

# VISUALIZING AND PREDICTING HEART DISEASES WITH AN INTERACTIVE DASHBOARD

TEAM ID: PNT2022TMID29253

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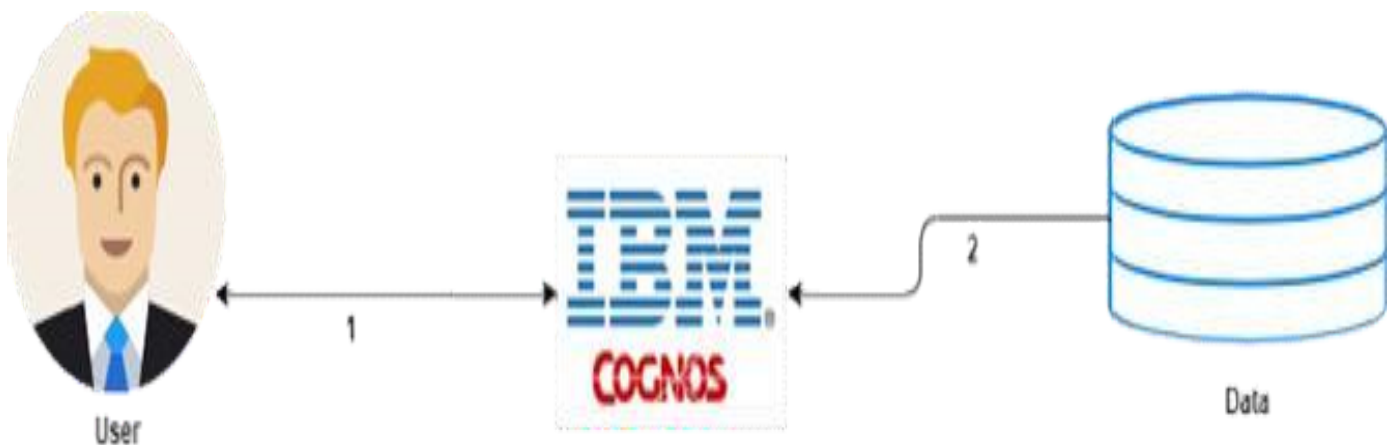
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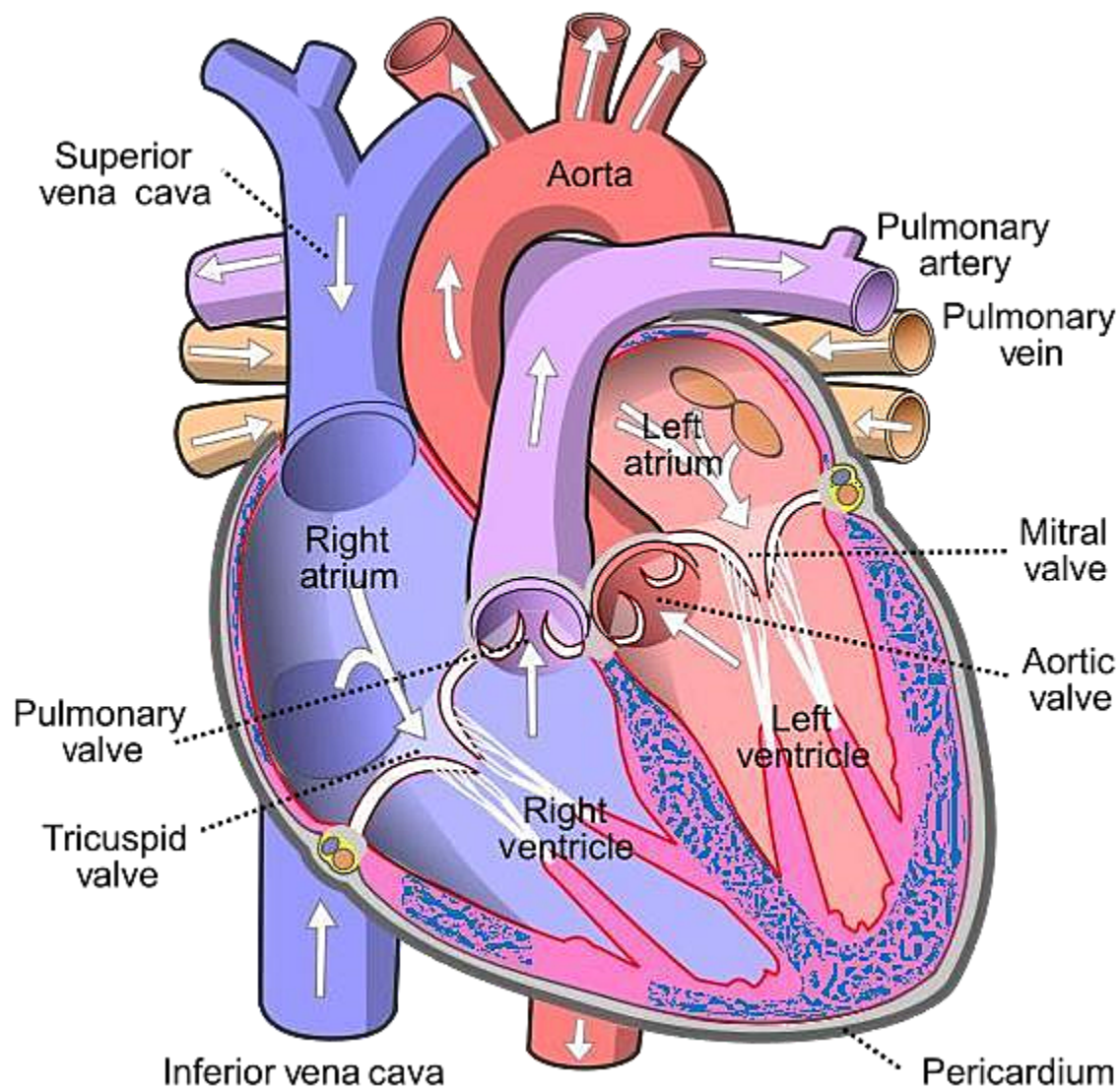
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## **PROBLEM DEFINITION:**

Heart related diseases or Cardio Vascular Diseases (CVDs) are the main reason for a huge number of deaths in the world over the last few decades and has emerged as the most life-threatening disease, not only in India but in the whole world. Many researchers, in recent times, have been using several machine learning techniques to help the health care industry and the professionals in the diagnosis of heart related diseases. This indicates a need of reliable, accurate and feasible system to continuously monitor and diagnose for CVD for timely action and treatment. This work proposes a smartphone-based heart disease prediction system than can have both monitoring as well as prediction of heart disease. A system to monitor patients in real-time has been developed using Node MCU interfaced with temperature, humidity and pulse rate sensors. The developed system is capable to transmit the acquired sensor data to a cloud(firebase) every 10

seconds. An Android application is designed to display the sensor data. One best machine learning algorithm was ported to the Android application for heart disease prediction in real-time. The machine learning algorithms were trained and tested using two widely used openaccess datasets. Five machine learning algorithms were checked for their performances using two different methods. ANN was found to be the best performing algorithm with an accuracy of 93.5%. This algorithm is deployed to the Android application and the heart disease is predicted in real-time. The proposed work is limited by use of single hidden layer for implementing Neural network. Data from few more sensors related to heart parameters should be experimented with. Trying out with increasing hidden layer size may increase the accuracy of the neural network. There is further scope in optimizing the Android application user interface.





## How to preprocess data in Python:

Here we are using Jupyter Notebook, we imported the libraries. The main way to import a program in library functions are used in Pandas, Numpy, OS Matplotlib, Seaborn, and sklearn. Pandas is a library that creates dataframes and manipulates them. Numpy is a library that works on arrays and performs algebraic

functions. OS is a library that allows the retrieval of the files in the working directory, and sklearn is a popular library used for machine learning. Matplotlib and Seaborn are graphic libraries that enable the visualization of data.

### **Data analysis using IBM Cognos Analytics and IBM cloud :**

**Data analysis**, is a process for obtaining raw data, and subsequently converting it into information useful for decision-making by users. Data is collected and analyzed to answer questions, test hypotheses, or disprove theories.

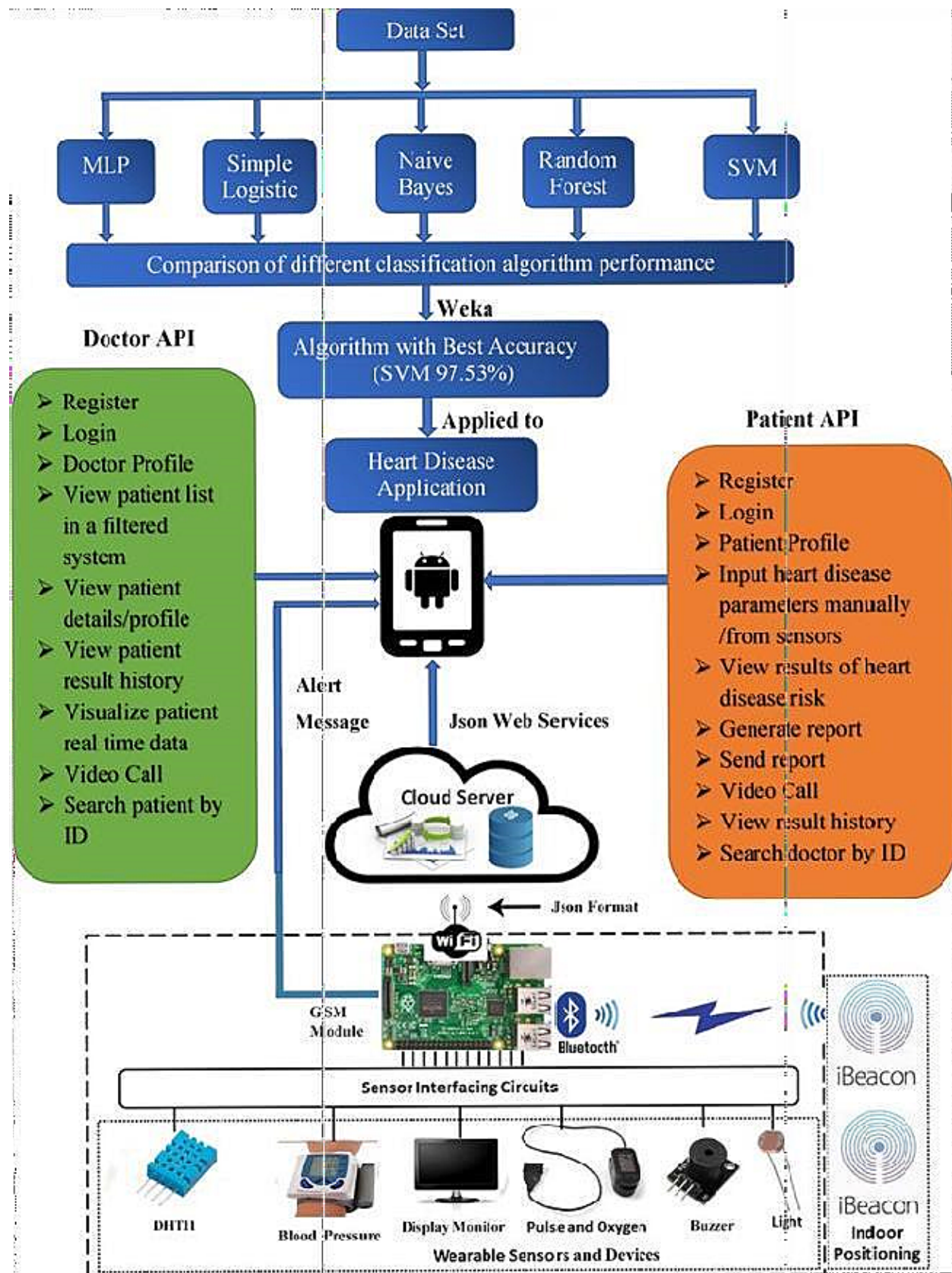
Statistician **John Tukey**, defined data analysis in 1961, as:

"Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data."

There are several phases that can be distinguished, described below. The phases are iterative, in that feedback from later phases may result in additional work in earlier phases. The **CRISP framework**, used in data mining, has similar steps.

**IBM Cognos Business Intelligence** is a web-based integrated business intelligence suite by IBM. It provides a toolset for reporting, analytics, score carding, and monitoring of events and metrics. The software consists of several components designed to meet the different information requirements in a company. IBM Cognos has components such as IBM Cognos Framework Manager, IBM Cognos Cube Designer, IBM Cognos Transformer.





## **Data Visualization for Health care**

Data Visualization for Health care Data visualization in the healthcare industry is no longer an option— it's a must-have for modern medical organizations. The global market of healthcare data analytics is estimated to grow 3.5 times in just six years, from \$11.5 billion in 2019 to \$40.8 billion in 2025. Meanwhile, more than half of the healthcare organizations worldwide name data integration as the first technology they plan to adopt by the end of 2021.

While many factors influence the boom in data analytics and visualization tools, the most recent and obvious one is the pandemic. The COVID-19 outbreak drove the health tech adoption, which naturally increased the volumes of data available in digital format. To bring relevant information into focus, healthcare organizations implement tools for data integration and visualization. Interactive maps, sites, or widgets allow users to choose how they interact with the data and focus on what's relevant.

For example, the Institute for Health Metrics and Evaluation offers an interactive website to analyze death rates and leading death causes worldwide. There, you can switch between maps and charts or choose a specific country, age, or gender group. Healthcare data visualization tools allow everyone to view simplified information at a glance, resulting in better understanding and higher engagement, regardless of whether your audience is stakeholders or patients.

## Patient Experience Analysis Dashboard

Day of Week

All

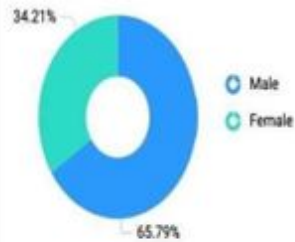
Department

All

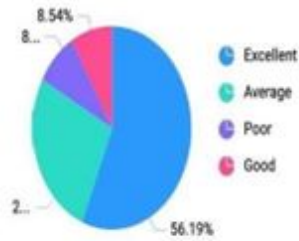
Date

10/28/2020 - 7/13/2021

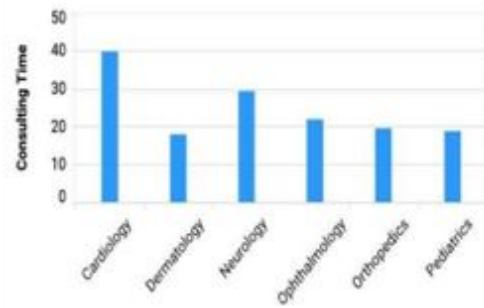
### Patients Feedback b...



### Patient Satisfaction



### Average Visit Length by Department



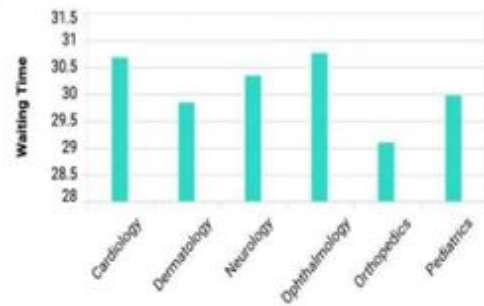
### Patient Count by Depar...

Department	Patients Count
Cardiology	2,344
Dermatology	2,321

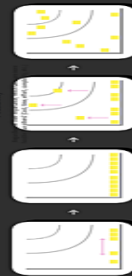
### Patient Feedback Details

Name	Department	Feedback
Alen	Cardiology	Excellent
Alen	Dermatology	Excellent

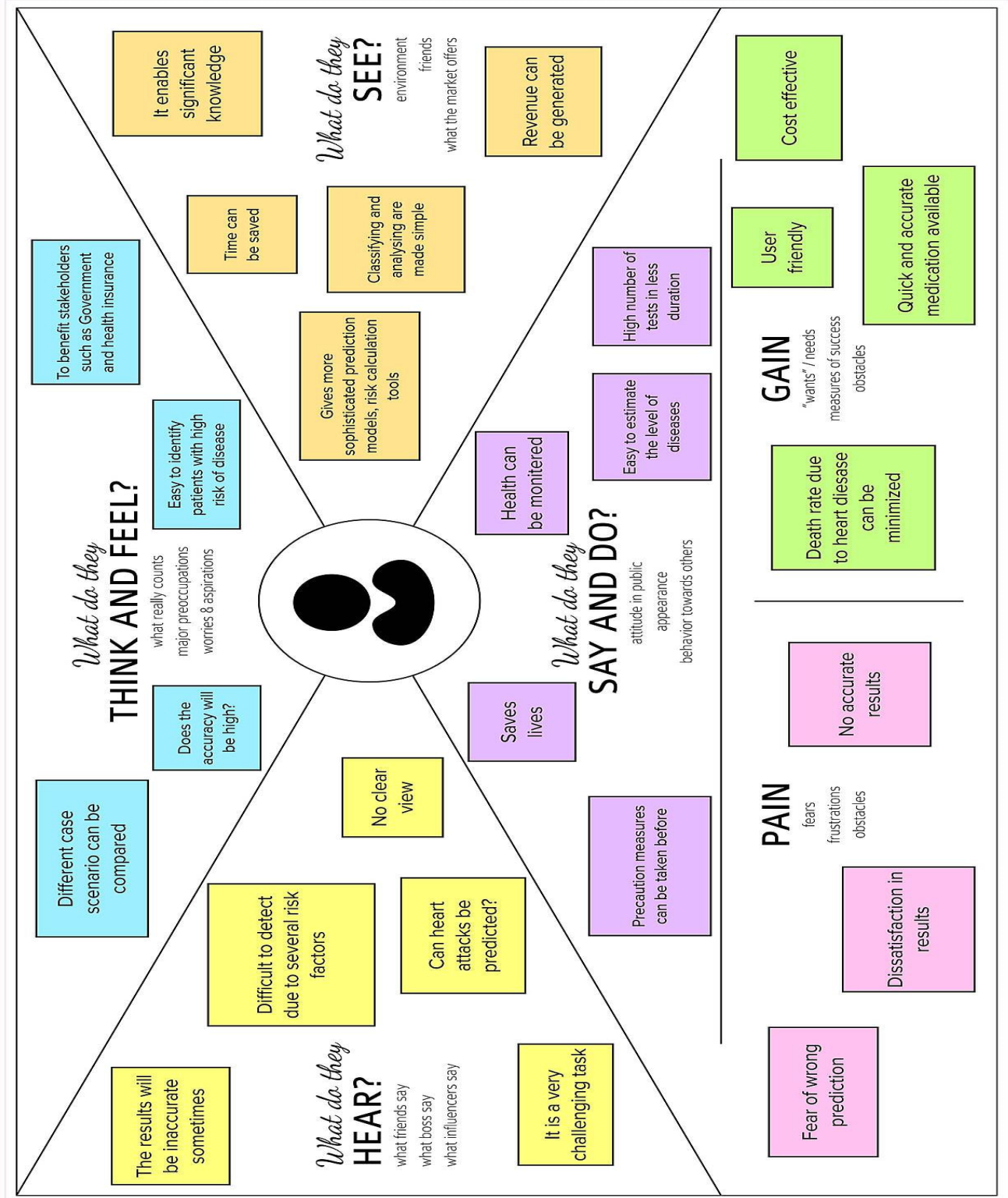
### Average Wait Time by Department





[illegible]

# EMPATHY MAP :



## **EXISTING PROBLEM:**

[1] Aakash Chauhan et al. (2018) presented "Heart Disease Prediction using Evolutionary Rule Learning" This study eliminates the manual task that additionally helps in extracting the information (data) directly from the electronic records. To generate strong association rules, we have applied frequent pattern growth association mining on patient's dataset. This will facilitate (help) in decreasing the amount of services and shown that overwhelming majority of the rules helps within the best prediction of coronary sickness

[2]. Ashir Javeed, Shijie Zhou et al. (2017) designed "An Intelligent Learning System based on Random Search Algorithm and Optimized Random Forest Model for Improved Heart Disease Detection". This paper uses random search algorithm (RSA) for factor selection and random forest model for diagnosing the cardiovascular disease. This model is principally optimized for using grid search algorithmic program. Two forms of experiments are used for cardiovascular disease prediction. In the first form, only random forest model is developed and within the second experiment the proposed Random Search Algorithm based random forest model is developed. This methodology is efficient and less complex than conventional random forest model. Comparing to conventional random forest it produces 3.3% higher accuracy.

## **PROBLEM STATEMENT DEFINITION:**

The Problem statement Comprises set of questions which the project seeks to address. It identifies the current state and future state and any gaps between the two. The Problem arises here in this project is:

- 1.Where does the problem affect?
- 2.What is the impact of the issues?
- 3.What would happen if we didn't solve the problem?
- 4.When does the issue occur?
- 5.Where is the issue occurring?

## **REFERENCE:**

[1] Senthil kumar Mohan, Chandrasegar Thirumalai, and Gautam Srivastava, "Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques IEEE Access 2019

[2] K Prasanna Lakshmi, Dr. C.R.K Reddy, "Fast Rule-Based Heart Disease Prediction using Associative Classification Mining", IEEE International Conference on Computer, Communication and Control (IC4-2015).

[3] M.Satish, D.Sridhar, "Prediction of Heart Disease in Data Mining Technique". International Journal of Computer Trends & Technology (IJCTT), 2015

[4] Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta Pattnaik, "An Intelligent Decision Support System for Cardiac Disease Detection", IJCTA, International Press 2015.

[5] Mai Showman, Tim Turner, Rob Stocker, "Using data mining techniques in heart disease diagnosis and treatment", IEEE Japan-Egypt Conference on Electronics, Communications and Computers, 2012

[6] G. Purusothama and P. Krishnakumari, "A Survey of Data mining techniques on risk prediction: Heart disease". Indian Journal of Science and Technology. 2015.





