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## INTRODUCTION

Heart disease is a serious and concerning topic among researchers; one of the major challenges in heart disease is accurate detection and finding the presence of it inside a human. There are various medical instruments available in the market for predicting heart disease, but there are two major problems with them. The first one is that they are very much expensive, and the second one is the efficiency of that machine to calculate the chance of heart disease in a human. According to the latest survey conducted by WHO, medical professionals are able to correctly predict only 67% of heart disease, so there is a vast scope of research in the area of predicting heart disease in a human using Computer Science.

Computer Science is being advanced in different areas, and medical science is one of the fields where computer science is implemented. In recent practice, artificial intelligence has gained its moment because of advancement in computation power. Machine Learning is one such tool which is widely used for various areas, and nowadays, medical science is also using Machine Learning to find more accurate results to predict diseases. Reprogrammable capacities of machine learning bring a lot of strength and open new doors of opportunities for areas like medical science.

Heart Disease is one of the major challenges due to its parameters and technicality, which is involved in accurately predicting the disease. Using machine learning for predicting the disease is a better choice for obtaining high accuracy because this tool utilizes feature vectors and various data types such as text, images, audio/video under various conditions. For Heart Disease Prediction, algorithms like Naïve Bayes, Decision Tree, Random Forest, Logistic Regression, etc. are used to detect the diseases.

This project basically takes data such as patient age, sex, chest pain, maximum heart rate, etc. of a patient and predicts the possibility of the presence of heart disease. This system will be trained with existing datasets of previous heart patients, and the system is aimed to be highly accurate.

## PROBLEM STATEMENT

Heart disease prediction using machine learning is one of the most interesting and challenging tasks. There are only few specialists who can predict the heart disease efficiently, due to shortage of specialists the efficient disease detection system is highly needed. There are various wrongly diagnosed cases which results the critical negative impact to the patient health. The detection of heart disease is more expensive because of highly professional experts and specialists that are involved in predicting the disease according to the information of patient.

A major challenge facing healthcare organizations (Hospitals, Medical Centre) is the provision of quality services at affordable costs. 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

## OBJECTIVES

. The main objective of this system is to identify the patterns of the user input data and the process the input data with the trained data to predict the presence of heart disease with high accuracy. The purpose of building this system is also to provide the accurate prediction result in efficient time with efficient cost.

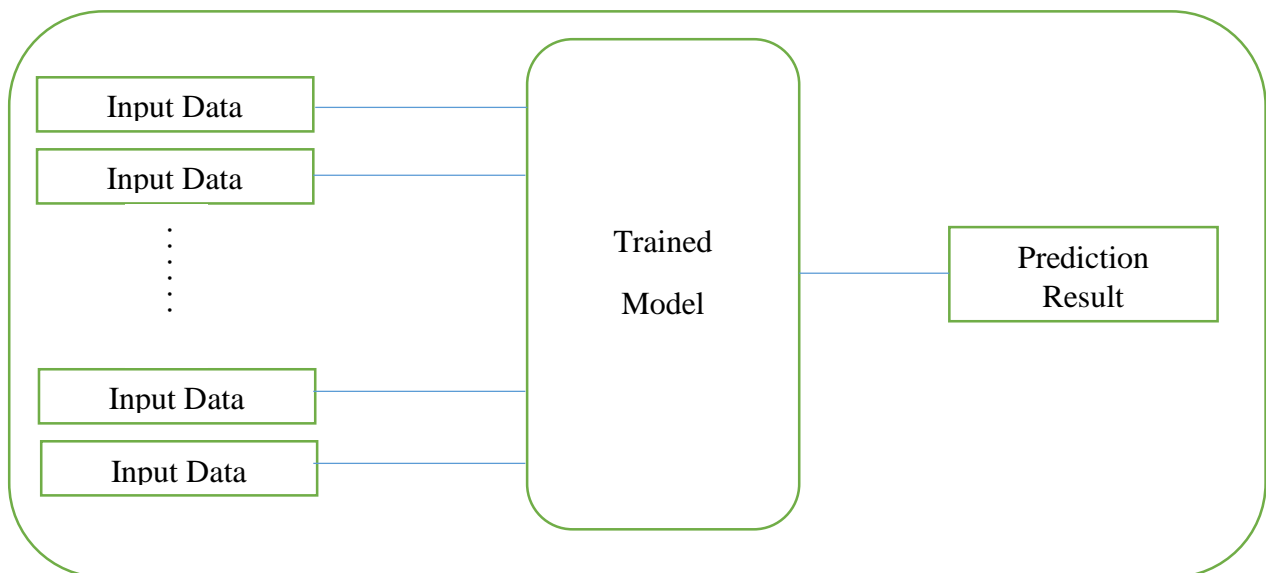


Fig: Objective of System

## SCOPE AND LIMITATIONS

### SCOPE

Heart Disease Prediction System is a computer based smart disease prediction system which takes an information about patient and detects whether the patient have heart disease or not. The system is mainly focused for

- Medical Centre,
- Hospitals
- Patients who have sufficient information that is needed to the system.

The user is provided with input field for the various data input.

### LIMITATIONS

There will be practiced for making the system more reliable and flexible in various perspective in spite of that there will be following limitations.

- Machine Learning approach cannot assure 100% accuracy
- Uses of various language as input are not feasible at the moment (only English)
- System is not fully automated.
- System need many data to predict the result

## METHODOLOGY

The system is proposed to implement the different machine learning algorithms like Random Forest, Logistic Regression. We will first

- Gather the dataset of the previous heart patient for the system vectorize those data.
- Make model for the training the dataset
- Train the dataset
- Test the model with the test data
- Implementation
- Revise the system

This system will provide the user interface to input the data.

The system receives the data from user and perform the computation using the developed model.

The system provides the result that whether the patient.

## REQUIREMENT IDENTIFICATION

### STUDY OF EXISTING SYSTEM

Many hospital information systems are designed to support patient billing, inventory management and generation of simple statistics. Some hospitals use decision support systems, but they 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?”. However, they cannot answer complex queries regarding the prediction of diseases. The hospitals nowadays implement the manual inspection of patient information by specialist doctors to detect the heart disease.

HamroDoctor.com is the first virtual healthcare platform from Nepal where patients can consult certified medical personnel and get additional health related services along with other information related to health online. It provides us the search engine to search the information of doctors, hospitals, clinics and blood donors on the basis of their services but it does not predict the disease using the information of the patient.

## REQUIREMENT COLLECTION

### USER REQUIREMENT

- Easy user interface
- Higher accuracy rate
- Efficient Timing

### SYSTEM REQUIREMENT

The system needs the datasets of the previous heart patient as training data set and testing dataset. The datasets we used are referenced from UCI Machine Learning Repository.

#### Hardware Requirement

- External HDD
- Laptop

#### Software Requirement

- Windows 10 OS, Ubuntu OS
- Microsoft Visio
- Python
- Anaconda
- Adobe Photoshop

## FEASIBILITY STUDY

### TECHNICAL FEASIBILITY

We are planning to use the open source language python. Python is an interpreted high-level programming language for general-purpose programming. This system is going to be purely web based system so the machine that are compatible with web browser are also compatible for this system. So the system will be feasible for the available resources.

### OPERATIONAL FEASIBILITY

We are aiming to predict the best accurate result, using the available source data set and we will be also focused on the better user interface design to provide the better user experience. We will use the algorithms of machine learning to train the model so we are sure that the system will assure the operational feasibility.

## ECONOMIC FEASIBILITY

The system will be beneficial on the perspective of economy, because the major technology we are using to build this system are open source technology. The System will be favourable for the hospitals, so that it can minimize the cost of hiring the specialist doctors.

## SCHEDULE FEASIBILITY

The system will be completed within the proposed time, with the mandatory duration of 3 months.

## TOOLS

### ANALYSIS AND DESIGN TOOLS

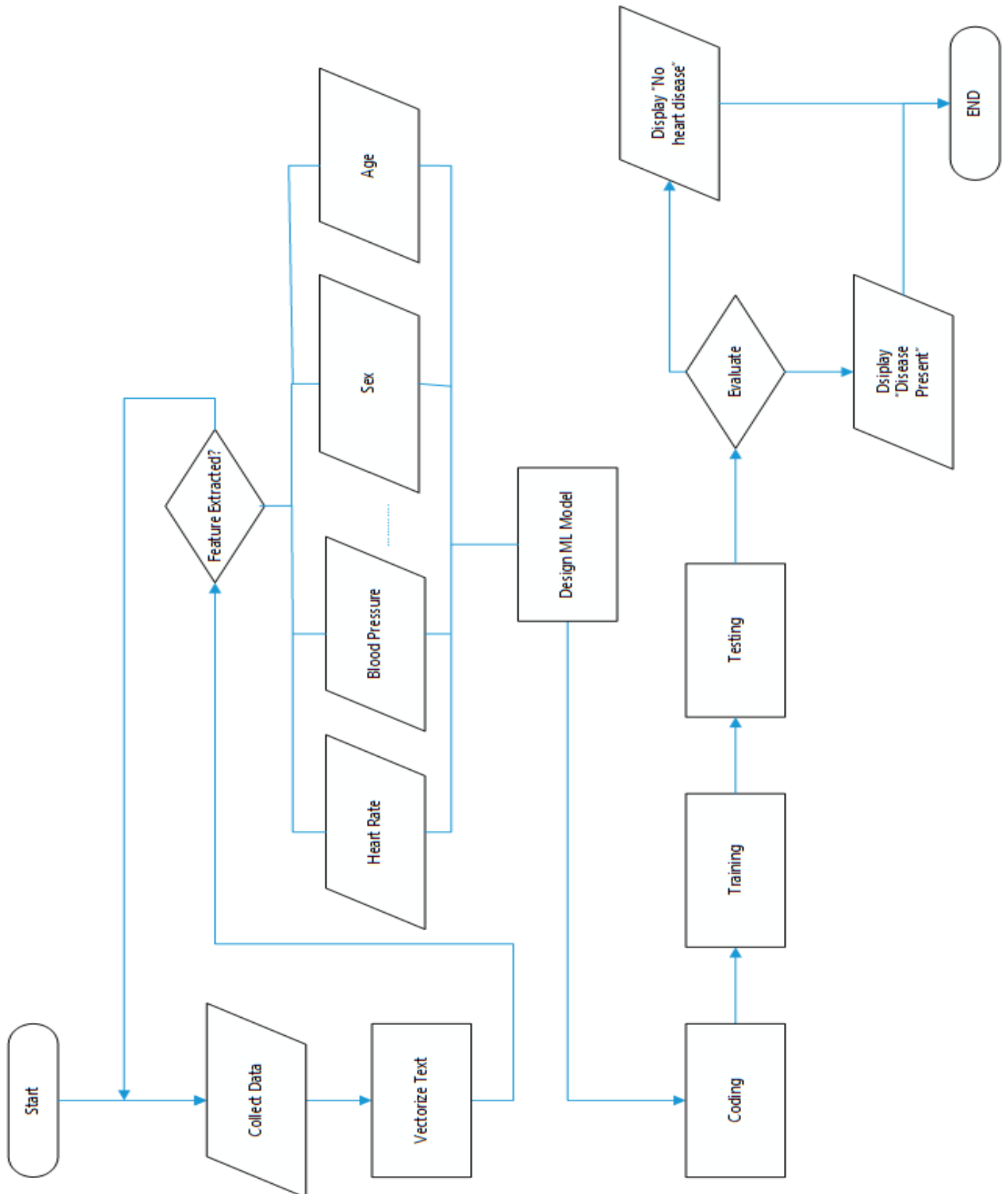
- Microsoft Visio  
Microsoft Visio is a diagramming and vector graphics application and is part of the Microsoft Office family.
- Adobe Photoshop  
Adobe Photoshop is a raster graphics editor developed and published by Adobe Systems for macOS and Windows.

### IMPLEMENTATION TOOLS

- Python  
Python is relatively new programming language. It has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales
- Django  
Django is a free and open-source web framework, written in Python, which follows the model-view-template (MVT) architectural pattern. Django emphasizes reusability and "pluggability" of components, less code, low coupling, rapid development, and the principle of don't repeat yourself

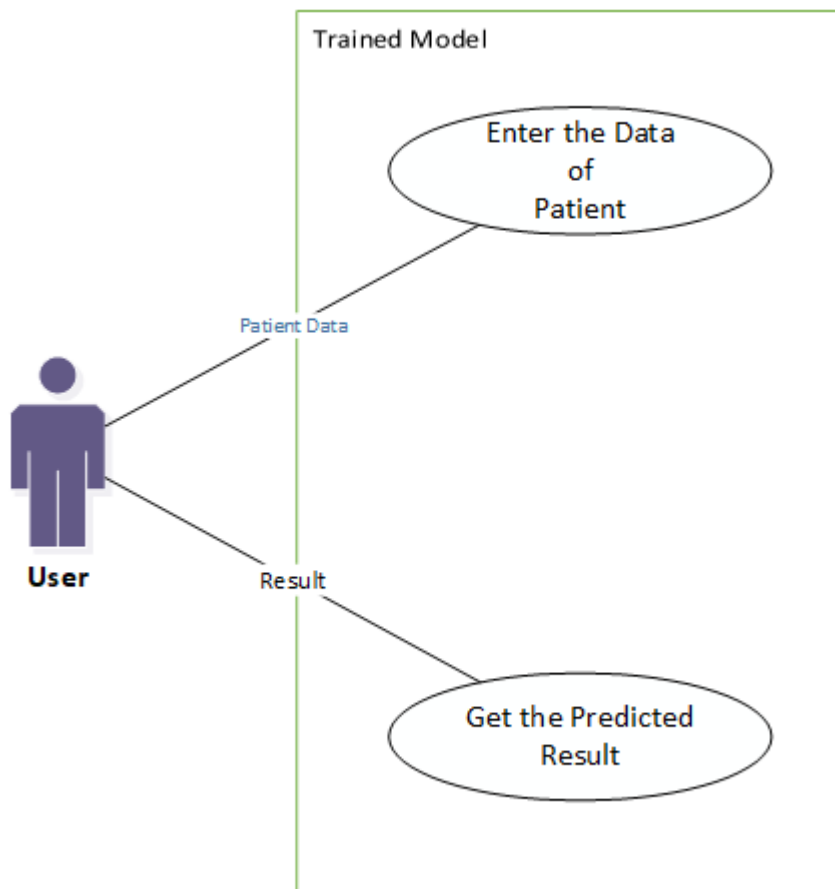
# HIGH LEVEL DESIGN

## FLOW CHART





## USE CASE DIAGRAM



# GANTT CHART

S.N	TaskName	Start Date	Finish Date	Duration	Apr 2018							May 2018							Jun 2018																																																							
					22/4							29/4							6/5							13/5							20/5							27/5							3/6							10/6							17/6							24/6						
1	Proposal Writing	4/18/2018	4/24/2018	1w																																																																						
2	Milestone 1: Proposal Submission	4/23/2018	4/23/2018	0w																																																																						
3	UI Design	4/25/2018	4/29/2018	.67w																																																																						
4	Development	4/30/2018	5/25/2018	3.83w																																																																						
5	Model Design	4/30/2018	5/15/2018	2.33w																																																																						
6	Data Collection	4/30/2018	5/4/2018	.83w																																																																						
7	ML Model	5/6/2018	5/15/2018	1.5w																																																																						
8	Coding	5/16/2018	5/25/2018	1.5w																																																																						
9	Model Training	5/27/2018	5/30/2018	.67w																																																																						
10	Milestone 2: Model Trained	6/1/2018	6/1/2018	0w																																																																						
11	Evaluation	6/3/2018	6/5/2018	.5w																																																																						
12	Performance Tuning	6/6/2018	6/8/2018	.5w																																																																						
13	Revise the Model	6/10/2018	6/12/2018	.5w																																																																						
14	Milestone 3: Implementation Complete	6/13/2018	6/13/2018	0w																																																																						
15	Documentation	6/14/2018	6/22/2018	1.33w																																																																						
16	Final Report	6/22/2018	6/28/2018	1w																																																																						
17	Milestone 4: Project Completed	6/29/2018	6/29/2018	0w																																																																						

## EXPECTED OUTCOME

The expected end result of the Heart Disease Prediction System is to obtain high accuracy on predicting the disease, however the accuracy rate highly depends on the amount of data and the algorithms that we use to train the model. Within this limited time and short research the accuracy of the system is predicted to get 60% - 70% correct outcome.

After accomplishment of this project the user can get the prediction of their health based on the patient information within appropriate time and feasible cost, however the data needed to the system should be pre-collected using various tests.