

HEART DISEASE ANALYSIS

Detailed Project Report

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PROJECT DETAIL

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, Tableau

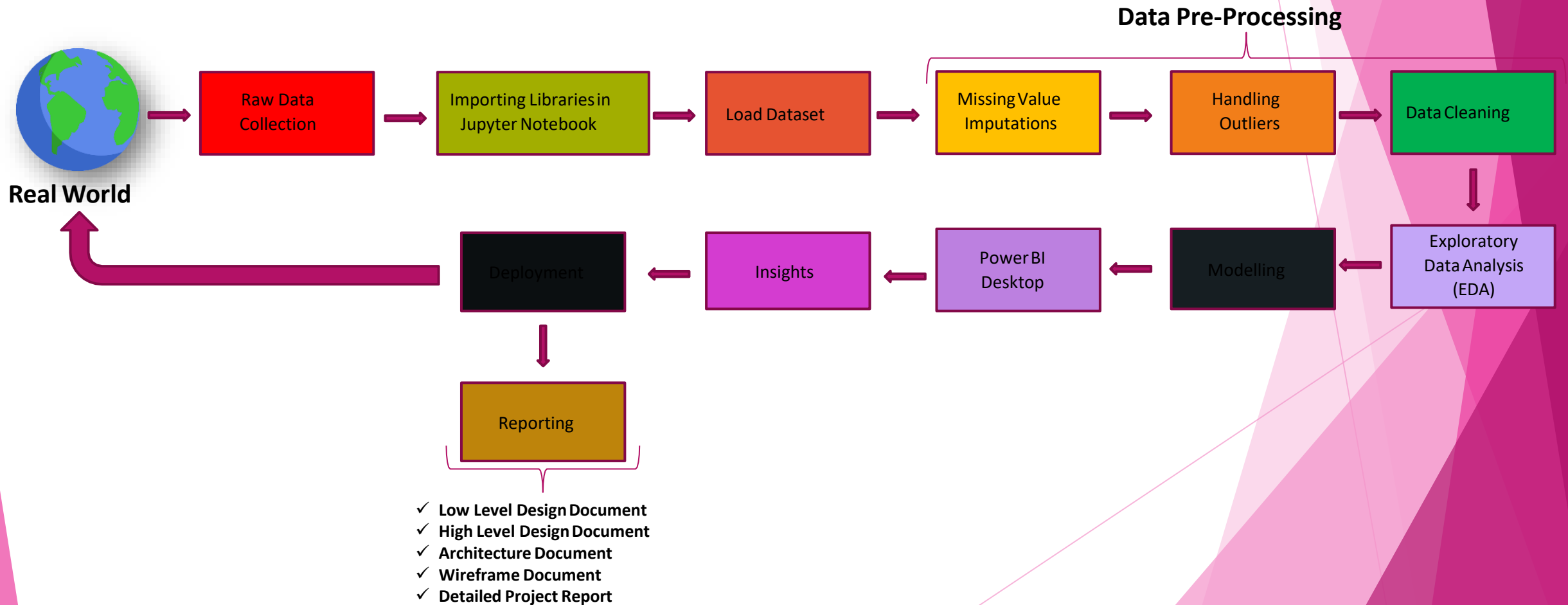
OBJECTIVE

- The goal of this project is to analyze the probability of heart disease occurrence, based on a combination of features that describes the heart disease

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 analyse this health and medical data for better future preparation.
- A dataset is formed by taking into consideration some of the information of 303 individuals.

ARCHITECTURE



DATASET INFORMATION

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.

DATASET INFORMATION

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.

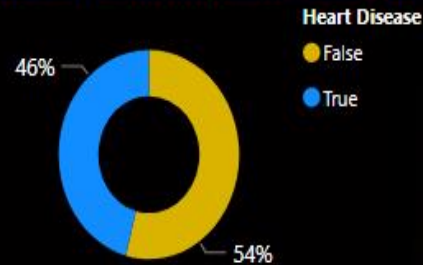
ST Depression: In unstable coronary artery disease, ST-segment depression is associated with a 100% increase in the occurrence of three-vessel/left main disease and to an increased risk of subsequent cardiac events. In these patients an early invasive strategy substantially decreases death/myocardial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

Heart Disease Analysis



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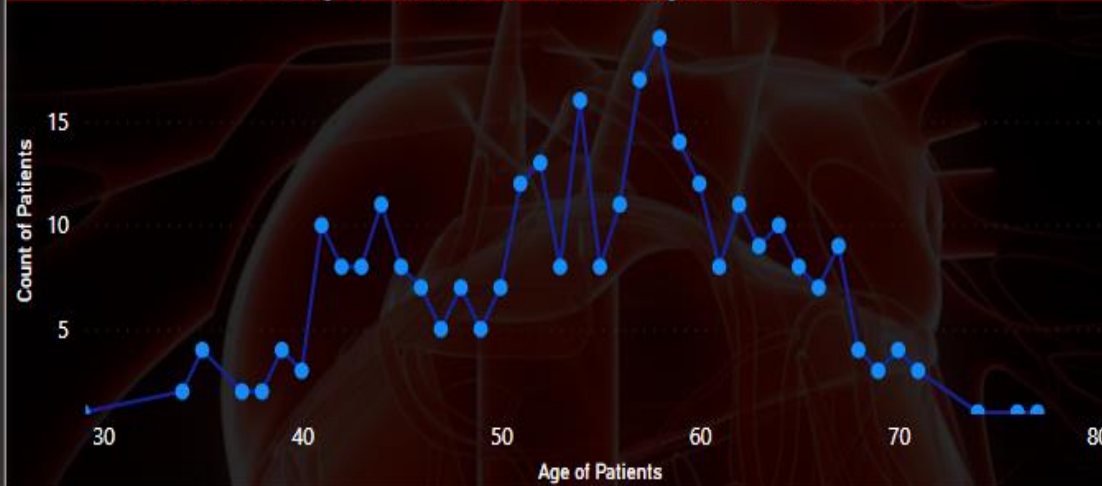
Review of Total Dataset by H...



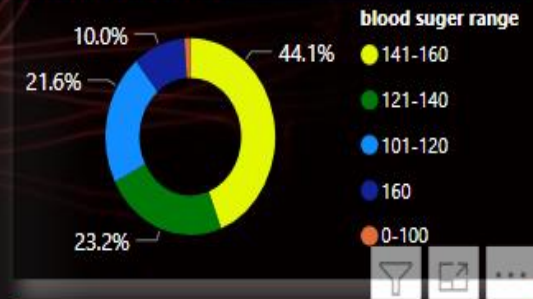
Total Reviews

303

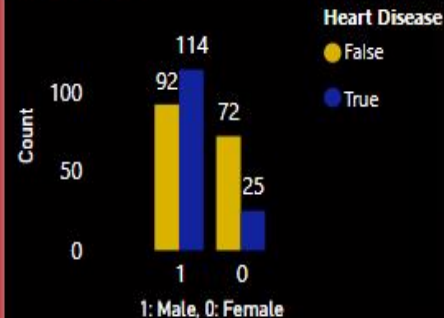
Review of Age of Patients suffering from Heart Disease



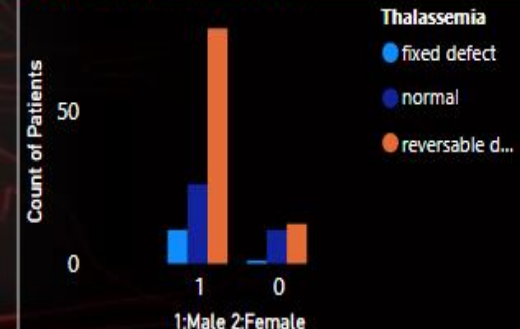
Resting blood sugar range by Heart Disease



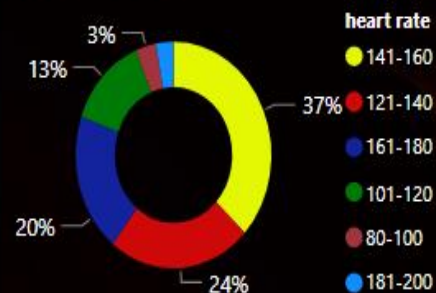
Review of Gender By Heart Disease



Genderwise Heart Disease caused by Types of Thalassemia



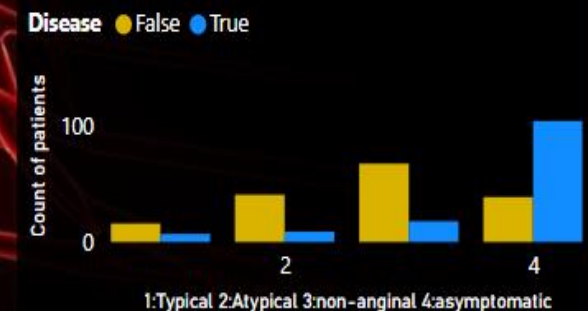
Review of Max heart rate in case of heart disease



Insights

- 1) Our dataset is almost balanced with 54% of patients having no heart disease and 46% of patients having heart disease.
- 2) Males have higher chances of having heart disease than females.
- 3) Patients who are likely to suffer from heart disease have higher maximum heart rates (rate between 141-160) whereas patients who are not likely to suffer from heart disease are having lower maximum heart rates.
- 4) Patients suffering from heart disease are mostly in age group of 55-65 years
- 5) Patients having resting blood sugar (diastolic state) <90mm Hg in diastolic state have less chances of heart disease
- 6) Female having chances of fixed defect type of thalassaemia is very rare compared to male. Male suffers more from fixed defect thalassaemia and reversible defect thalassaemia both compared to female

Review of heart disease by types of Chest pain



Heart Disease Analysis

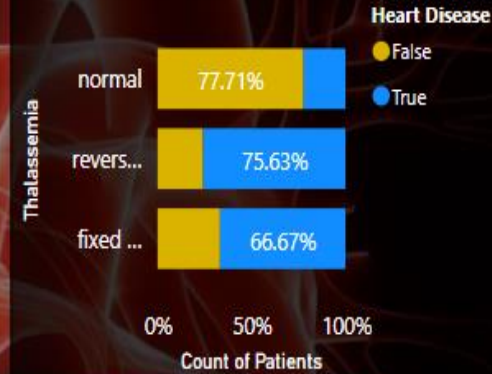


Heart Disease by Max Heart Rate and Age

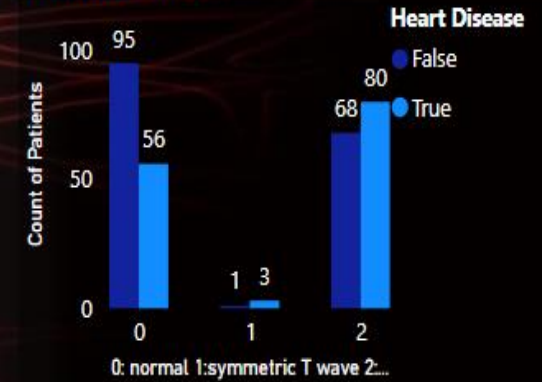
Heart Disease ● False ◆ True



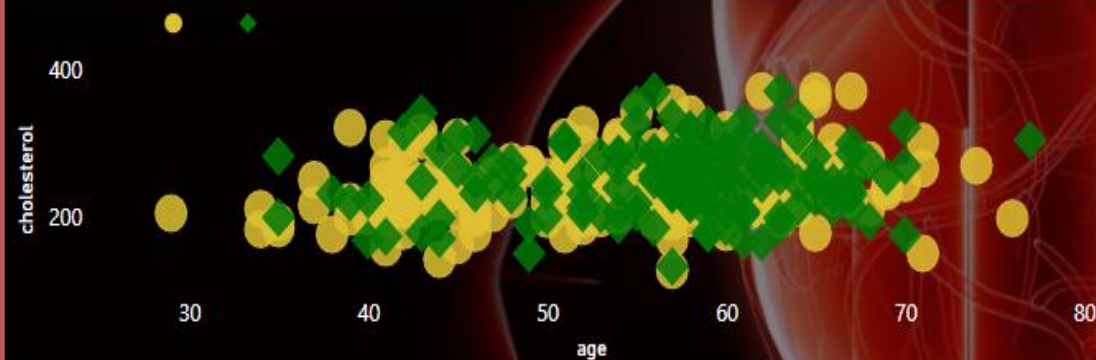
Heart Disease due to Different Types of Thalassemia



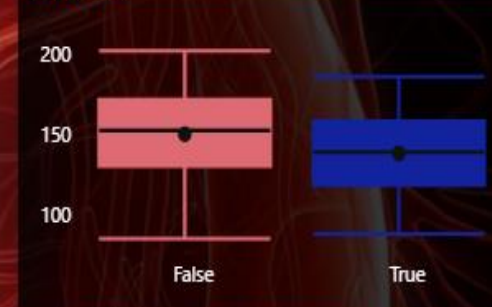
Heart Disease by Rest_ecg measurement



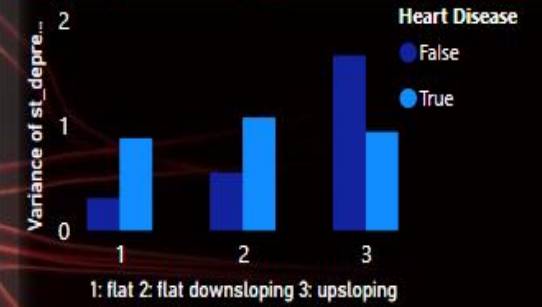
Review of Heart disease due to cholesterol and Age



Max Heart rate by Induced Angina



Variance of st_depression by st_slope and target



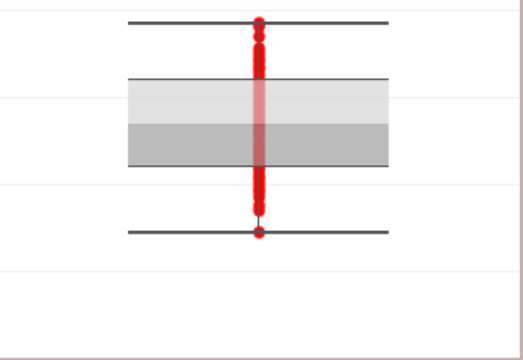
Insights

- 1) Patients of age between 55-60 are likely to suffer from heart disease have higher maximum heart rates(rate between 140-160) whereas patients who are not likely to suffer from heart disease are having lower maximum heart rates.
- 2) Higher cholesterol means higher chances of heart disease. it plays an important role in determining heart problems. With age cholesterol increases and level 200- 350 mg/dl are of concern.
- 3) Patients having no thalassaemia can also suffer from heart disease, but patients having reversible effect thalassaemia have greater chances of suffering from heart disease. So thalassaemia plays an important role in detecting heart disease.
- 4) The above plot shows that the more number of patients showing probable or definite left ventricular hypertrophy are more likelihood of suffering from a heart disease.
- 5) St depression > 0.5 mm in ECG indicates abnormality. Therefore the slope of the peak exercise ST segment showing downslope with st depression > 0.5 mm has greater

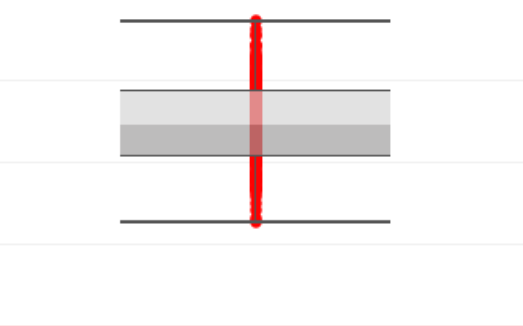
Back

Heart Disease Analysis - I

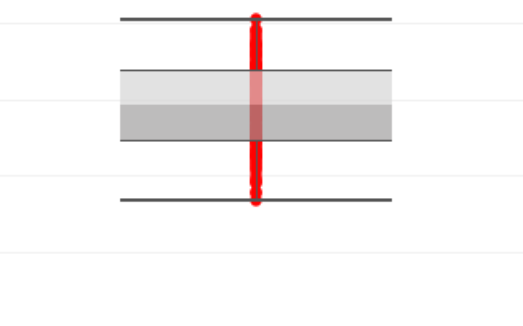
Age Distribution



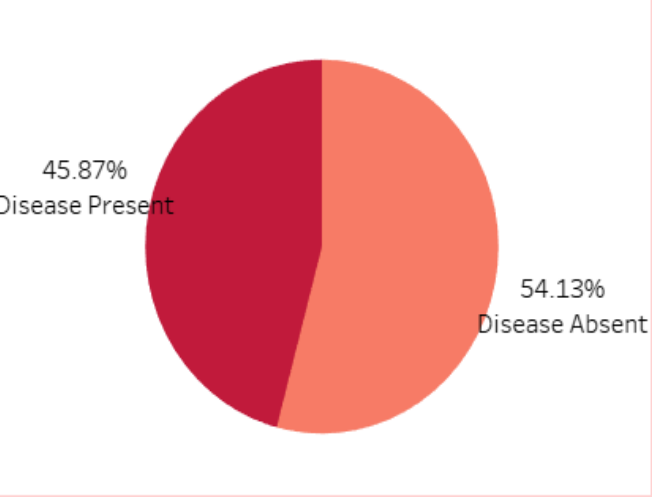
Cholestrol Distribution



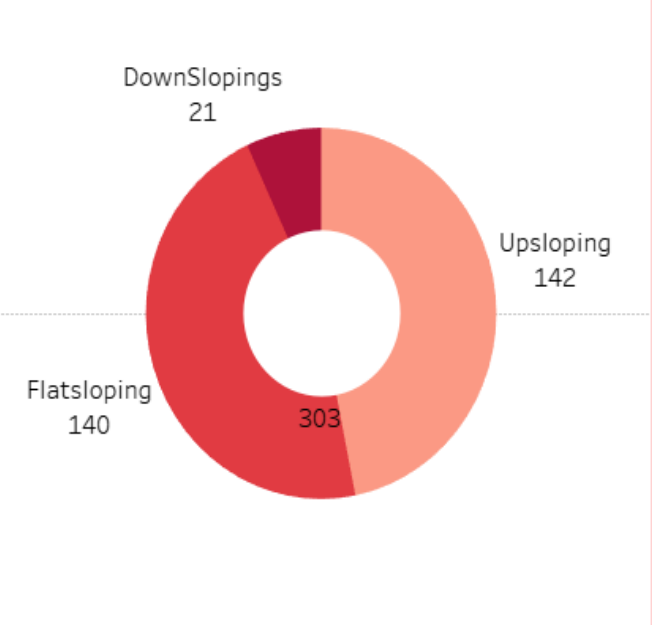
Heart Rate Distribution



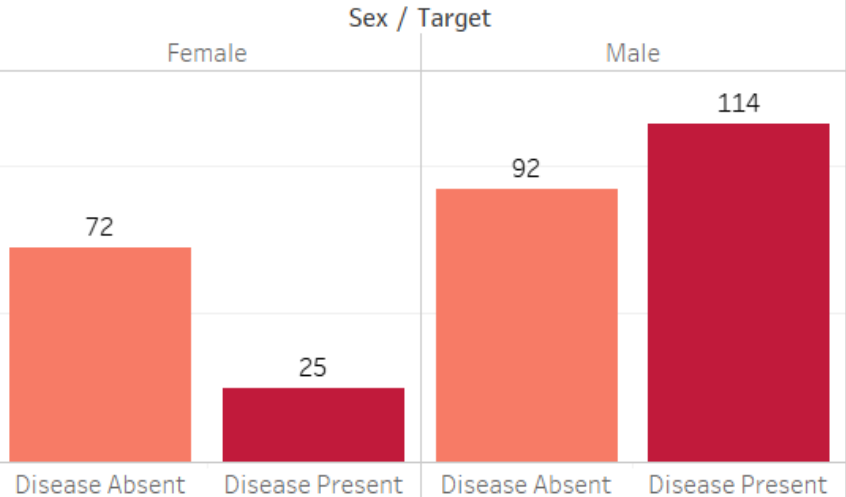
Target %



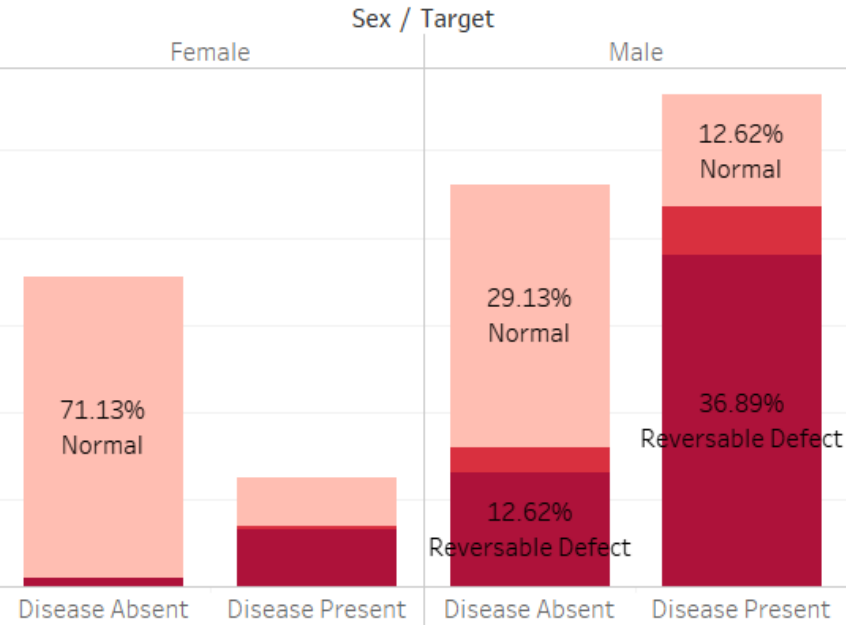
Target against ST Slope



Gender-wise Target count



Gender-wise Thalassemia for Heart Disease



St Slope
Upsloping
Flatsloping
DownSloping

Target
Disease Absent
Disease Present

Next Page

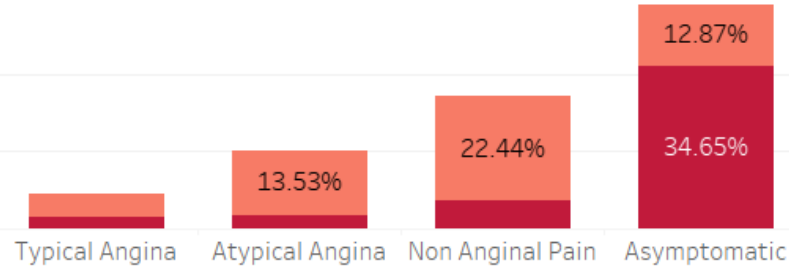
Observations

1. Males have higher chances of having Heart Disease than females.
2. Patients suffering from Heart Disease are mostly in age group 55-65.
3. Patients who are likely to suffer from the disease have heart rates range between 141-160 whereas patients who are not likely to suffer are in the range.between 161-180.
4. People having Asymtomatic Chest Pain, have higher chances of the disease.
5. Patients having Reversible Defect Thalamessia have greater chnaces of suffering from Thalasemmia.
6. Higher Cholesterol indicates higher chances of Heart Disease.

Heart Disease Analysis-II

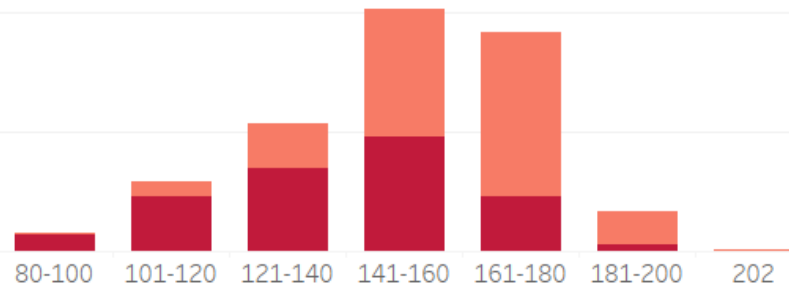
Chest Pain Experienced

Chest Pain Type



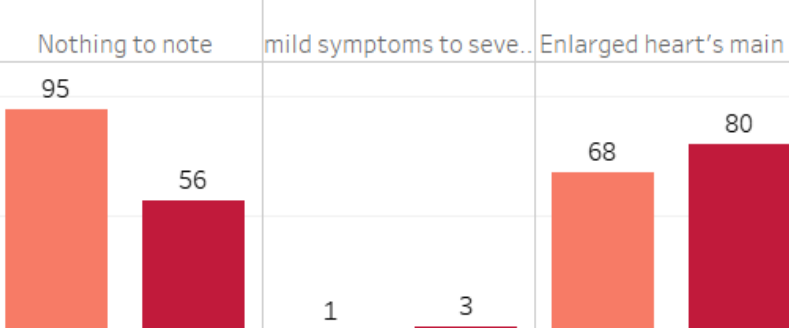
Review of Max Heart Rate achieved

Max Heart Rate Achieved Groups



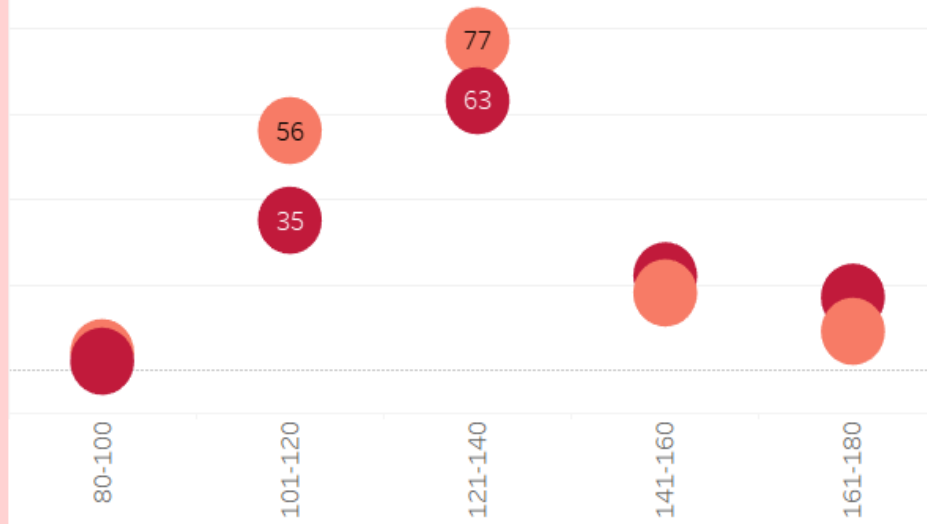
Rest ECG

Rest Ecg

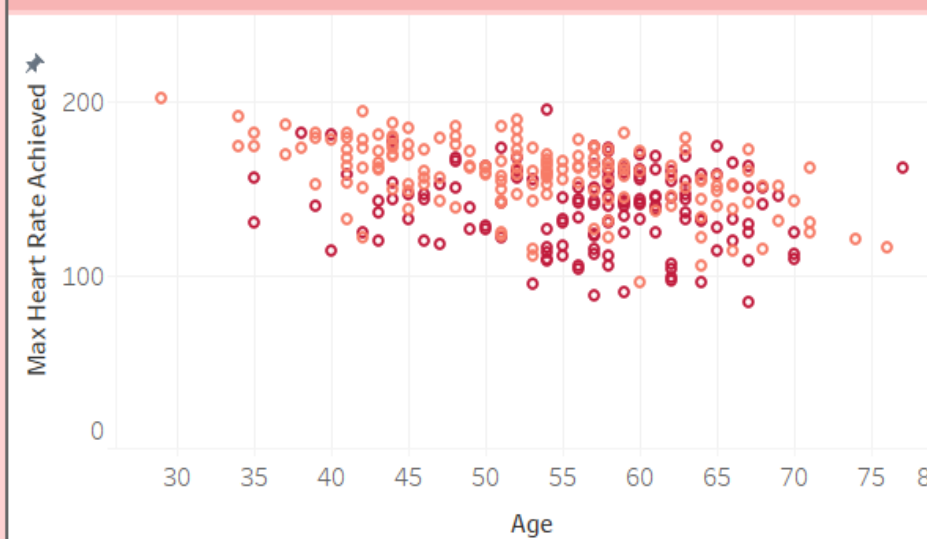


Review of Resting Blood Sugar

Resting Blood Sugar Groups

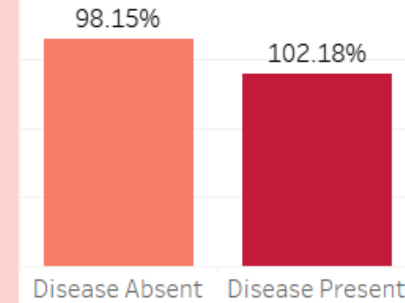


HeartRate_agewise



Cholesterol Effect on the Disease

Target



St Slope
Upsloping
Flatsloping
DownSloping

Target
Disease Absent
Disease Present

Previous

Variance of ST Depression by ST Slope and target



INSIGHTS

- 45.87% People suffering from heart disease.
- Elderly Aged Men are more (50 to 60 Years) and Females are more in 55 to 65 Years Category
- Males are more prone to heart disease.
- Elderly Aged People are more prone to heart disease.
- It seems people having asymptomatic chest pain have a higher chance of heart disease.
- Asymptomatic Chest pain means neither causing nor exhibiting symptoms of heart disease.
- It seems high number of cholesterol level in people having heart disease.
- Here we can observe that Blood Pressure increases between age of 50 to 60 and somehow continue the pattern till 70.
- Similarly, Cholesterol and maximum heart rate Increasing in the age group of 50-60.
- we can observe from here that ST depression mostly increases between the age group of 30-40.
- ST depression refers to a finding on an electrocardiogram, wherein the trace in the ST segment is abnormally low below the baseline.

Q & A

Q1) What's the source of data?

Ans) The Dataset was taken from iNeuron's Provided Project Description Document.
<https://drive.google.com/drive/folders/165Pjmf9W9PGy0rZjHEA22LW0Lt3Y-Q8>

Q2) What was the type of data?

Ans) The data was the combination of numerical and Categorical values.

Q 3) What's the complete flow you followed in this Project?

Ans) Refer slide 5th for better Understanding

Q4) What techniques were you using for data?

Ans) -Removing unwanted attributes
-Visualizing relation of independent variables with each other and output variables.
-Removing outliers
-Cleaning data and imputing if null values are present.
-Converting Numerical data into Categorical values.

Q 5) What were the libraries that you used in Python?

Ans) I used Pandas, NumPy and Matplotlib and Seaborn libraries in Pandas.

THANK YOU