

# **REPORT ON HEART ATTACK PREDICTION USING MACHINE LEARNING BY PYTHON**

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**ABSTRACT:** Machine Learning is used across many ranges around the world. The healthcare industry is no exclusion. Machine Learning can play an essential role in predicting presence/absence of locomotors disorders, heart diseases and more. Such information, if predicted well in advance, can provide important intuitions to doctors who can then adapt their diagnosis and dealing per patient basis. We work on predicting possible heart diseases in people using Machine Learning algorithms. In this project, we perform the comparative analysis of classifiers like SVM, KNN, and logistic regression which can give the better accuracy and predictive analysis.

**INTRODUCTION:** Machine learning proves to be effective in assisting in making decisions and predictions from the large quantity of data produced by the health care industry. This project aims to predict future heart disease by analyzing data of patients which classifies whether they have heart disease or not using machine-learning algorithm. Machine Learning techniques can be a boon in this regard. Even though heart disease can occur in different forms, there is a common set of core risk factors that influence whether someone will ultimately be at risk for heart disease or not. By collecting the data from various sources, classifying them under suitable headings & finally analyzing to extract the desired data we can say that this technique can be very well adapted to do the prediction of heart disease.

**Problem Statement:** The major challenge in heart disease is its detection. There are instruments available which can predict heart disease but either it is expensive or are not efficient to calculate chance of heart disease in human. Early detection of cardiac diseases can decrease the mortality rate and overall complications. However, it is not possible to

monitor patients every day in all cases accurately and consultation of a patient for 24 hours by a doctor is not available since it requires more sapience, time and expertise. Since we have a good amount of data in today's world, we can use various machine learning algorithms to analyze the data for hidden patterns. The hidden patterns can be used for health diagnosis in medicinal data.

## **METHODOLOGY:**

**Existing Model:** Heart disease is even being highlighted as a silent killer which leads to the death of a person without obvious symptoms. The nature of the disease is the cause of growing anxiety about the disease & its consequences. Hence continued efforts are being done to predict the possibility of this deadly disease in prior. So that various tools & techniques are regularly being experimented with to suit the present-day health needs. Machine Learning techniques can be a boon in this regard. Even though heart disease can occur in different forms, there is a common set of core risk factors that influence whether someone will ultimately be at risk for heart disease or not. By collecting the data from various sources, classifying them under suitable headings & finally analysing to extract the desired data we can conclude. This technique can be very well adapted to the do the prediction of heart disease. As the well-known quote says "Prevention is better than cure", early prediction & its control can be helpful to prevent & decrease the death rates due to heart disease.

**Proposed System:** The working of the system starts with the collection of data and selecting the important attributes. Then the required data is preprocessed into the required format. The data is then divided into two parts training and testing data. The algorithms are applied and the model is trained using the training data. The accuracy of the system is obtained by testing the system using the testing data. This system is implemented using the following modules.

- 1.) Collection of Dataset
- 2.) Data Pre-Processing
- 3.) Balancing of Data
- 4.) Disease Prediction

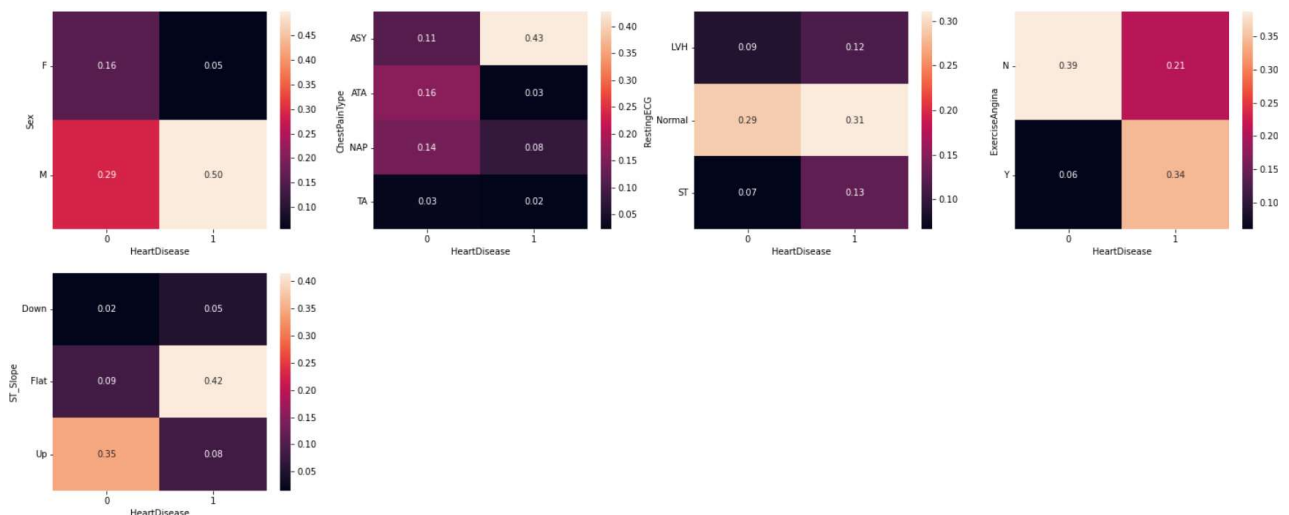
1. **Collection of data set:** Initially, we collect a dataset for our heart disease prediction system. After the collection of the dataset, we split the dataset into training data and testing data. The training dataset is used for prediction model learning and testing data is used for evaluating the prediction model. For this project, 80% of training data is used and 20% of data is used for testing. The

dataset used for this project is Heart Disease UCI. The dataset consists of 12 attributes in which we divided as 11 features and 1 target variable.

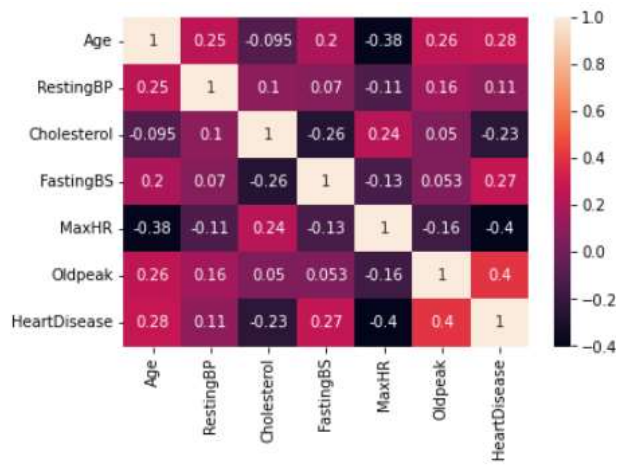
2. **Pre-processing of Data:** Data pre-processing is an important step for the creation of a machine learning model. Initially, data may not be clean or in the required format for the model which can cause misleading outcomes. In pre-processing of data, we transform data into our required format. It is used to deal with noises, duplicates, and missing values of the dataset. Data pre-processing has the activities like importing datasets, splitting datasets, attribute scaling, etc. Preprocessing of data is required for improving the accuracy of the model.
3. **Balancing of Data:** Imbalanced datasets can be balanced in two ways. They are Under Sampling and Over Sampling (a) Under Sampling: In Under Sampling, dataset balance is done by the reduction of the size of the ample class. This process is considered when the amount of data is adequate. (b) Over Sampling: In Over Sampling, dataset balance is done by increasing the size of the scarce samples. This process is considered when the amount of data is inadequate.
4. **Prediction of Disease:** Various machine learning algorithms like SVM, Logistic Regression, KNN are used for classification. Comparative analysis is performed among algorithms and the algorithm that gives the highest accuracy is used for heart disease prediction.

## OBSERVATIONS & RESULTS:

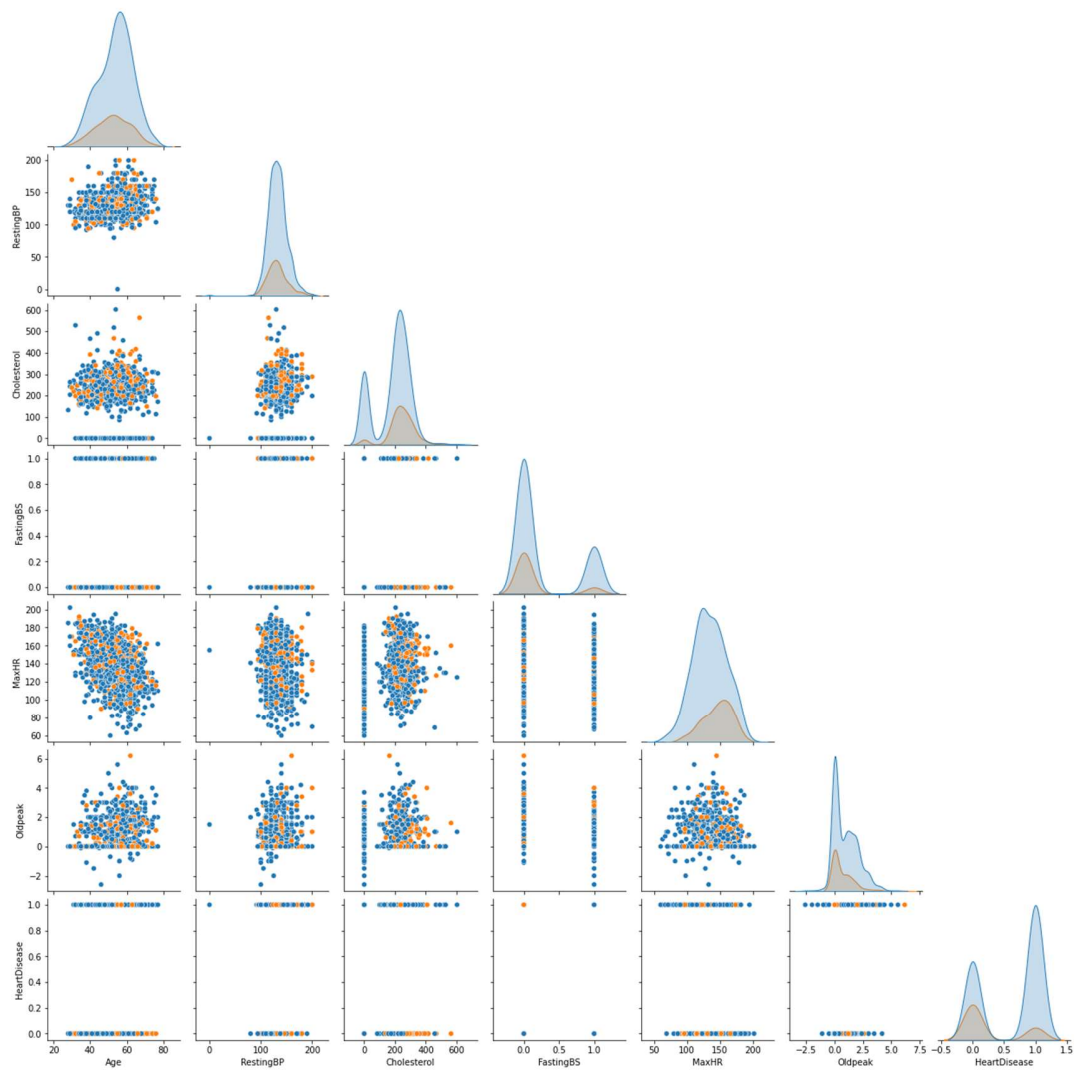
a. Heat-map: gives correlation between attributes.



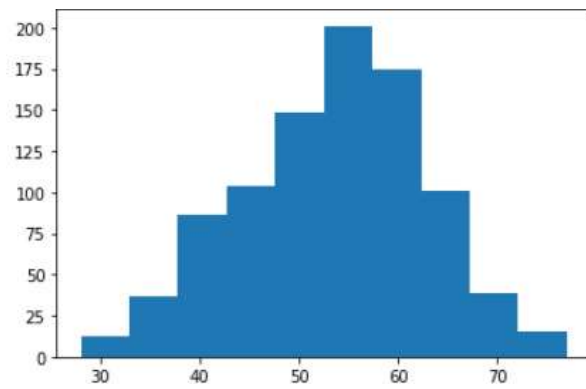
b. Confusion matrix:



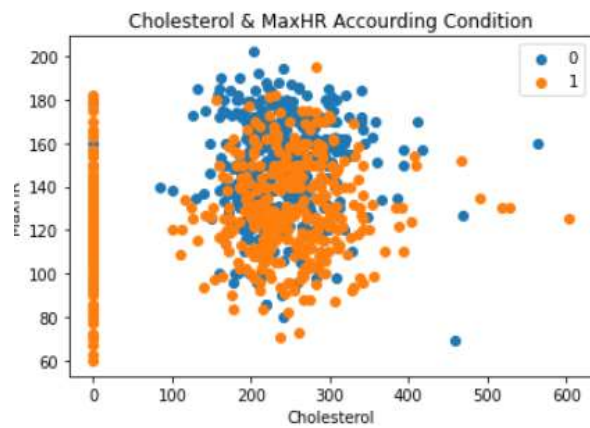
*c. pair-plot*



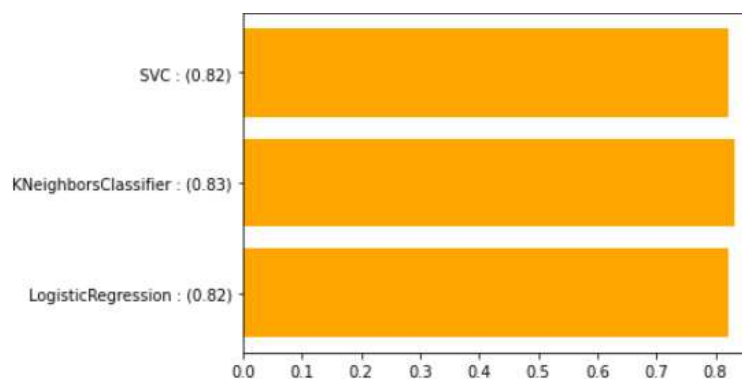
*d. histogram:*



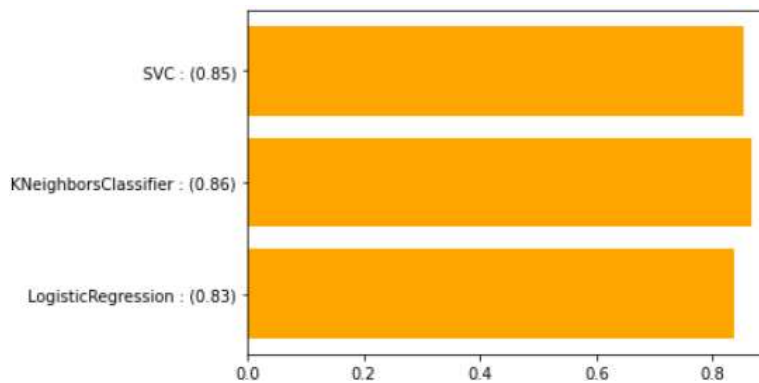
*e. scatter-plot:*



*f. testing accuracy scores:*



*g. validation score:*



**CONCLUSION:** Heart diseases are a major killer in India and throughout the world, application of promising technology like machine learning to the initial prediction of heart diseases will have a profound impact on society. The early prognosis of heart disease can aid in making decisions on lifestyle changes in high-risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. The number of people facing heart diseases is on a raise each year. This prompts for its early diagnosis and treatment. The utilization of suitable technology support in this regard can prove to be highly beneficial to the medical fraternity and patients. In this paper, the seven different machine learning algorithms used to measure the performance are SVM, Logistic Regression, and KNN applied on the dataset. The expected attributes leading to heart disease in patients are available in the dataset which contains 11 features and 1 target feature that are useful to evaluate the system are selected among them. If all the features taken into the consideration, then the efficiency of the system the author gets is less. To increase efficiency, attribute selection is done. In this n features have to be selected for evaluating the model which gives more accuracy. The correlation of some features in the dataset is almost equal and so they are removed. If all the attributes present in the dataset are taken into account, then the efficiency decreases considerably. All the seven machine learning methods accuracies are compared based on which one prediction model is generated. Hence, the aim is to use various evaluation metrics like confusion matrix, accuracy, precision, recall, and f1-score which predicts the disease efficiently. Comparing all three the extreme KNN gives the highest accuracy of 86%.