# HEART DISEASE DIAGNOSIS ANALYSIS

## DETAILED PROJECT REPORT

AAKASH BHUTE

# PROJECT DETAILS

| | |
|---|---|
| **Project Title** | Heart Disease Diagnostic – Analysis |
| **Technology** | Business Intelligence |
| **Domain** | Healthcare |
| **Project Difficulty level** | Advanced |
| **Programming Language Used** | Python |
| **Tools Used** | Jupyter Notebook, MS-Excel, MS-Power BI |

# OBJECTIVE

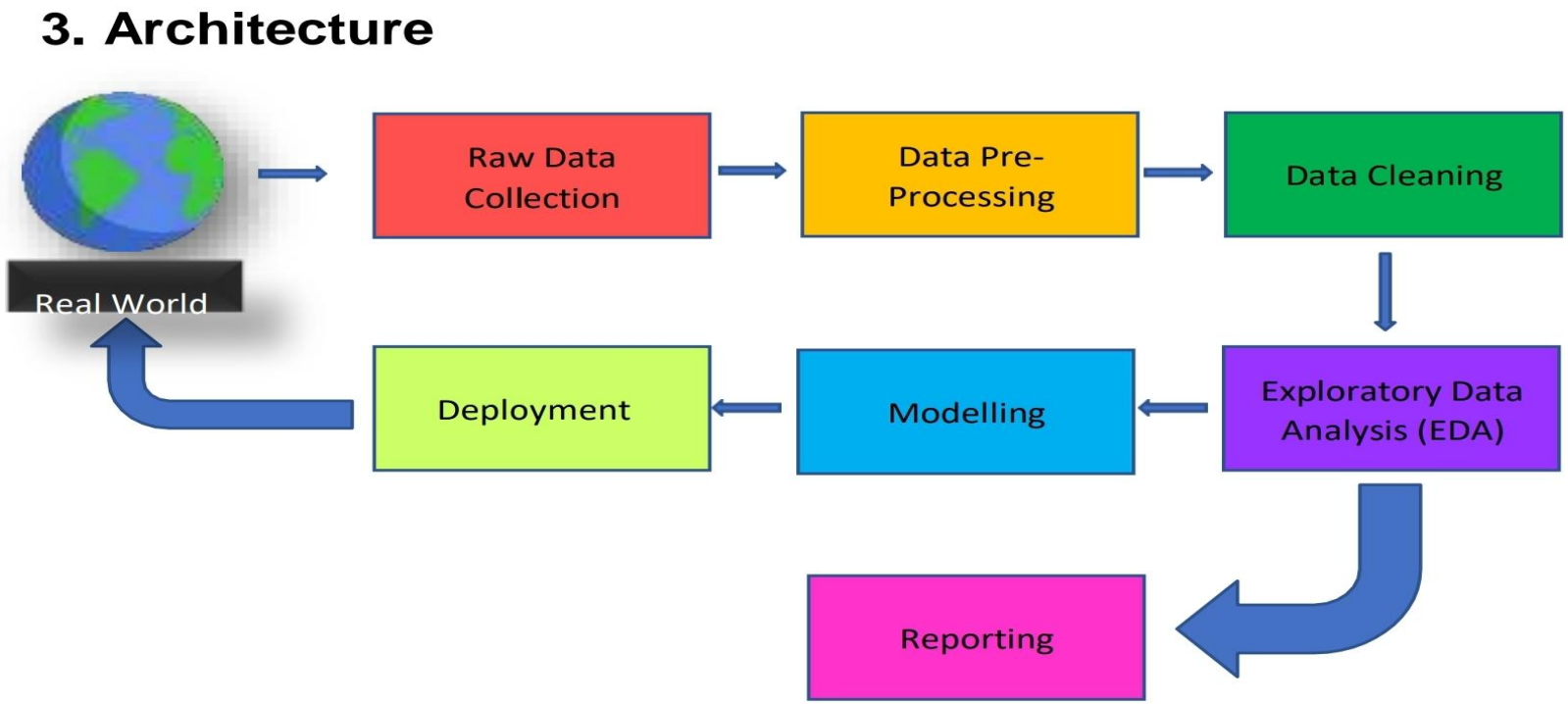
- The objective of this project is to examine the occurrence of heart disease by analyzing a set of features that collectively describe the condition.

# PROBLEM STATEMENT

- The COVID-19 pandemic has brought to light the profound impact of the virus on people from all walks of life, reminding us that good health is indeed invaluable. In order to enhance future preparedness, there is a need to analyze health and medical data pertaining to this pandemic.

- A dataset is formed by taking into consideration some of the information of 303 individuals.

# ARCHITECTURE



# DATASET INFORMATION

1. ***Age***: displays the age of the individual.
2. ***Sex***: displays the gender of the individual using the following format : 1 = male
   0 = female
3. ***Chest-pain type***: displays the type of chest-pain experienced by the individual using the following format :
   0 = typical angina
   1 = atypical angina
   2 = non — anginal pain
   3 = asymptotic
4. ***Resting Blood Pressure***: displays the resting blood pressure value of an individual in mmHg (unit)
5. ***Serum Cholestrol***: displays the serum cholesterol in mg/dl (unit)
6. ***Fasting Blood Sugar***: compares the fasting blood sugar value of an individual with 120 mg/dl.
   If fasting blood sugar > 120 mg/dl then : 1 (true) else
   : 0 (false)
7. ***Resting ECG*** : displays resting electrocardiographic results 0 = norma 1 = having ST-T
   2 = left ventricular hypertrophy
8. ***Max heart rate achieved*** : displays the max heart rate achieved by an individual.

# DATASET INFORMATION

9. ***Exercise induced angina*** :
   1 = yes
   0 = no

10. ***ST depression induced by exercise relative to rest***: displays the value which is an integer or float.

11. ***Peak exercise ST segment*** :
   0 = upsloping
   1 = flat
   2 = downsloping

12. ***Number of major vessels (0–4) coloured by fluoroscopy*** : displays the value as integer or float.

13. ***Thal*** : displays the thalassemia :
   0,1 = normal
   2 = fixed defect
   3 = reversible defect

14. ***Diagnosis of heart disease*** : Displays whether the individual is suffering from heart disease or not :
   0 = absence
   1 = present

# Why These Parameters are Important?

**Age:** Age is the most important risk factor in developing cardiovascular or heart diseases, with approximately a tripling of risk with each decade of life. Coronary fatty streaks can begin to form in adolescence. It is estimated that 82 percent of people who die of coronary heart disease are 65 and older. Simultaneously, the risk of stroke doubles every decade after age 55.

**Sex:** Men are at greater risk of heart disease than pre-menopausal women. Once past menopause, it has been argued that a woman's risk is similar to a man's although more recent data from the WHO and UN disputes this. If a female has diabetes, she is more likely to develop heart disease than a male with diabetes.

**Resting Blood Pressure:** Over time, high blood pressure can damage arteries that feed your heart. High blood pressure that occurs with other conditions, such as obesity, high cholesterol or diabetes, increases your risk even more.

**Fasting Blood Sugar:** Not producing enough of a hormone secreted by your pancreas (insulin) or not responding to insulin properly causes your body's blood sugar levels to rise, increasing your risk of heart attack.

**Cholesterol:** A high level of low-density lipoprotein (LDL) cholesterol (the "bad" cholesterol) is most likely to narrow arteries. A high level of triglycerides, a type of blood fat related to your diet, also ups your risk of heart attack. However, a high level of high-density lipoprotein (HDL) cholesterol (the "good" cholesterol) lowers your risk of heart attack.

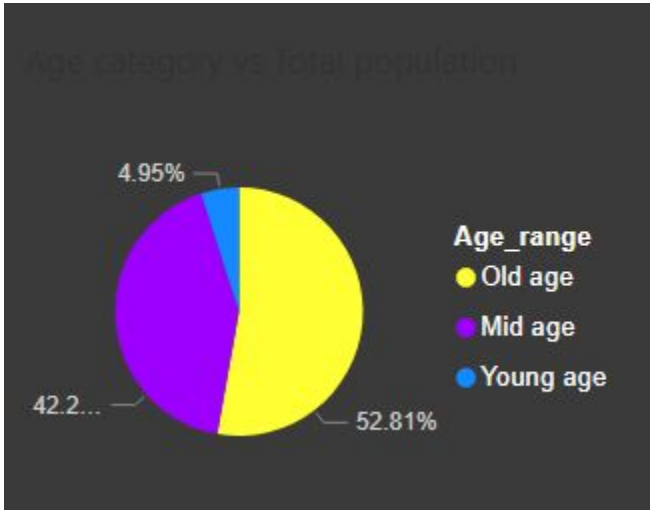
**Resting ECG:** For people at low risk of cardiovascular disease, the USPSTF concludes with moderate certainty that the potential harms of screening with resting or exercise ECG equal or exceed the potential benefits. For people at intermediate to high risk, current evidence is insufficient to assess the balance of benefits and harms of screening.

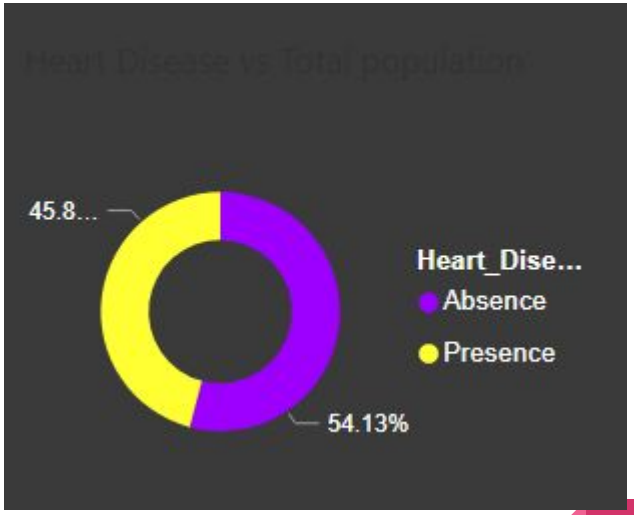
**Max heart rate achieved:** The increase in the cardiovascular risk, associated with the acceleration of heart rate, was comparable to the increase in risk observed with high blood pressure. It has been shown that an increase in heart rate by 10 beats per minute was associated with an increase in the risk of cardiac death by at least 20%, and this increase in the risk is similar to the one observed with an increase in systolic blood pressure by 10 mm Hg.

**ST Depression:** In unstable coronary artery disease, ST-segment depression is associated with a 100% increase in the occurrence of three-vessel/left main disease and to an increased risk of subsequent cardiac events. In these patients an early invasive strategy substantially decreases death/myocardial infarction.

# INSIGHTS

## What Kind of Population do we have?

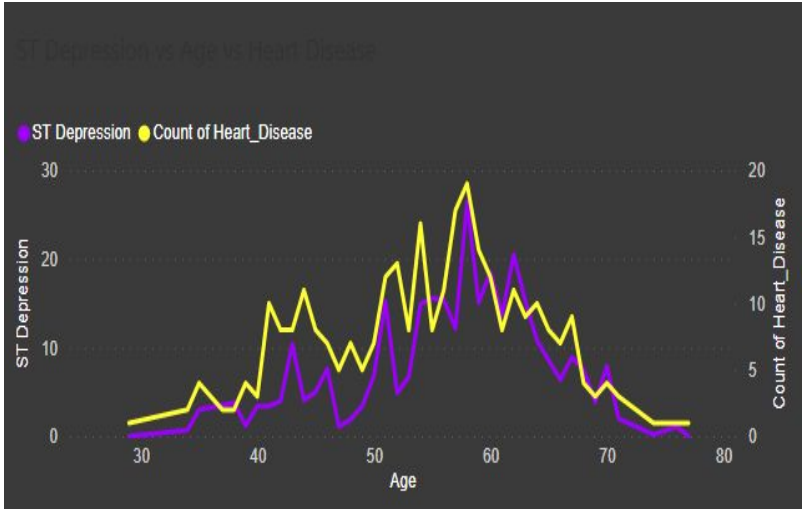


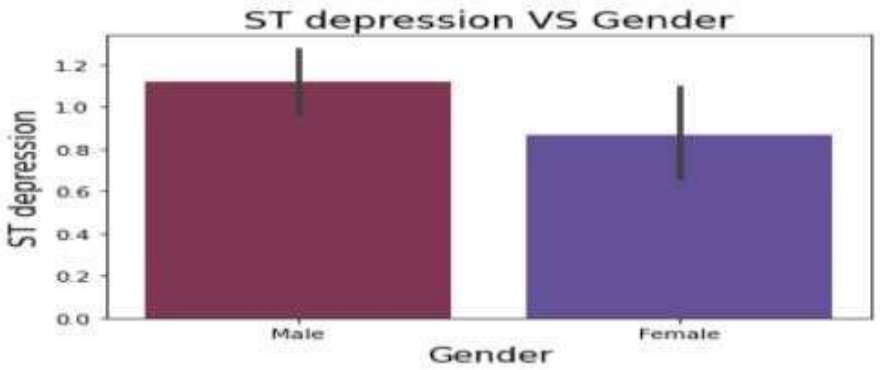




**45.87%People suffering from heart disease from our total population.**

**We have more Old age people (>55) i.e. 52.81% in our dataset.**

# ST Depression and how it is related to Heart disease

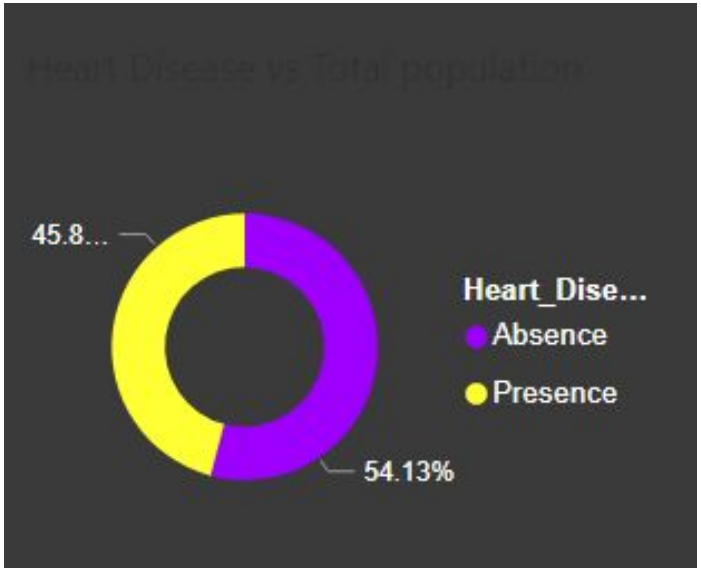


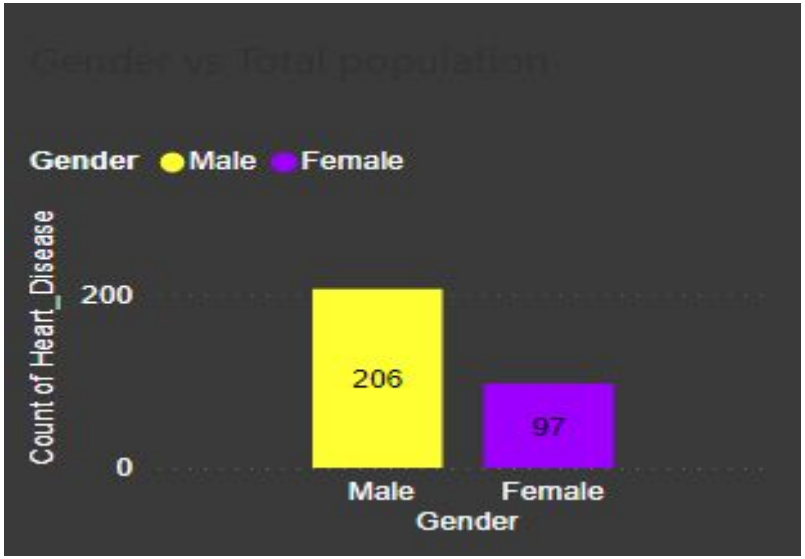




**We could see that males are more getting FT depression than the females**

**We could see that ST Depression increases after the age 52-55 and reaches it's highest at the age of 57-60 then decreases.**

# Who suffers from heart disease?

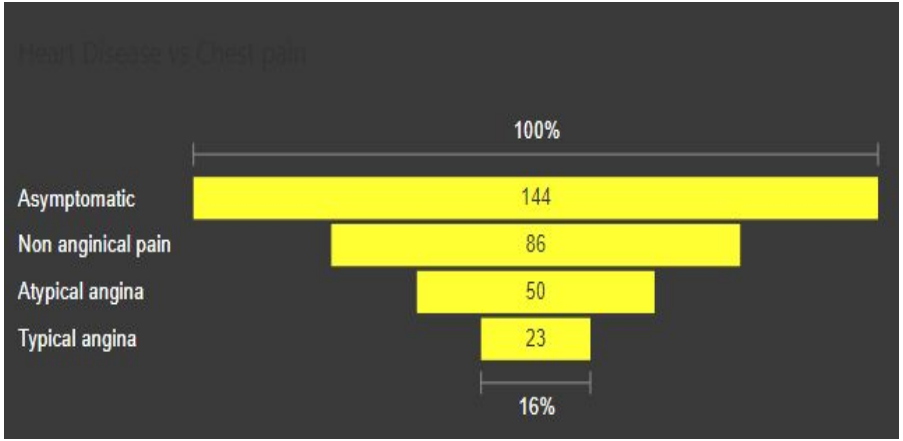


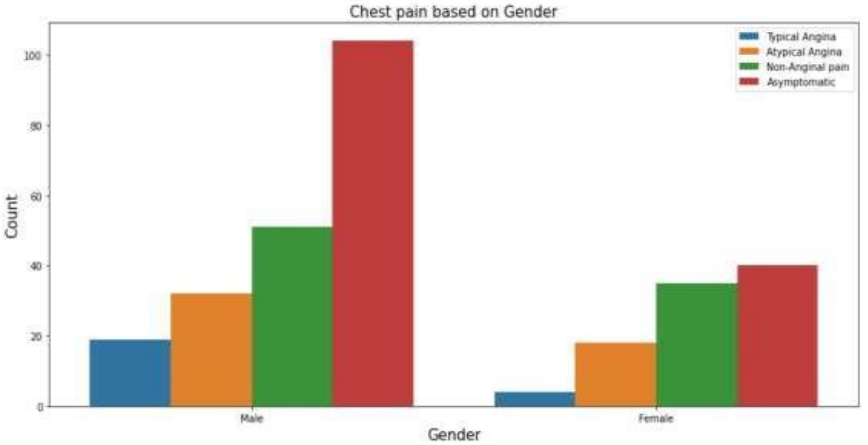




**68.35 % people who belongs to elder age (>55) are more prone to heart disease.**

**Males are more affected by heart disease than the females**

# Chest pain experienced by Heart patients




**It is very interesting to see that more heart patient don't have any symptoms of Chest pain asymptomatic**

**Both males and females have more asymptomatic chest pain followed by Atypical angina chest pain**

# Other Observations

- The average maximum heart rate of patients with heart disease (139.26 mm/Hg) is lower than that of individuals without heart disease.
- Patients with heart disease exhibit higher ECG measurements (163) compared to those without the condition.
- Heart patients have a higher average cholesterol level (251.47) than individuals who do not have heart disease.

# Heart Disease Diagnosis Analysis

## Gender
Female | Male

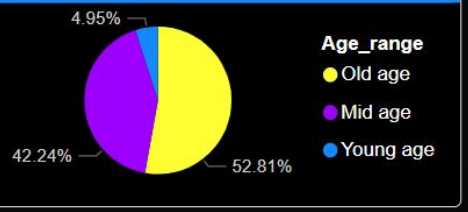
## Heart Disease
Absence | Presence

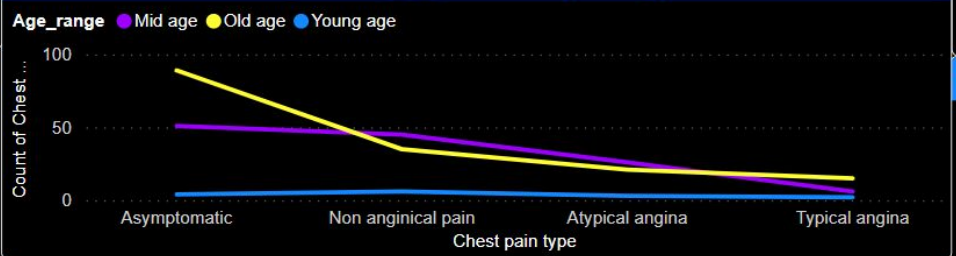
## Avg Colesterol
246.69

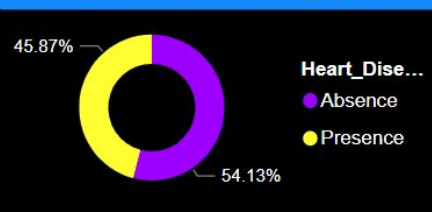
## Avg BP
131.69

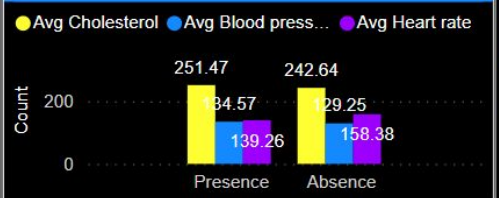
## Total Individuals
303

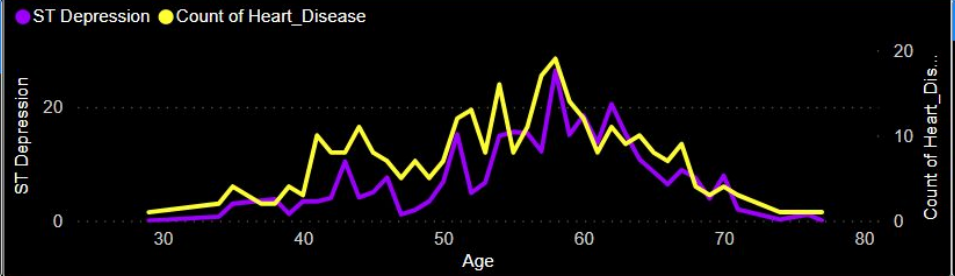
## Avg Heartbeat
149.61

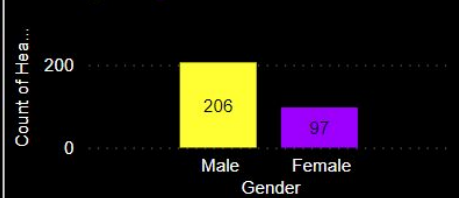
## Age category vs Total population



## Age Category vs Chest pain type


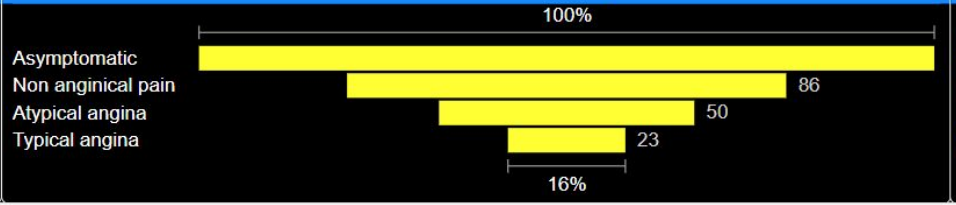

## Heart Disease vs Total population



## Chol, BP, Heart Rate vs Heart Disease



## ST Depression vs Age vs Heart Disease



## Gender vs Total population



## Average Heart Rate vs Age Range

## Heart Disease vs Chest pain



## ECG vs Heart Disease

# KEY PERFORMANCE INDICATOR(KPI)

1. Age distribution differs based on the presence of heart disease.
2. Gender distribution varies based on the presence of heart disease.
3. ST depression and age are associated with the presence of heart disease.
4. Age categories are related to different types of chest pain.
5. Heart disease occurrence in the total population.
6. The relationship between chest pain types and the presence of heart disease.
7. Cholesterol, blood pressure, and heart rate differ in heart disease patients compared to others.
8. ECG measurements are linked to the presence of heart disease.

# CONCLUSION

1. Approximately 45.87% of people suffer from heart disease.
2. Men in the age range of 50 to 60 years are more susceptible to heart disease, while women in the age range of 55 to 65 years have a higher likelihood.
3. Men are more prone to heart disease than women.
4. Elderly individuals have a higher risk of developing heart disease.
5. People with asymptomatic chest pain have a higher chance of having heart disease.
6. High cholesterol levels are commonly observed in people with heart disease.
7. Blood pressure tends to increase between the ages of 50 to 60 and may continue to rise until the age of 70.
8. Cholesterol levels and maximum heart rate tend to increase in the age group of 50 to 60.
9. -ST depression typically increases between the ages of 30 to 40.

Thank you