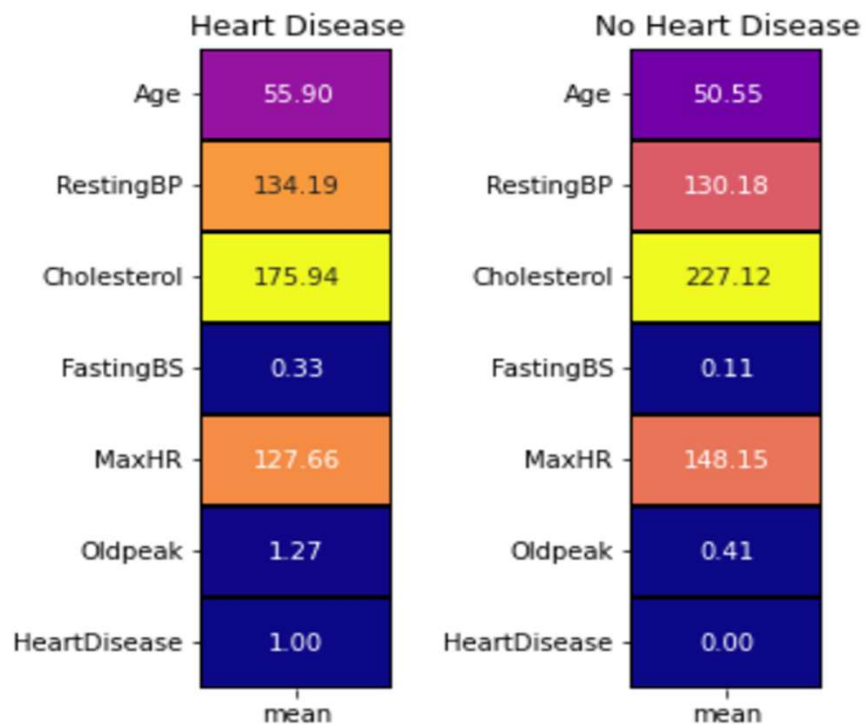# Heart Disease Detection

By –
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Problem Statement

➢ Given datasets containing examination, clinical data, and patient gender and age information, creates a predictive model to identify those likely to have a heart attack.

➢ Classify/predict whether a patient is prone to heart failure based on multiple attributes.

Dataset Attributes

➢ Age: age of the patient [years]
➢ Sex: sex of the patient [M: Male, F: Female]
➢ ChestPainType: chest pain type [TA: Typical Angina, ATA: Atypical Angina, NAP: Non-Anginal Pain, ASY: Asymptomatic]
➢ Resting BP: resting blood pressure [mm Hg]
➢ Cholesterol: serum cholesterol [mm/dl]
➢ Fasting BS: fasting blood sugar [1: if Fasting BS > 120 mg/dl, 0: otherwise]
➢ MaxHR: [Numeric value between 60 and 202]

➢ Resting ECG: resting electrocardiogram results [Normal: Normal, ST: having ST-T wave abnormality, LVH: showing probable or definite left ventricular hypertrophy by Estes' criteria]
➢ Exercise Angina: exercise-induced angina [Y: Yes, N: No]
➢ Oldpeak: oldpeak = ST [Numeric value measured in depression]
➢ ST_Slope: [Up: upsloping, Flat: flat, Down: downsloping]
➢ Heart Disease: output class [1: heart disease, 0: Normal]

# Mean Values of all Features - Heart Disease and Normal

Heart Disease

	mean
Age	55.90
RestingBP	134.19
Cholesterol	175.94
FastingBS	0.33
MaxHR	127.66
Oldpeak	1.27
HeartDisease	1.00

No Heart Disease

	mean
Age	50.55
RestingBP	130.18
Cholesterol	227.12
FastingBS	0.11
MaxHR	148.15
Oldpeak	0.41
HeartDisease	0.00

➢ The minimum age we have for any patient is 28, mean age as 53 and maximum as 77.

➢ Majority of the patient's age lies near 53-54 Years.
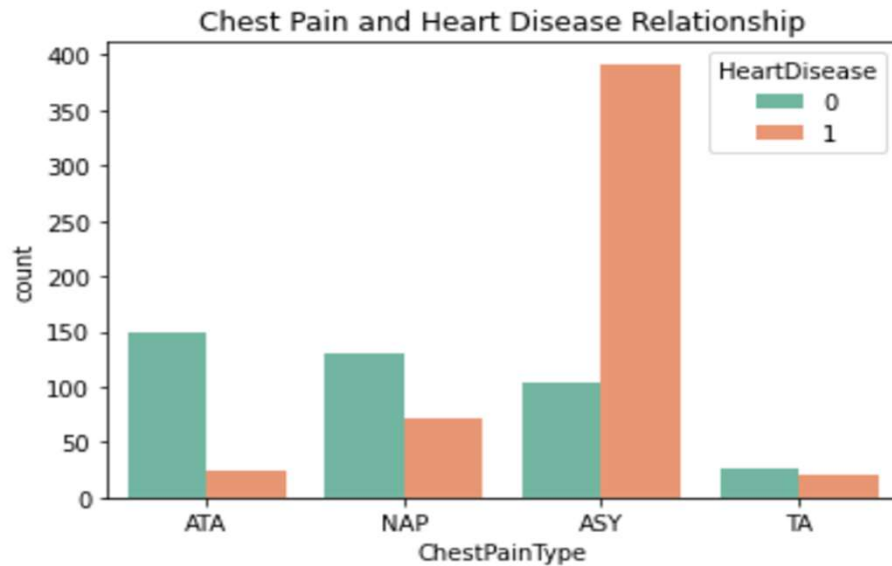
Age and Heart Disease

Sex vs Heart Disease
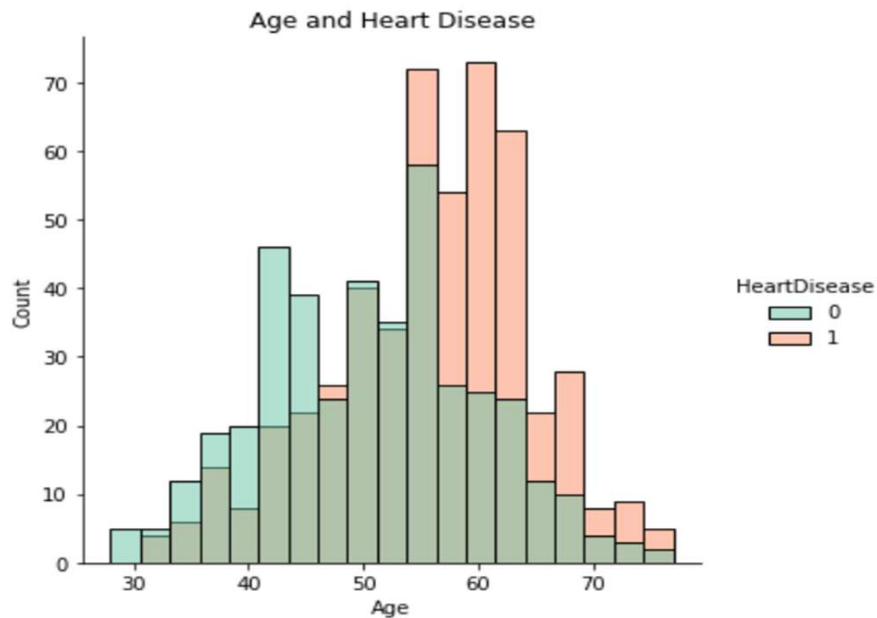
➢ We can see that from graph majority of the patient with Heart Disease are aged and lies between 55 - 77.
➢ The patients with Normal Heart Condition lies between age 30 to 55.
➢ There is a fine line between people with Heart Disease and Normal.
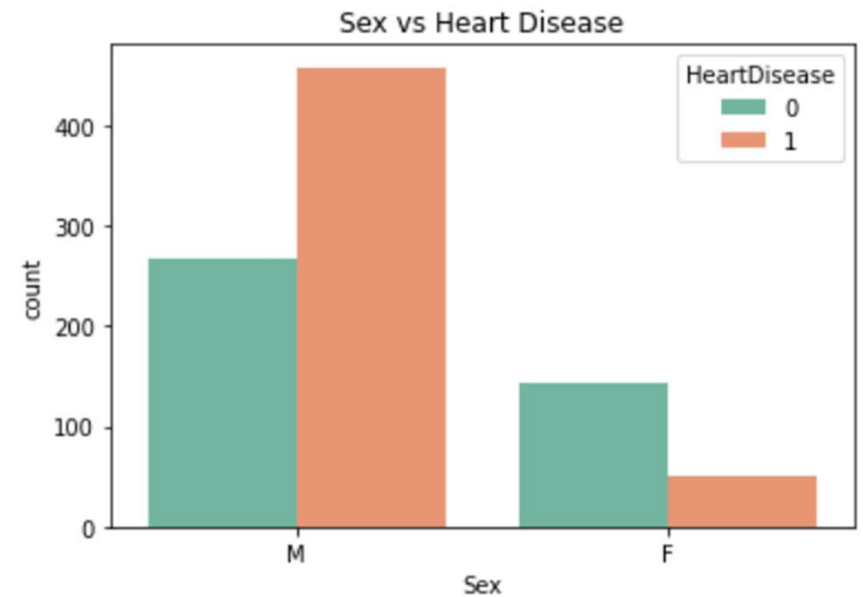
➢ We can see from graph, The majority of the males have Heart Disease.
➢ In case of Females, the heart disease ratio is low.

Chest Pain and Heart Disease Relationship


Cholesterol Level and Heart Disease Relationship

➤ From the plot we can see that the patients with Asymptomatic Chest Pain are more likely to get the Heart Failure.

➤ The patients with typical Angina are also at high risk of Heart Failure
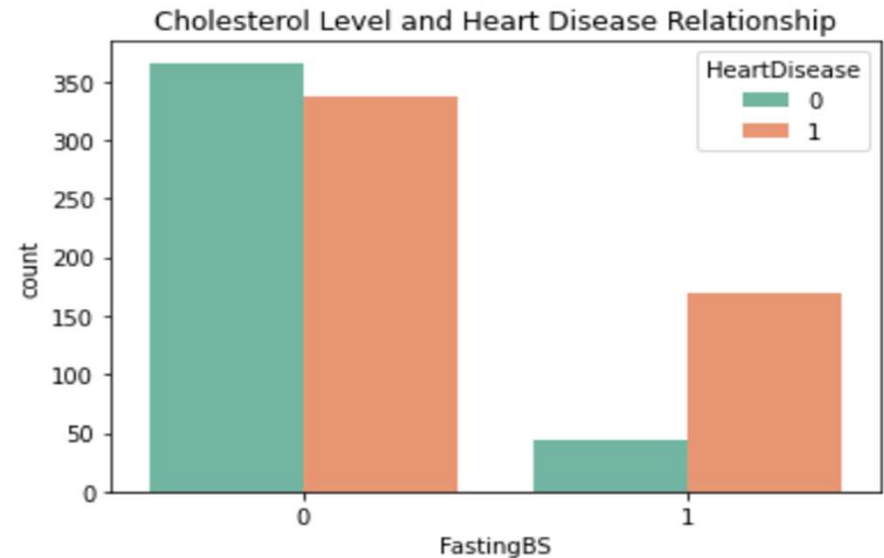
➤ The relationship of Cholesterol level and Heart Disease is very distorted.

➤ We can see that people with High Cholesterol are more likely to Normal people

Resting ECG and Heart Disease Relationship


ST Slope and Heart Disease Relationship
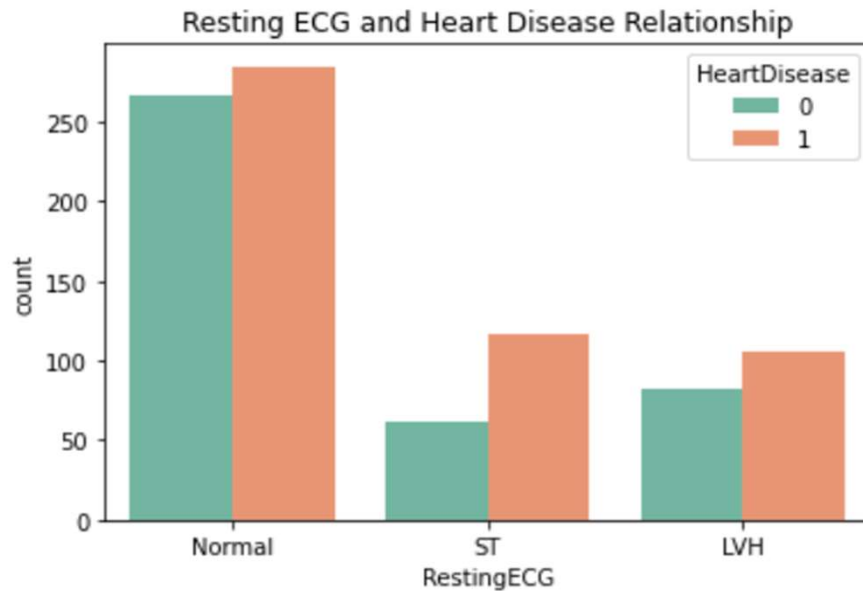
➢ From the above plot of ECG, We can say that ECG is very important feature for us. As the ECG result are "ST" or "LVH", there is high chance of heart Failure.

➢ We can also see that the people with Normal ECG also get Heart Disease, which means people can also get heart disease with normal ECG, as it changes suddenly with heart conditions.
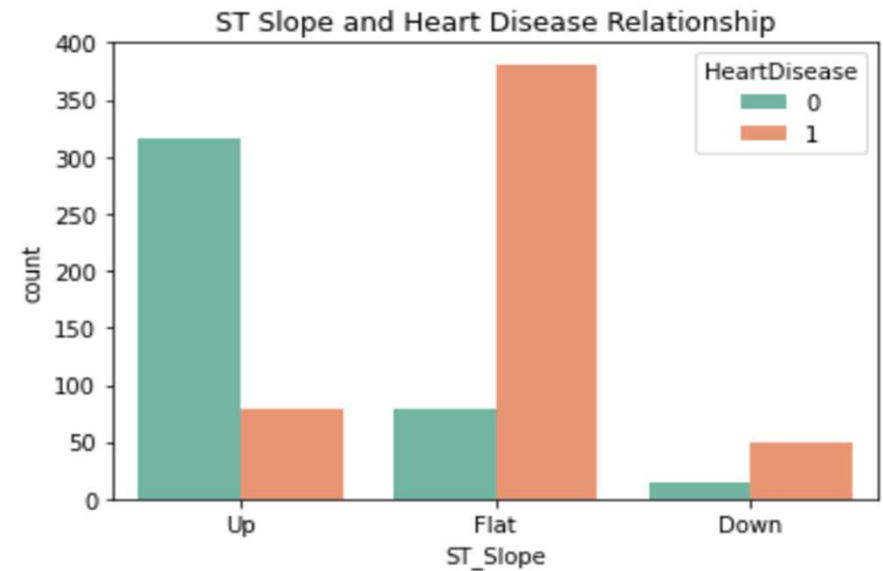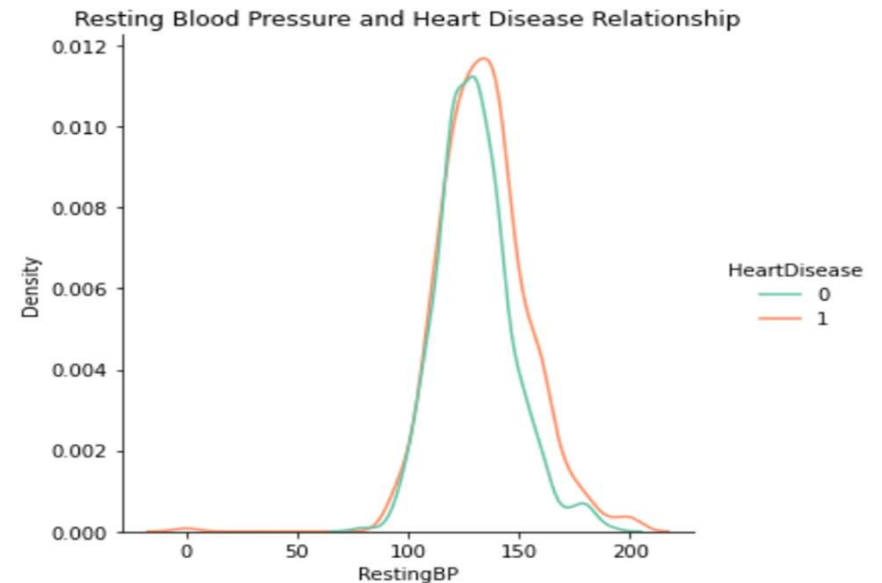
➢ We can see that from the plot, if the slope gone flat and Down, there is high likelihood of Heart Disease.

Maximum Heart Rate vs Heart Disease Relationship

Resting Blood Pressure and Heart Disease Relationship
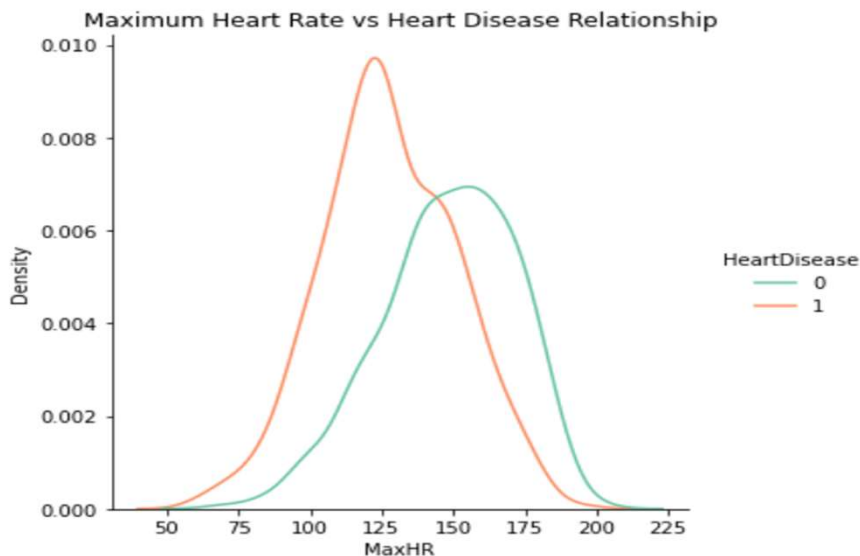
➢ We can see that from graph, The trend of Normal People have low density and People with Heart Disease have little more density at high heart rate.

➢ We can see that from graph, The trend of Normal People and People with Heart Disease is the same

Conclusion

➢ For better results, we have performed the different models implementation like Logistics Regression, SVM, Random Forest and Decision Tree.
➢ The Best Model to solve our problems is Random Forest Classifier having accuracy of 90.43% and F1 score of 91.41.
➢ Such prediction tools can be widely used to detect more that just heart disease.
➢ We can enhance model by adding more data or observations to dataset, Fine tuning parameters.
➢ Lastly, this analysis show how important is the heart health and what are the key factor that leads to heart failure.

Thank You