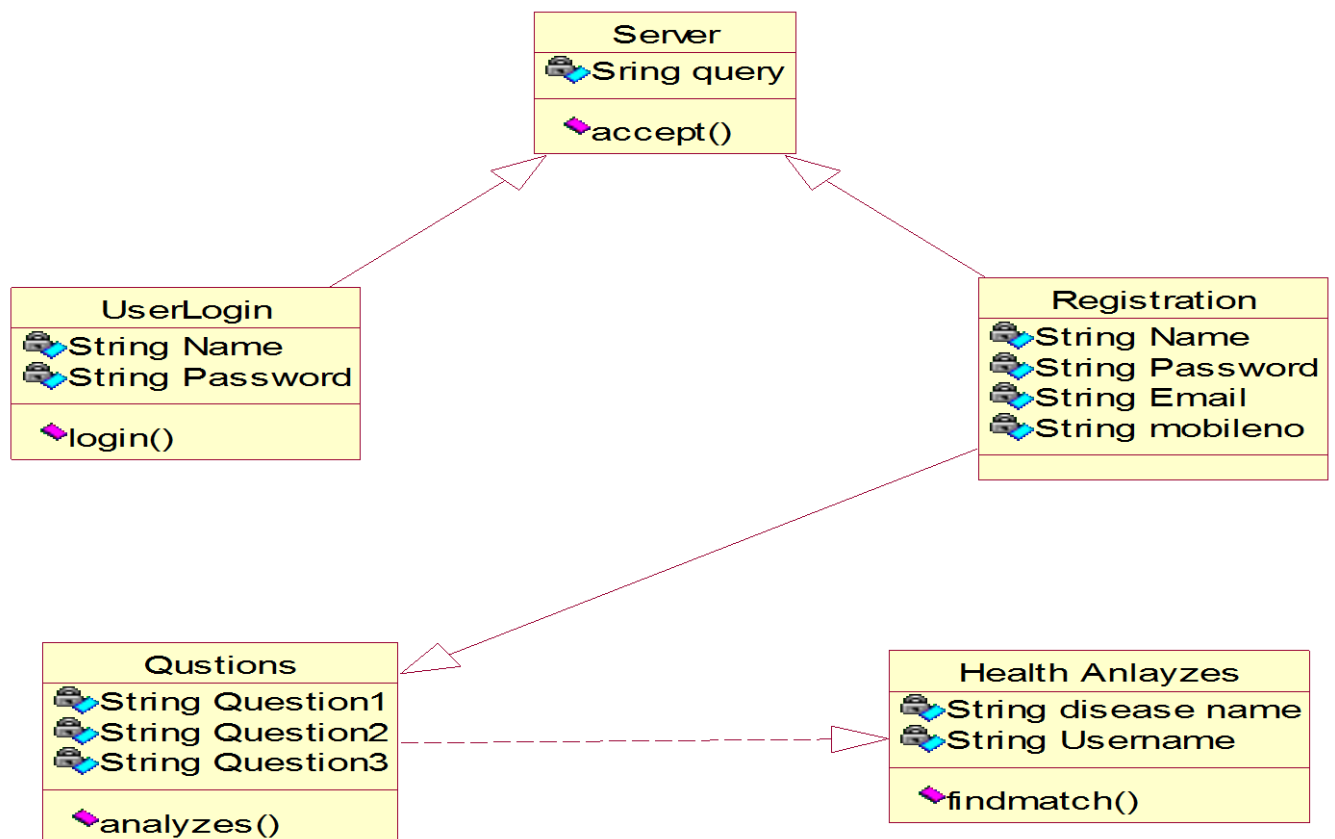


Fig-4-Class Diagram

5.6.4 Activity Diagram

Activity diagrams describe the workflow behavior of a system. Activity diagrams are similar to state diagrams because activities are the state of doing something. The diagrams describe the state of activities by showing the sequence of activities performed. Activity diagrams can show activities that are conditional or parallel.

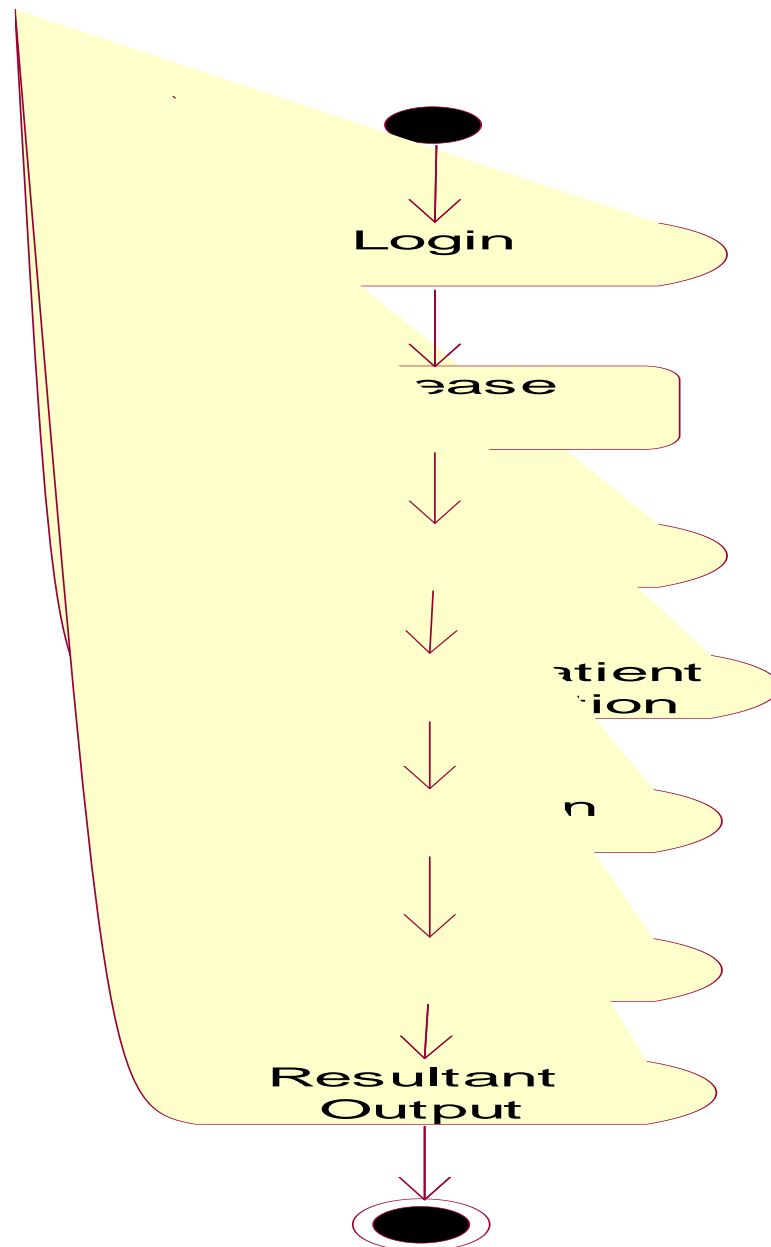


Fig-5- Activity Diagram

5.6.5 Sequence Diagram

Sequence diagrams in UML shows how object interact with each other and the order those interactions occur. It's important to note that they show the interactions for a particular scenario. The processes are represented vertically and interactions are show as arrows. This article explains the purpose and the basics of Sequence diagrams.

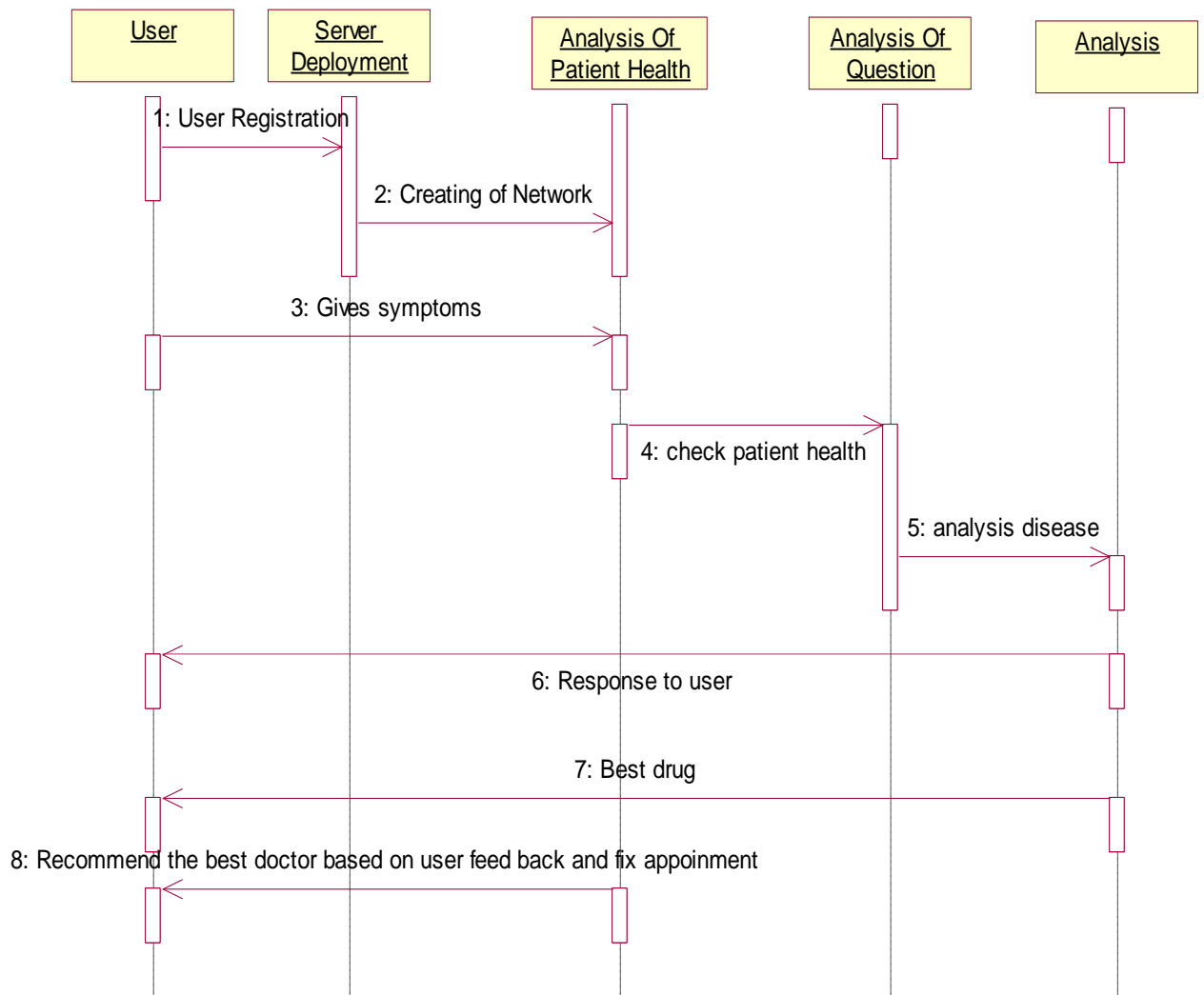


Fig-6- Sequence Diagram

5.6.6 Collaboration Diagram

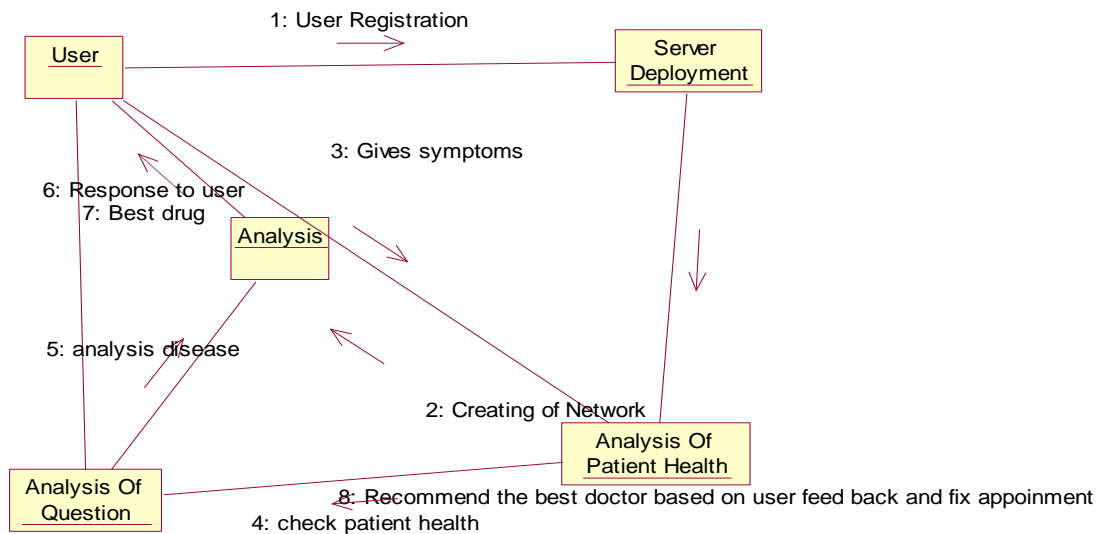


Fig-7- Collaboration Diagram

5.7 INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when error occur.

OBJECTIVES

- Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.
- It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.
- When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input design is to create an input layout that is easy to follow

5.8 OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

- Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.
- Select methods for presenting information.
- Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

- Convey information about past activities, current status or projections of the
- Future.
- Signal important events, opportunities, problems, or warnings.
- Confirm an action.

CHAPTER 6

SYSTEM TESTING

6.1 TEST STRATEGIES

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

6.1.1 Unit Testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application. It is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

6.1.2 Integration Testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

6.1.3 System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

6.1.4 White Box Testing

White Box Testing is a testing in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is used to test areas that cannot be reached from a black box level.

6.1.5 Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

6.1.6 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

CHAPTER 7

SYSTEM IMPLEMENTATION

Logistic Regression:

Logistic Regression is a classification algorithm for the probability of occurrence of an event, whether that event will occur or not. It is used to portray a binary or a categorical outcome with only 2 classes. It is similar to linear regression with the only difference being that the outcome of the variable is categorical instead of a continuous variable. It uses Logit Link function, in which the data values are fitted, for prediction. The mathematical interpretation defines Logit function as the natural log of the odds that Y equals one of the categories.

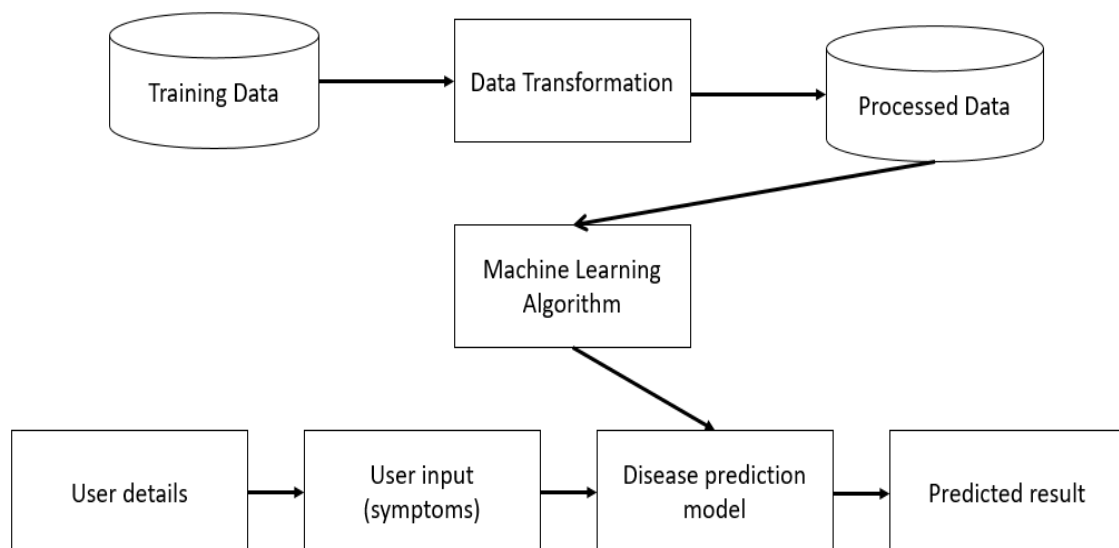


Fig-8- System Architecture

CHAPTER 8

8.1 CONCLUSION

Our Proposed System aims at bridging gap between Doctors and Patients which will help both classes of users in achieving their goals. This system provides support for multiple disease prediction using different Machine Learning algorithms. The present approach of many systems focuses only on automating this process which lacks in building the user's trust in the system. By providing Doctor's recommendation in our system, we ensure user's trust side by side ensuring that the Doctor's will not feel that their Business is getting affected due to this System.

8.2 FUTURE ENHANCEMENTS

This logistic regression algorithm can be enhanced by considering and incorporating many more parameters . For disease identification and prediction for agricultural diseases, the same set of algorithms and rules can also apply.

CHAPTER 9

APPENDIX

9.1 SOURCE CODE

Python

app.py

```
from flask import Flask, render_template, request, url_for, send_file, flash, redirect, make_response
import pickle
import numpy as np
import os
import json
import termcolor
import smtplib

import CurrentStats
# import CancerModel
# import PdfConverter
# from PdfConverter import PDFPageCountError
import DiseasePred
# import warnings

app = Flask(__name__)
app.config['SECRET_KEY'] = '73a4b6ca8cb647a20b71423e31492452'

# For Coronavirus
with open("Coronavirus_logistic", "rb") as f:
    logisticRegression = pickle.load(f)

@app.route("/")
@app.route("/home")
def Homepage():
    # cases, cured, death = CurrentStats.currentStatus()
```

```
return render_template("Homepage.html", feedback="False")
```

```
@app.errorhandler(404)
```

```
def page_not_found(e):
```

```
    return render_template("PageNotFound.html")
```

```
@app.route("/about")
```

```
def About():
```

```
    return render_template("About.html")
```

```
@app.route("/contact", methods=["POST", "GET"])
```

```
def Contact():
```

```
    if request.method == "POST":
```

```
        # print(request.form)
```

```
        contactDict = request.form
```

```
        firstname = contactDict['firstname']
```

```
        lastname = contactDict['lastname']
```

```
        email = contactDict['email']
```

```
        phone = int(contactDict['phone'])
```

```
        description = contactDict['description']
```

```
        subject = "Medical Website feedback !!"
```

```
        message = f"First Name : {firstname} \nLast Name : {lastname} \nEmail : {email}\nPhone  
Number : {phone}\nDescription : {description}\n"
```

```
        content = f"Subject : {subject} \n\n{message}"
```

```
        sender = "dineshkumarmymom17@gmail.com"
```

```
        receiver = "dineshkumarmymom17@gmail.com"
```

```
        password = "9500848395"
```

```
        print(content)
```

HTML

about.html

```
<nav class="navbar navbar-expand-lg navbar-dark bg-dark" style="width:100%">
<a class="navbar-brand" href="#">About</a>
<button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarSupportedContent"
aria-controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle navigation">
<span class="navbar-toggler-icon"></span>
</button>

<div class="collapse navbar-collapse" id="navbarSupportedContent">
<ul class="navbar-nav mr-auto">
<li class="nav-item active">
<a class="nav-link" href="{ { url_for('Homepage') } }">Home <span
class=" sr-only">(current)</span></a>
</li>
<li class="nav-item">
<a class="nav-link" href="{ { url_for('About') } }">About Application</a>
</li>
<li class="nav-item">
<a class="nav-link" href="{ { url_for('Contact') } }">Contact Us</a>
</li>

</ul>
</div>
</nav>
```

CSS

about.css

```
<style>

* {
    margin: 0;
    padding: 0;
    box-sizing: border-box;
}

.form-actions {
    margin: 0;
    background-color: transparent;
    text-align: center;
}

.mobileContent {
    display: none;
}

@media only screen and (min-device-width:200px) and (max-device-width:770px) {
    .mobileContent {
        display: inline;
    }

    .table-responsive {
        display: none;
    }

    .newbtn {
        margin-top: 10%;
    }
}

</style>
```


9.2 SCREEN SHOTS

9.2.1 Home Page

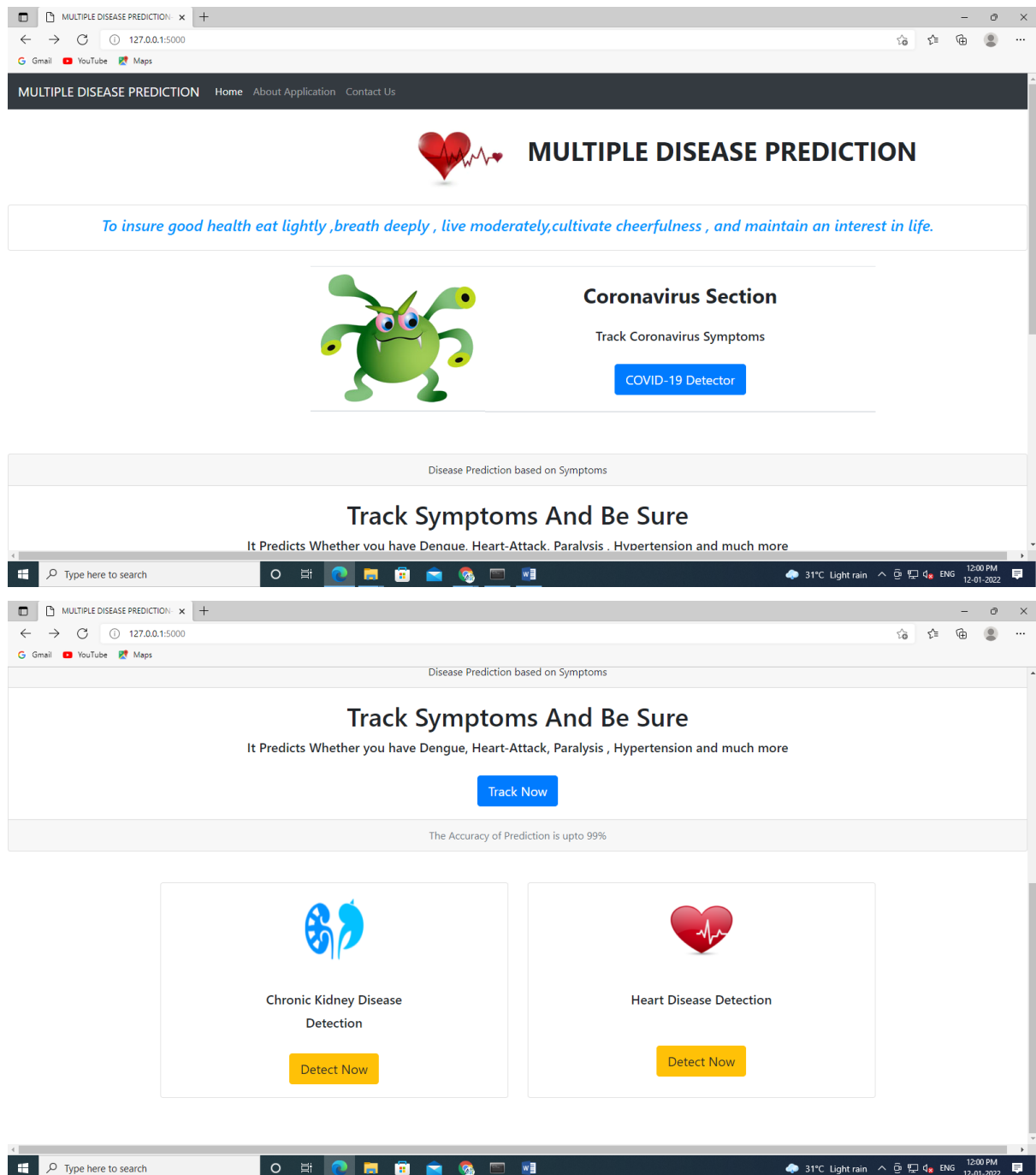


Fig-9- Home Page

9.2.2 Covid-19 Detector

Safe Zone

The image displays two screenshots of a web application titled "Coronavirus Probability Detector".

The top screenshot shows the input form. The browser address bar indicates the URL "127.0.0.1:5000/CoronavirusPrediction". The form includes the following fields and options:

- Enter Body Temperature :** A text input field containing "36.14".
- Age :** A text input field containing "25".
- Cough :** Radio buttons for "Yes" (selected) and "No".
- Cold :** Radio buttons for "Yes" (selected) and "No".
- Sore Throat :** Radio buttons for "Yes" (selected) and "No".
- Body Pain :** Radio buttons for "Yes" (selected) and "No".
- Fatigue :** Radio buttons for "Yes" (selected) and "No".
- Headache :** Radio buttons for "Yes" (selected) and "No".
- Diarrhea :** Radio buttons for "Yes" (selected) and "No".
- Difficulty in breathing :** Radio buttons for "Yes" (selected) and "No".
- Have you travelled recently during past 14 days :** A dropdown menu with "No" selected.
- Do you have a travel history to a COVID-19 INFECTED AREA :** A dropdown menu with "No" selected.
- Do you have direct contact or is taking care of a positive COVID-19 PATIENT :** A dropdown menu with "No" selected.
- A blue **Submit** button is located at the bottom right of the form.

The bottom screenshot shows the result page. The browser address bar remains the same. The page has a dark navigation bar with links: **Impulse**, **Home**, **About Application**, and **Contact Us**. The main content area displays:

- The word **Safe** in green.
- The message **You are Safe !!** in green.
- A paragraph of advice: "To insure good health eat lightly ,breath deeply ,live moderately, cultivate cheerfulness , and maintain an interest in life ."
- A green **Return to Home** button.

The Windows taskbar at the bottom of both screenshots shows the system clock as 12:01 PM on 12-01-2022, with weather information indicating 30°C and light rain.

Fig-10- Covid 19 Detector- Safe Zone

Danger Zone

The screenshot shows a web browser window with the address bar displaying "127.0.0.1:5000/CoronavirusPrediction". The page title is "Coronavirus Prediction". The main heading is "Coronavirus Probability Detector" with a small green alien icon. The form contains the following fields and options:

- Enter Body Temperature :** A text input field containing "47.34".
- Age :** A text input field containing "25".
- Cough :** Radio buttons for "Yes" (selected) and "No".
- Cold :** Radio buttons for "Yes" (selected) and "No".
- Sore Throat :** Radio buttons for "Yes" (selected) and "No".
- Body Pain :** Radio buttons for "Yes" (selected) and "No".
- Fatigue :** Radio buttons for "Yes" (selected) and "No".
- Headache :** Radio buttons for "Yes" (selected) and "No".
- Diarrhea :** Radio buttons for "Yes" (selected) and "No".
- Difficulty in breathing :** Radio buttons for "Yes" (selected) and "No".
- Have you travelled recently during past 14 days :** A dropdown menu with "Yes" selected.
- Do you have a travel history to a COVID-19 INFECTED AREA :** A dropdown menu with "Yes" selected.
- Do you have direct contact or is taking care of a positive COVID-19 PATIENT :** A dropdown menu with "Yes" selected.
- Submit** button.

The Windows taskbar at the bottom shows the search bar, taskbar icons, and system tray with weather "30°C Light rain" and time "12:03 PM 12-01-2022".

The screenshot shows the "Infected" page of the web application. The page has a dark header with "Impulse" and links for "Home", "About Application", and "Contact Us". The main content area has a red heading "Danger" and the text "You maybe suffering from Coronavirus" and "Please contact nearest hospitals". A red "Return to Home" button is at the bottom.

Fig-11- Covid 19 Detector- Danger Zone

9.2.3 Multiple Disease Prediction Page

The image displays two screenshots of a web application titled "Medical Condition Prediction". The application is accessed via a browser at the URL 127.0.0.1:5000/diseaseprediction. The interface features a logo and a prompt: "Are you experiencing any of these symptoms below (mark all those applicable)".

Step 1: The first screen shows two groups of symptoms. The first group includes Fever (checked), Stomach Pain, Itching, Sweating, Cough (checked), Vision problem, Muscle Pain, Vomiting, Confusion, Depression, Shoulder pain, Cold, Arm pain, and Headache. The second group includes Stiff Neck, Chest Pain, Back Pain (checked), Low heartbeat, Yawning, Swelling, Nausea, Low breath, Fatigue, Painful Bowel moments, Dry mouth, Stool pressure, and Urine Blood. A "Next" button is located below each group.

Step 2: The second screen continues the symptom selection. The first group includes Back Pain (checked), Painful Bowel moments, Anal bleeding, Constipation, Bloody stools, Fecal leakage, Muscle cramps, Abdominal Pain, Weight loss, Dizziness, Sweat, More Urine, Bleed, Neck pain (checked), Rash, Muscle spasm, and Breath Problems (checked). The second group includes Anal swelling, Thirsty, Anus itching, Decreased appetite, Wheezing (checked), Diarrhea, Neck stiff, Lump anus, Anxiety, More Urine, Bleeding, and Hives. A "Submit" button is located at the bottom.

Fig-12- Multiple Disease Prediction Page

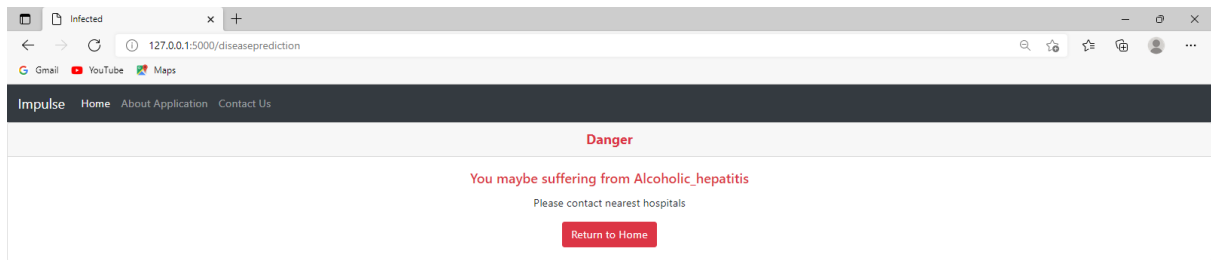


Fig-13-Danger-Alcoholic_hepatitis

9.2.4 Pneumonia

The screenshot shows a web browser window with the URL `127.0.0.1:5000/diseaseprediction#fourth`. The page features a logo with a stylized atom and the title "Medical Condition Prediction". Below the title, it asks: "Are you experiencing any of these symptoms below (mark all those applicable)". The form contains two sections of checkboxes for symptoms. The first section includes: Fever (checked), Stomach Pain, Itching, Sweating (checked), Cough, Vision problem, Muscle Pain, Vomiting (checked), Confusion, Depression, Shoulder pain, Cold, Arm pain, and Headache (checked). A blue "Next" button is located below the first section. The second section includes: Stiff Neck, Chest Pain, Skin rash, Back Pain, Low heartbeat, Yawning, Swelling, Nausea (checked), Low breath, Fatigue, Painful Bowel moments, Dry mouth, Stool pressure, and Urine Blood.

Disease Prediction

127.0.0.1:5000/diseaseprediction#fourth

Gmail YouTube Maps

<input type="checkbox"/> Stiff Neck	<input type="checkbox"/> Low heartbeat	<input checked="" type="checkbox"/> Nausea	<input type="checkbox"/> Dry mouth
<input type="checkbox"/> Chest Pain	<input type="checkbox"/> Yawning	<input type="checkbox"/> Low breath	<input type="checkbox"/> Stool pressure
<input type="checkbox"/> Skin rash	<input type="checkbox"/> Swelling	<input type="checkbox"/> Fatigue	<input type="checkbox"/> Urine Blood
<input type="checkbox"/> Back Pain		<input type="checkbox"/> Painful Bowel moments	

Next

<input type="checkbox"/> Anal bleeding	<input type="checkbox"/> Constipation	<input checked="" type="checkbox"/> Bloody stools	<input type="checkbox"/> Fecal leakage
<input type="checkbox"/> Muscle cramps	<input checked="" type="checkbox"/> Abdominal Pain	<input type="checkbox"/> Weight loss	<input type="checkbox"/> Dizziness
<input type="checkbox"/> Sweat	<input type="checkbox"/> More Urine	<input type="checkbox"/> Bleed	<input type="checkbox"/> Neck pain
<input type="checkbox"/> Rash	<input checked="" type="checkbox"/> Muscle spasm	<input type="checkbox"/> Breath Problems	

Next

<input type="checkbox"/> Anal swelling	<input type="checkbox"/> Thirsty	<input type="checkbox"/> Anus itching	<input type="checkbox"/> Decreased appetite
<input type="checkbox"/> Wheezing	<input checked="" type="checkbox"/> Diarrhea	<input type="checkbox"/> Neck stiff	<input type="checkbox"/> Lump anus
<input type="checkbox"/> Anxiety	<input type="checkbox"/> More Urine	<input type="checkbox"/> Bleeding	<input type="checkbox"/> Hives

Submit

Type here to search

30°C Light rain 12:15 PM 12-01-2022

Infected

127.0.0.1:5000/diseaseprediction

Gmail YouTube Maps

Impulse Home About Application Contact Us

Danger

You maybe suffering from Pneumonia

Please contact nearest hospitals

Return to Home

Type here to search

30°C Light rain 12:16 PM 12-01-2022

Fig-14-Danger-Pneumonia

9.2.5 Chronic Kidney Disease Detection Page

Danger Zone

The screenshot shows a web browser window with the address bar displaying "127.0.0.1:5000/CKD". The page title is "Chronic Kidney Disease". The main heading is "Chronic Kidney Disease Detector" with a kidney icon. The form contains the following fields and values:

Field	Value
Specific gravity :	0.75
Albumin :	0.2
Serum chirstening :	0.033898
Hemoglobin :	0.836735
Packed cell volume :	0.717949
Hypertension :	<input type="radio"/> Yes <input checked="" type="radio"/> No

A blue "Submit" button is located below the form. Below the button, a box titled "Some Facts about Chronic Kidney Disease" contains the following text:

Deciding Factors
The survey data shows that the **Hemoglobin** , **Packed cell volume** , and **Specific Gravity** have **77% impact** on deciding whether an individual is suffering from **Chronic Kidney Disease** or not

The Accuracy of the model is 98%

The screenshot shows the same web browser window, but the page has changed to a "Danger" state. The page title is "Impulse". The main heading is "Danger" in red. Below it, the text reads:

You maybe suffering from Chronic Kidney Disease
Please contact nearest hospitals

A red "Return to Home" button is located at the bottom of the message box.

Fig-15- Chronic Kidney Disease Detection Page-Danger Zone


Safe Zone

Chronic Kidney Disease

127.0.0.1:5000/CKD

Gmail YouTube Maps

Chronic Kidney Disease Detector



Specific gravity : 1.020

Albumin : 0.0

Serum christening : 1.2

Hemoglobin : 14.8

Packed cell volume : 30

Hypertension : ☒ Yes ☐ No

Submit

Some Facts about Chronic Kidney Disease

Deciding Factors

The survey data shows that the Hemoglobin , Packed cell volume , and Specific Gravity have 77% impact on deciding whether an individual is suffering from Chronic Kidney Disease or not

The Accuracy of the model is 98%

Type here to search

30°C Light rain 12:17 PM 12-01-2022

Non Infected

127.0.0.1:5000/CKD

Gmail YouTube Maps

Impulse Home About Application Contact Us

Safe

You are Safe !!

To insure good health eat lightly ,breath deeply ,live moderately,
cultivate cheerfulness , and maintain an interest in life .

Return to Home

Type here to search

30°C Light rain 12:17 PM 12-01-2022

Fig-16- Chronic Kidney Disease Detection Page-Safe Zone

9.2.6 Heart Disease Detection Page

Safe Zone

The image displays a web browser window with the title 'Heart Disease Detector'. The address bar shows the URL '127.0.0.1:5000/HeartDisease'. The page content is titled 'Heart Disease Probability Detector' and features a red heart icon with a pulse line. The form includes the following fields and values:

- Age : 62
- Gender : ☒ Male ☐ Female
- Height : 169
- Weight : 80
- Systolic blood pressure : 120
- Diastolic blood pressure : 80
- Cholestrol : ☐ High ☒ Medium ☐ Low
- Glucose : ☐ High ☒ Medium ☐ Low
- Do you smoke ? Yes
- Do you consume alcohol ? Yes
- Are you physically challenged ? No

A blue 'Submit' button is located below the form. Below the browser window, a Windows taskbar is visible with the search bar and various application icons. Below the taskbar, another browser window is open with the title 'Non Infected'. The address bar shows the same URL. The page content is titled 'Impulse' and includes a navigation bar with 'Home', 'About Application', and 'Contact Us'. The main content area displays the result 'Safe' in green, followed by 'You are Safe !!' in green. Below this, a message reads: 'To insure good health eat lightly ,breath deeply ,live moderately, cultivate cheerfulness , and maintain an interest in life .'. A green 'Return to Home' button is located at the bottom of the page.

Windows taskbar: Type here to search, 30°C Light rain, 12:19 PM 12-01-2022

Browser window: Non Infected, 127.0.0.1:5000/HeartDisease

Page content: Impulse, Home, About Application, Contact Us

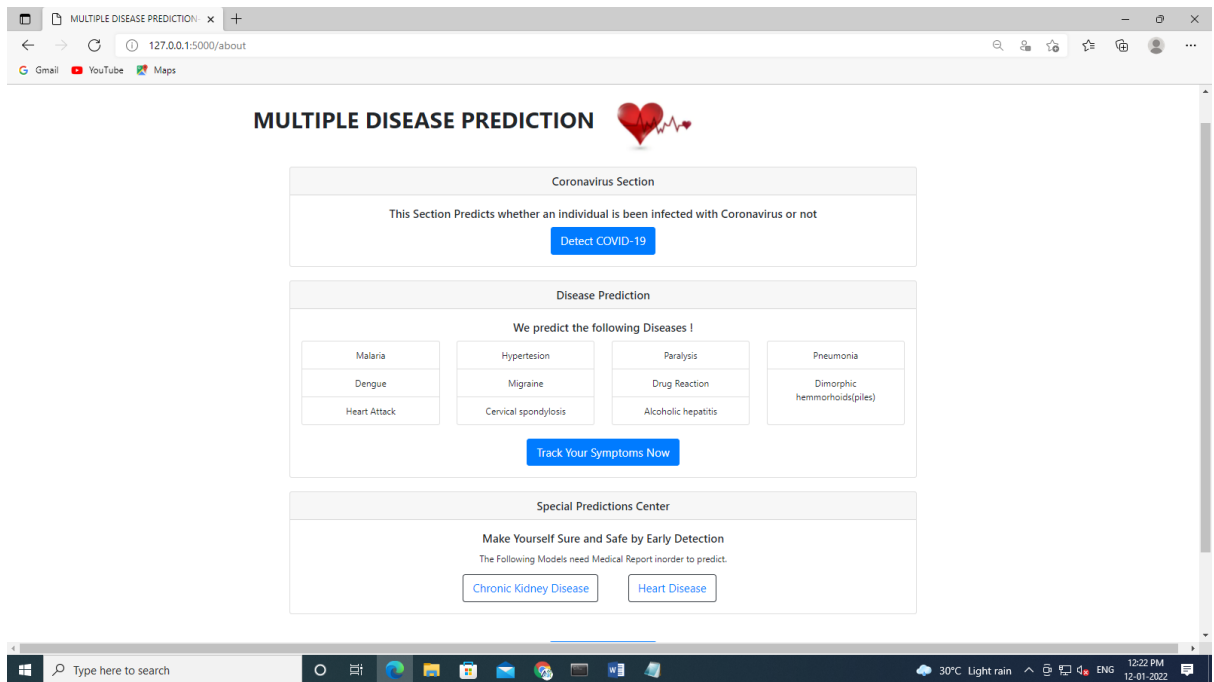
Safe

You are Safe !!

To insure good health eat lightly ,breath deeply ,live moderately, cultivate cheerfulness , and maintain an interest in life .

Return to Home

Fig-17- Heart Disease Detection Page- Safe Zone



Danger Zone

Heart Disease Probability Detector

Age :
50

Gender : ☐ Male ☒ Female

Height :
169

Weight :
82

Systolic blood pressure :
150

Diastolic blood pressure :
100

Cholestrol : ☐ High ☒ Medium ☐ Low

Glucose : ☐ High ☒ Medium ☐ Low

Do you smoke ?
Yes

Do you consume alcohol ?
Yes

Are you physically challenged ?
No

Submit

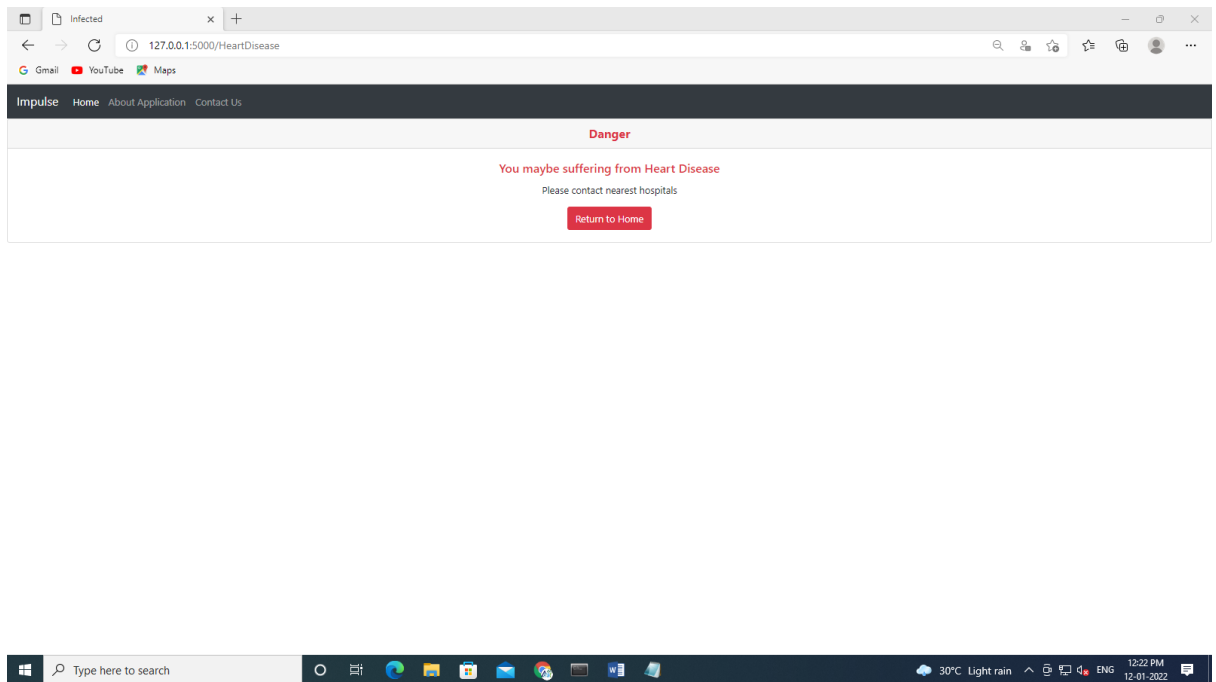


Fig-18- Heart Disease Detection Page- Danger Zone

CHAPTER 10

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