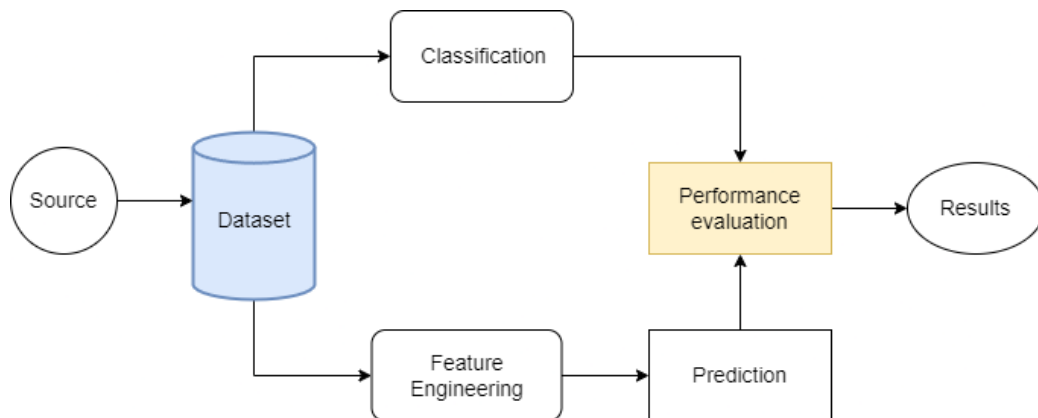


## Project Design Phase-I Solution Architecture

Date	5 <sup>th</sup> October 2022
Team ID	PNT2022TMID02667
Project Name	Visualizing and Predicting Heart Diseases with an Interactive Dash Board
Maximum Marks	4 Marks

### Solution Architecture:



Heart disease is the main cause of death in the developed world. Therefore, efforts must be made to reduce the likelihood of suffering a heart attack or stroke. Using the provided attributes, this dataset can identify which patients are most likely to have a heart condition in the near future. One of the leading causes of morbidity and mortality among the global population is heart disease. One of the most crucial topics in the clinical data analysis subsection is the prediction of cardiovascular disease. In the healthcare sector, there is an enormous amount of data. The vast amount of unprocessed healthcare data is transformed via data mining into knowledge that may be used to make forecasts and educated judgments. Data from 303 different individuals make up the dataset. The dataset contains 14 columns, each of which is detailed below.

### IMPORT DATASET

We saved the dataset with the name dataset.csv to my working directory after downloading it from Kaggle. The dataset was then read and saved to the dataset variable using read csv (). I only needed a quick glance at the data before doing any analysis. Therefore, we applied the info () method. A total

of 13 characteristics and 1 target variable are present. Additionally, there are

no missing values, hence there are no null values to worry about. Next, we utilised the approach to describe ().

### **Parameters:**

- 1.Age
- 2.Sex
- 3.Chest pain type
- 4.BP
- 5.Cholesterol
- 6.FBS over 120
- 7.EKG results
- 8.Max HR
- 9.Exercise angina
- 10.ST depression
- 11.Slope of ST
- 12.Number of vessels fluro
- 13.Thallium
- 14.Heart Disease

### **Age:**

With the risk of getting cardiovascular or heart problems roughly double with each decade of life, age is the most significant risk factor. In adolescence, coronary fatty streaks can start to develop. According to estimates, 65 and older persons make up 82 percent of coronary heart disease fatalities. The risk of stroke also doubles every ten years after age 55.

### **Sex:**

Compared to pre-menopausal women, men are more susceptible to heart disease. It has been stated that a woman's risk after menopause is comparable to a man's, however more recent data from the WHO and UN refute this. Compared to a guy with diabetes, a female is more likely to suffer heart disease.

### **Chest Pain:**

Angina is a type of chest pain or discomfort brought on by a lack of oxygen-rich blood to the heart muscle. Your chest may experience pressure or squeezing. You may also experience pain in your back, neck, jaw, shoulders, or arms. Even the pain from angina can resemble dyspepsia.

### **Blood Pressure:**

The arteries that supply your heart can get damaged over time by excessive blood pressure. Your risk is increased even further when high blood pressure coexists with other illnesses like diabetes, high cholesterol, or obesity.

### **Cholesterol:**

The most common cause of artery narrowing is a high level of low-density lipoprotein (LDL) cholesterol, also known as "bad" cholesterol. Your risk of a heart attack is also increased by having high blood levels of triglycerides, a type of blood fat connected to your diet. However, having high levels of HDL cholesterol (the "good" cholesterol) reduces your risk of having a heart attack.

### **Fasting Blood Sugar:**

Your body's blood sugar levels rise as a result of insufficient pancreatic hormone production or improper insulin response, which raises your chance of having a heart attack.

### **Resting ECG:**

The USPSTF comes to the conclusion that the potential risks of screening with a resting or exercise ECG are equivalent to or greater than the possible benefits for people at low risk of cardiovascular disease. There is currently inadequate information to determine the balance between screening's advantages and disadvantages for those at intermediate to high risk.

### **Max heart rate achieved:**

The rise in cardiovascular risk brought on by the heart rate acceleration was equal to the rise in risk brought on by high blood pressure. The risk of cardiac death has been demonstrated to increase by at least 20% for every 10 beats per minute increase in heart rate, and this risk increase is comparable to that seen with an increase in systolic blood pressure of 10 mm Hg.

### **Exercise induced angina:**

Angina can cause mild to severe pain or discomfort that typically feels tight, gripping, or squeezing. Angina is typically felt in the middle of the chest, but it can also affect one or both shoulders, as well as your back, neck, jaw, or arm. You can feel it in your hands as well. The several types of angina include:

- stable angina (also known as angina pectoris)
- unstable angina
- variant angina (prinz metal)
- microvascular angina.

### **Peak exercise ST segment:**

When the ST-segment depression is horizontal or downward-sloping and is greater than 1 mm 60–80 ms after the J point, the treadmill ECG stress test is deemed abnormal. Exercise ECGs that have upward-sloping ST-segment depressions are frequently recorded as a test that is ambiguous. In general, the presence of horizontal or down-sloping ST-segment depression at lower heart rates or workloads (measured in METs) is associated with a worse prognosis and a higher chance of multi-vessel disease. A positive treadmill ECG stress test is consistent with a protracted recovery following peak stress, therefore the length of the ST-segment depression is also significant. A second finding that strongly suggests the presence of severe CAD is the presence of ST segment elevation > 1 mm, which typically indicates transmural ischemia. Patients with this finding are frequently referred quickly for coronary angiography.

The patients in this dataset range in age from 29 to 79. Gender values of 1 and 0 are used to identify male and female patients, respectively. There are four different types of chest pain that may be a sign of heart disease. Narrowed coronary arteries limit blood flow to the heart muscles, resulting in type 1 angina. Chest discomfort of type 1 angina is brought on by mental or emotional strain. Chest pain that is not caused by angina may have many different causes and is not always related to genuine heart disease. Asymptomatic, the fourth category, might not be a sign of heart disease. The reading of the resting blood pressure is the following characteristic, trestbps. The level of cholesterol is chol.

Fbs stands for fasting blood sugar level; a value of 1 is given if it is less than 120 mg/dl and a value of 0 if it is greater. Exang is the exercise-induced angina, which is recorded as 1 if there is pain and 0 if there is none, and Restecg is the resting electrocardiographic result. Oldpeak is the exercise-induced ST

depression, slope is the exercise-induced ST segment peak slope, ca is the number of main vessels fluoroscopically coloured, thal is the exercise test duration in minutes, and num is the class attribute. Patients with heart disease

have a value of 1 for the class attribute, while normal people have a value of 0.