

# Heart Disease Diagnostic- Analysis

Detailed Project Report

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# Objective

- The aim of this project is to analyse the occurrence of Heart Disease among people by studying different parameters, factors and their effects related to heart disease by using the provided dataset.

# 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, Tableau

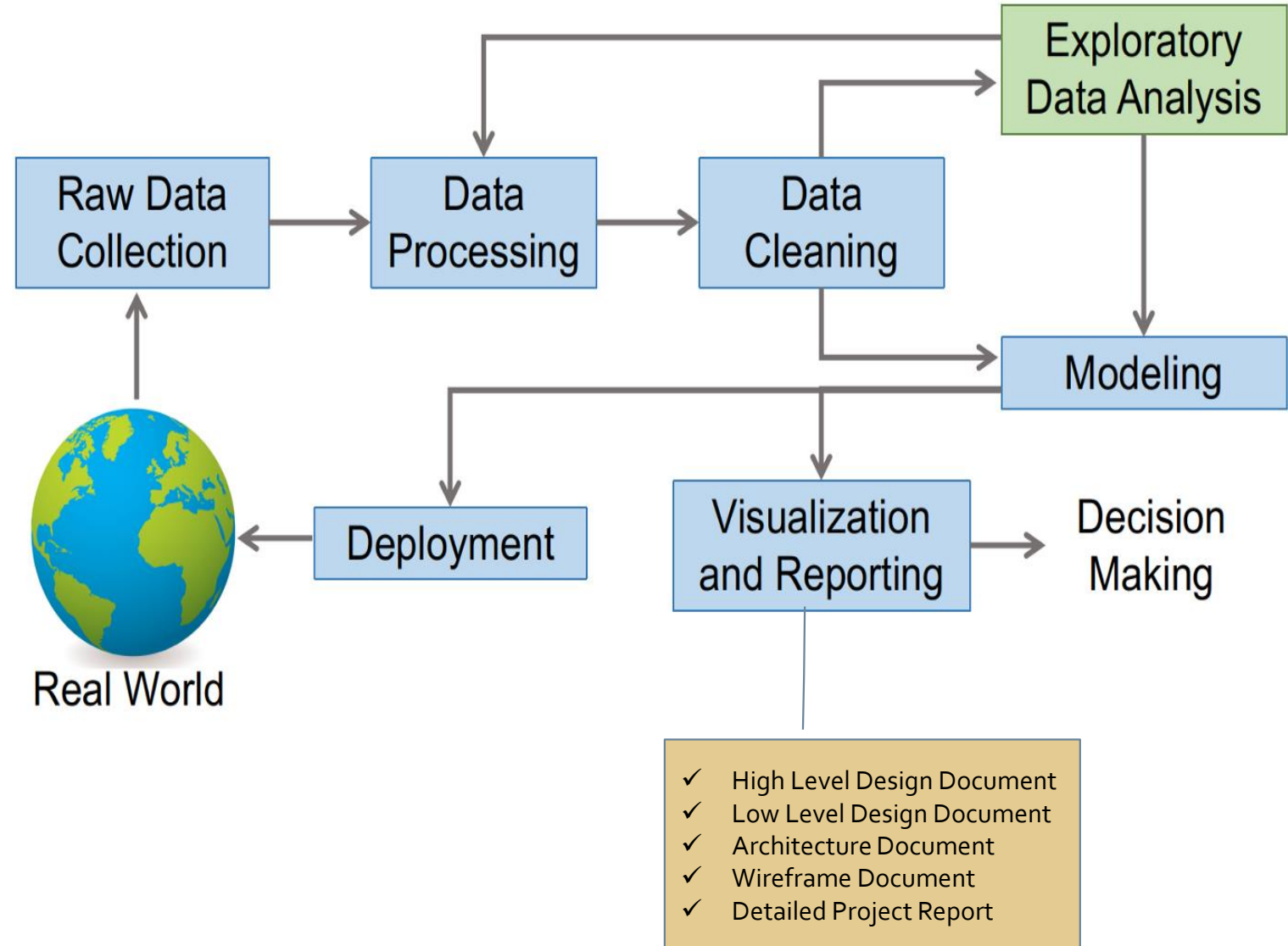
# Problem Statement

- Health is real wealth in the pandemic time we all realized the brute effects of covid-19 on all irrespective of any status. You are required to do the research, analyse this health and medical data for better future preparation.
- Dataset is formed by taking into consideration of some information from 303 individuals

## **Business Objectives:**

- ❑ Performing EDA through Python and find insights.
- ❑ Extract various information such as heart disease rates, Heart disease by - gender, by age.
- ❑ Compare attributes of the dataset to extract necessary information.
- ❑ Make Dashboard with extracted information from data.
- ❑ Find key metrics and factors and show relationship between attributes.

# Architecture



# Dataset Information

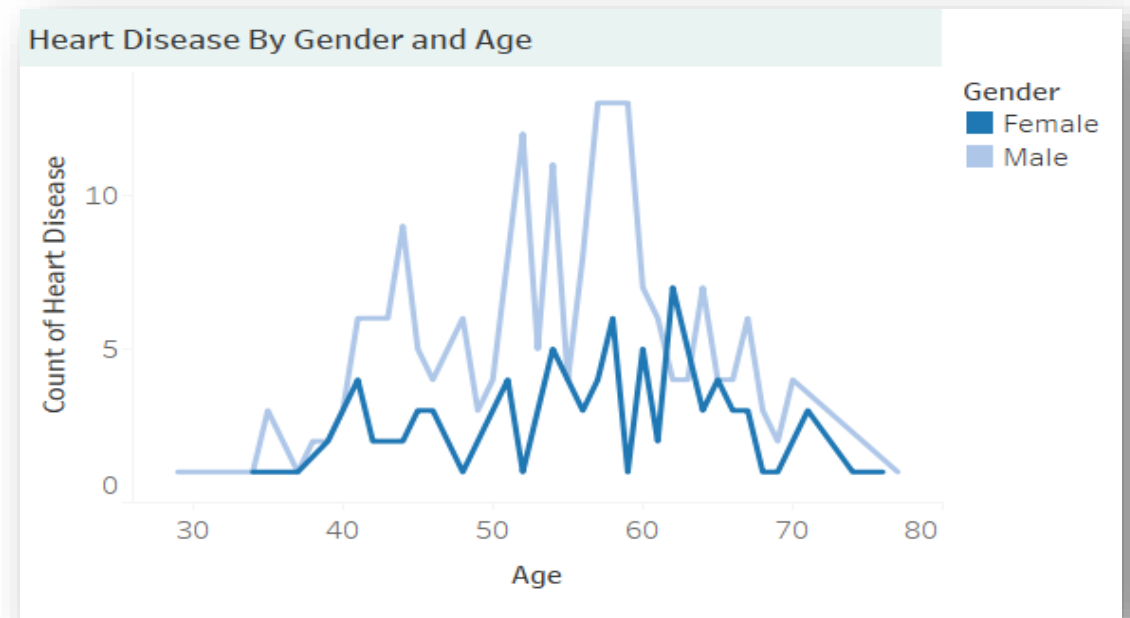
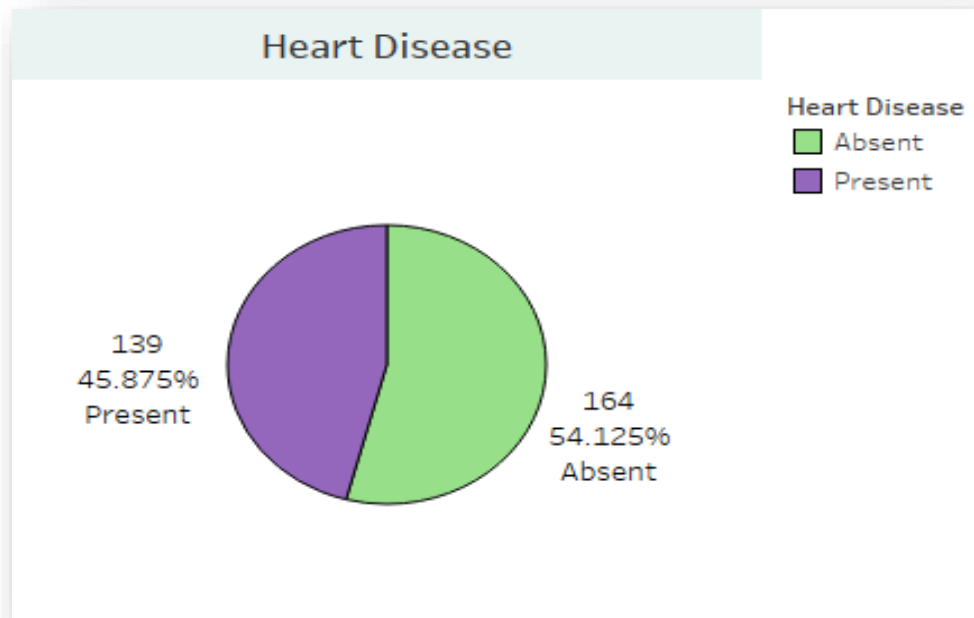
## 14 Attributes are used:

1. **age**: in years
2. **sex**: 2 Values (*1 = male, 0 = female*)
3. **chest pain type**: 4 values (*Value 1: typical angina, Value 2: atypical angina, Value 3: non-anginal pain, Value 4: asymptomatic*)
4. **trestbps**: resting blood pressure (*in mm Hg on admission to the hospital*)
5. **chol**: serum cholestrol in mg/dl
6. **fbs**: (fasting blood sugar > 120 mg/dl), (*1 = true, 0 = false*)
7. **restecg**: resting electrocardiographic results: (*Value 0: normal, Value 1: having ST-T wave abnormality (T wave inversions and/or ST elevation or depression of > 0.05 mV, Value 2: showing probable or definite left ventricular hypertrophy by Estes' criteria)*)
8. **thalach**: maximum heart rate achieved
9. **exang**: exercise include angina (*1 = yes, 0 = no*)
10. **oldpeak**: ST depression induced by exercise relative to rest
11. **slope**: the slope of the peak exercise ST segment (*Value 1: upsloping, Value 2: flat, Value 3: downsloping*)
12. **ca**: number of major vessels (0-3) colored by flourosopy
13. **thal**: 3 = normal; 6 = fixed defect; 7 = reversable defect
14. **num**: the predicted attribute diagnosis of heart disease (angiographic disease status) (*Value 0: < 50% diameter narrowing, Value 1: > 50% diameter narrowing i.e. 0 = no (no presence of heart disease), 1 = yes (presence of heart disease)*)

# Important Parameters

- **Age:** Age is an independent risk factor for cardiovascular disease (CVD) in adults. Aging can cause changes in the heart and blood vessels that may increase a person's risk of developing cardiovascular disease.
- **Sex:** Men generally develop CVD at a younger age and have a higher risk of coronary heart disease (CHD) than women. Women develop Heart Disease 7 to 10 years later than in men i.e. chances of heart risk develop in women after postmenopausal.
- **Resting Blood Pressure:** High blood pressure adds to your heart's workload. High blood pressure increases the force of blood through your arteries and can damage artery walls, and narrowed arteries that are less elastic make it more difficult for blood to travel and increase risk of heart failure, heart diseases, heart attack, stroke, atrial fibrillation, chronic kidney disease.
- **Fasting Blood Sugar:** High blood sugar can damage blood vessels and the nerves that control your heart. People with diabetes are also more likely to have other conditions that raise the risk for heart disease.
- **Cholesterol:** High levels of cholesterol can increase your risk of heart disease, conditions like peripheral artery disease, high blood pressure and stroke. With high cholesterol, you can develop fatty deposits in your blood vessels. Eventually, these deposits grow, making it difficult for enough blood to flow through your arteries.
- **Resting ECG:** Major and minor ECG abnormalities among older adults were associated with an increased risk of CHD events.
- **Maximum Heart Rate:** A high heart rate was associated with a higher risk of all-cause mortality and cardiovascular events, 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:** ST depression refers to a finding on an electrocardiogram, wherein the trace in the ST segment is abnormally low below the baseline. ST depression can increase the risk of an adverse cardiac event such as a heart attack or blood clots.





# Insights

## Heart Disease

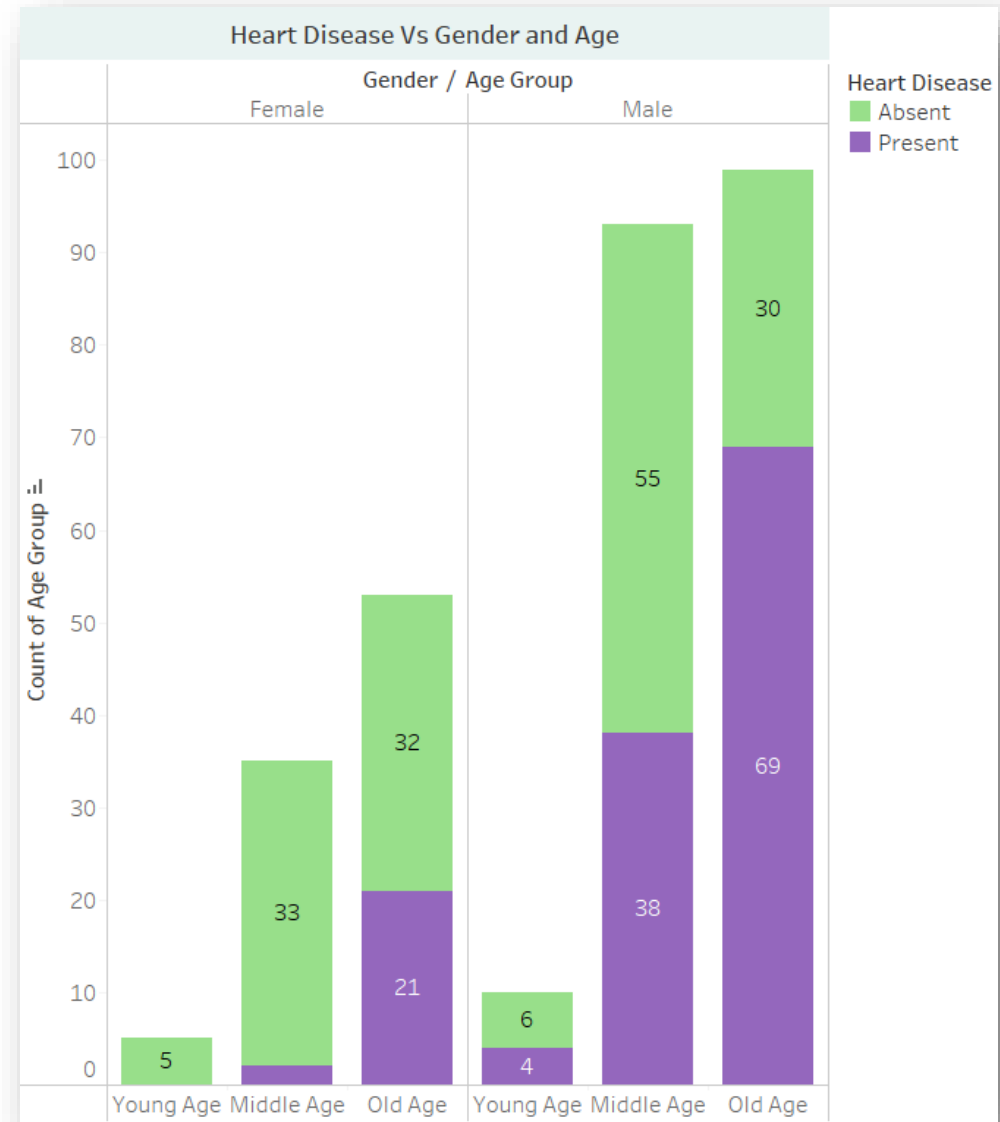
Almost 45.9% of people are suffering from Heart Disease

Males between age 50 – 60 Years and Females between 55 – 65 Years

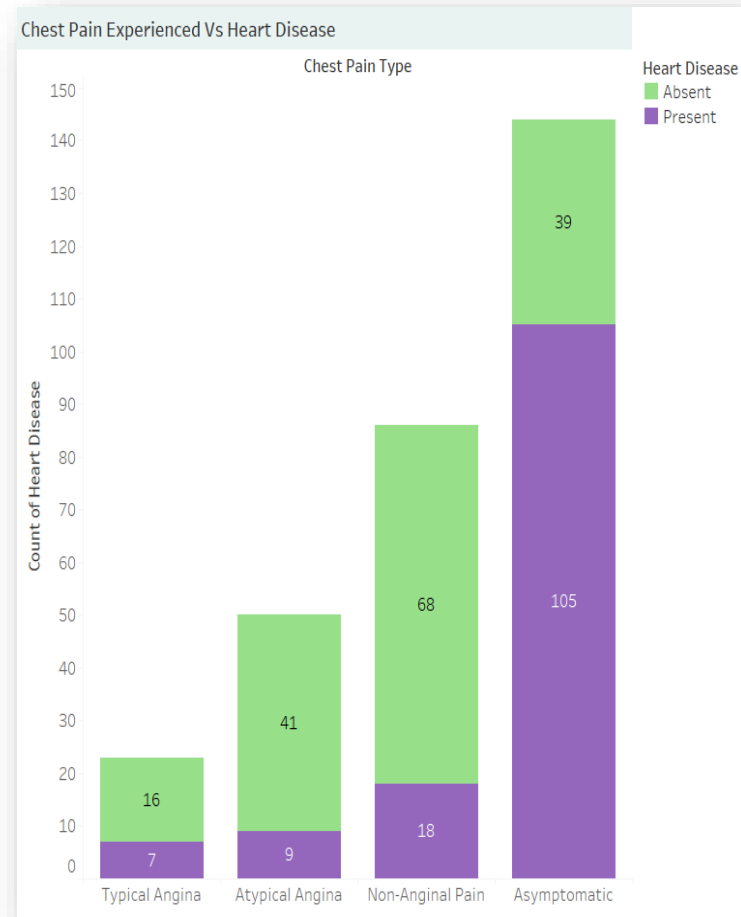
# Who suffers from Heart Disease?

People suffering from heart disease are more in Old Age followed by Middle Age

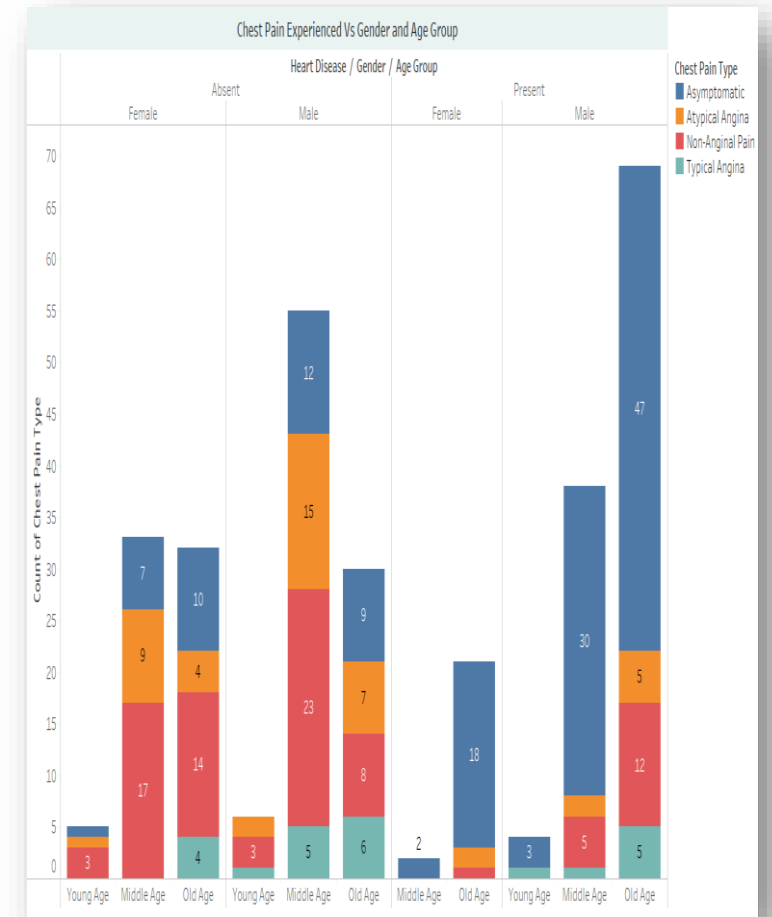
It seems Males suffer more from heart disease than Females



# Chest Pain Experienced by most of the People



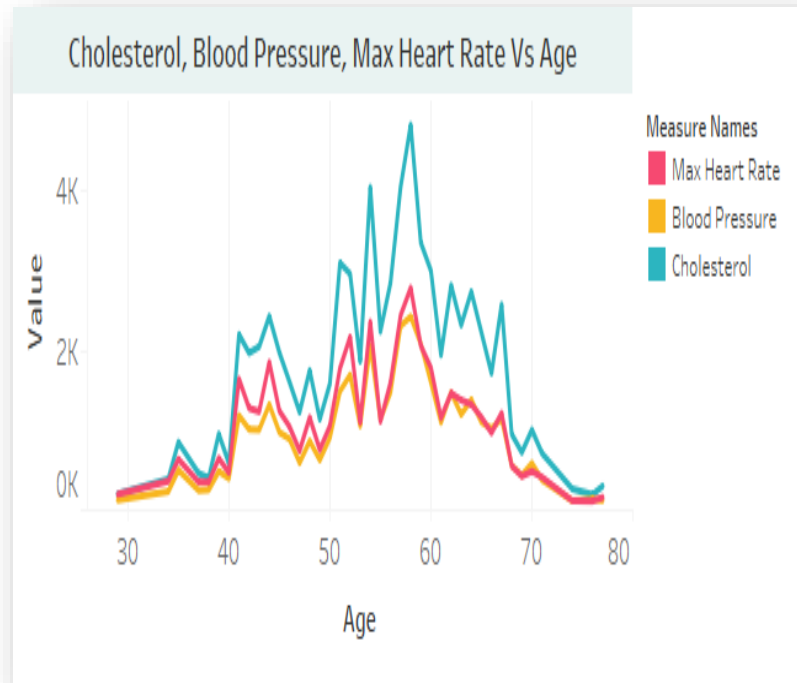
People having Asymptomatic Chest Pain have a higher chance of having Heart Disease



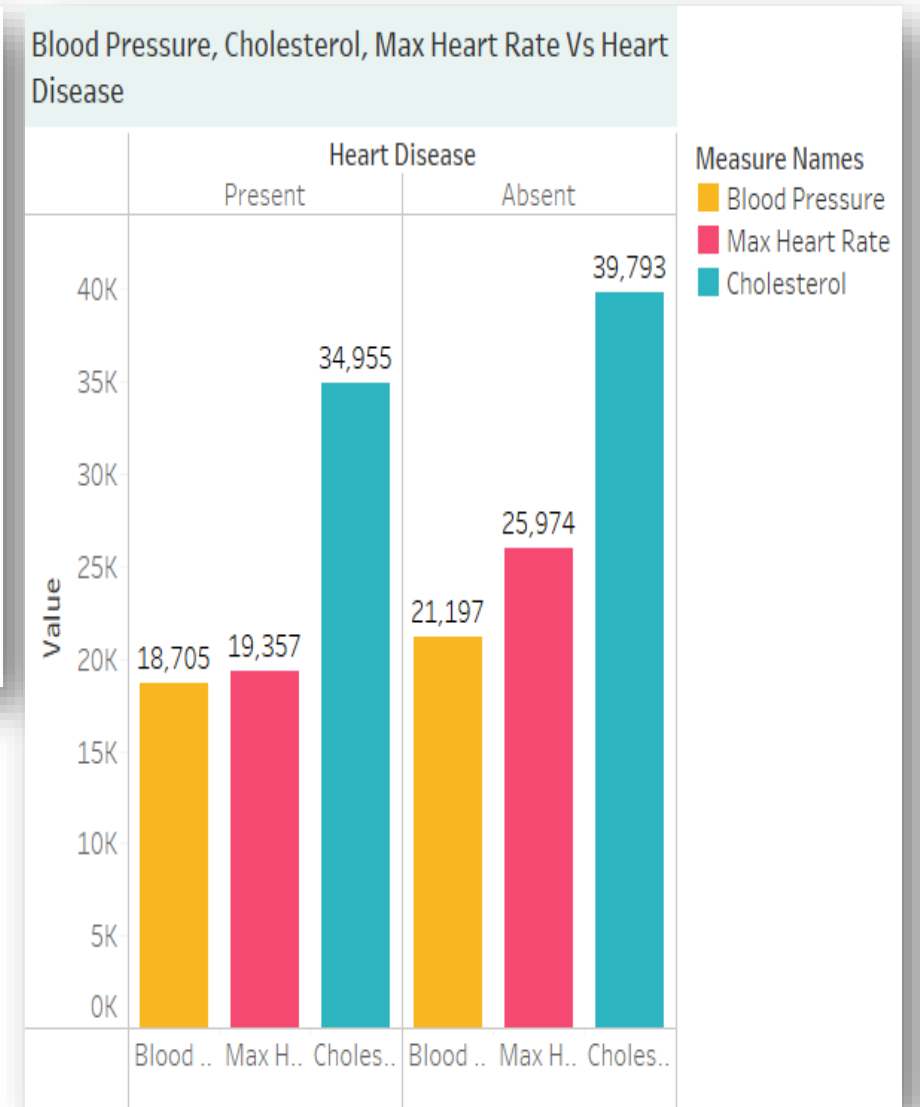
Higher number of Male from Old Age suffer from Asymptomatic Chest Pain

Asymptomatic Chest Pain means producing or showing no symptoms of Heart Disease

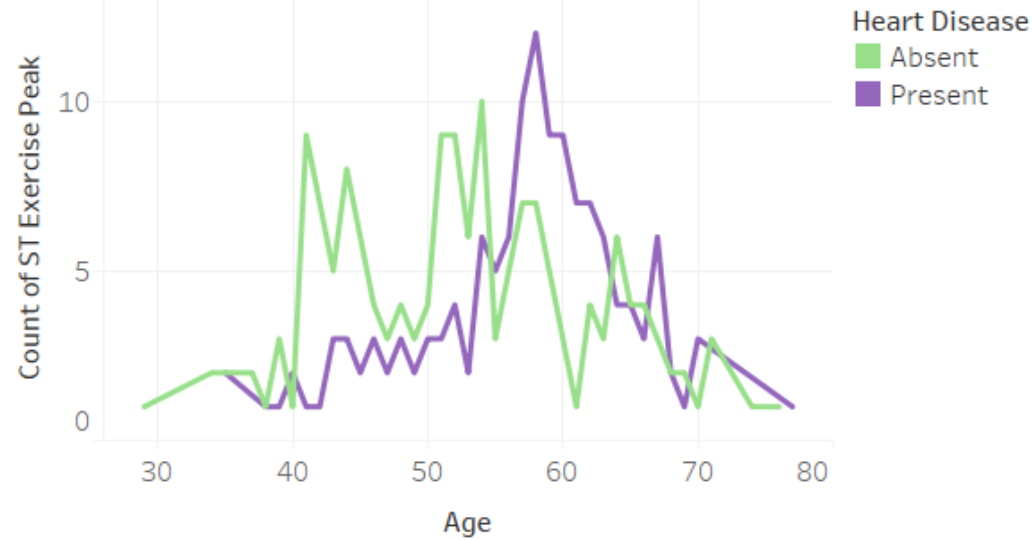
# Other Symptoms in Heart Disease



- Maximum Heart Rate, Blood Pressure, Cholesterol is observed between the age 50 -60 Years
- Cholesterol level of people having Heart Disease is High



Heart Disease Vs ST Exercise Peak and Age



ST Exercise Peak Vs Heart Disease

Heart Di..	Age Group	ST Exercise Peak			Count of Heart Dis..
		Upsloping	Flat	Downsloping	
Present	Old Age	22	60	8	160
	Middle Age	13	24	3	
	Young Age	1	3		
Absent	Old Age	35	23	4	
	Middle Age	60	24	4	
	Young Age	9	1	1	

## Other Symptoms in Heart Disease

ST Depression Peak (Flat and Upsloping) is seen more in old Age people (50 – 65 Years) having Heart Disease

# Key Performance Indicators (KPIs)

Key indicators displaying a summary of the Heart Disease Diagnostic-Analysis and its relationship with different metrics:

1. Percentage of People Having Heart Disease
2. Age Distribution including Gender
3. Gender Distribution Based on Heart Disease
4. Chest Pain Experienced by People Suffering from Heart Disease
5. Blood Pressure, Cholesterol Level and Maximum Heart Rate of Heart Disease Patients according to their Age
6. ST Depression Experienced by Heart Disease People w.r.t their Age

# Conclusion

- » Almost 45.87 % of people are suffering from Heart Disease
- » Males and Old Age group people are more prone to Heart Disease
- » Males in Old Age (50 – 60 Years) and Females in Old Age (55 – 65 Years) category suffer from Heart Disease more
- » People experiencing Asymptomatic Chest Pain have a higher chance to have Heart Disease
- » Maximum Heart Rate, Blood Pressure , Cholesterol is observed between the age 50 -60
- » Cholesterol level of people having Heart Disease is High
- » ST Depression Peak (Flat and Upsloping) is seen more in old Age people having Heart Disease

# Q & A

## Q.1. What's the source of Data?

- The Dataset was taken from iNeuron's provided project description document.

- Database list: heart\_disease\_dataset.csv

Link: <https://drive.google.com/drive/folders/165Pjmfbb9W9PGyorZjHEA22LWoLt3YQ8?usp=sharing>

## Q.2. What was the type of Data?

- The Data has both Numerical and Categorical values

## Q.3. What is the complete flow followed in this project?

- Refer slide for better understanding

## Q.4. What techniques were used for Data?

- Data Handling and Cleaning, Removing Outliers
- Converting Numerical data into Categorical data
- Visualization and Report making

## Q.5. What libraries were used in Python?

- Pandas, Numpy, Matplotlib, Seaborn





Thank You!