

Machine Learning

Course-End Project Problem Statement

Course-End Project: Healthcare

Problem statement:

Cardiovascular diseases are the leading cause of death globally. It is therefore necessary to identify the causes and develop a system to predict heart attacks in an effective manner. The data below has the information about the factors that might have an impact on cardiovascular health.

Dataset description:

<u>Variable</u>	<u>Description</u>
Age	Age in years
Sex	1 = male; 0 = female
cp	Chest pain type
trestbps	Resting blood pressure (in mm Hg on admission to the hospital)
chol	Serum cholesterol in mg/dl
fbs	Fasting blood sugar > 120 mg/dl (1 = true; 0 = false)
restecg	Resting electrocardiographic results
thalach	Maximum heart rate achieved
exang	Exercise induced angina (1 = yes; 0 = no)
oldpeak	ST depression induced by exercise


	relative to rest
slope	Slope of the peak exercise ST segment
ca	Number of major vessels (0-3) colored by fluoroscopy
thal	3 = normal; 6 = fixed defect; 7 = reversible defect
Target	1 or 0

Note:

Download **CEP 1_Dataset.xlsx** using the link given in the **Healthcare** project problem statement

Task to be performed:

1. Preliminary analysis:
 - a. Perform preliminary data inspection and report the findings on the structure of the data, missing values, duplicates, etc.
 - b. Based on these findings, remove duplicates (if any) and treat missing values using an appropriate strategy
2. Prepare a report about the data explaining the distribution of the disease and the related factors using the steps listed below:
 - a. Get a preliminary statistical summary of the data and explore the measures of central tendencies and spread of the data
 - b. Identify the data variables which are categorical and describe and explore these variables using the appropriate tools, such as count plot
 - c. Study the occurrence of CVD across the Age category
 - d. Study the composition of all patients with respect to the Sex category

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- e. Study if one can detect heart attacks based on anomalies in the resting blood pressure (trestbps) of a patient
 - f. Describe the relationship between cholesterol levels and a target variable
 - g. State what relationship exists between peak exercising and the occurrence of a heart attack
 - h. Check if thalassemia is a major cause of CVD
 - i. List how the other factors determine the occurrence of CVD
 - j. Use a pair plot to understand the relationship between all the given variables
 3. Build a baseline model to predict the risk of a heart attack using a logistic regression and random forest and explore the results while using correlation analysis and logistic regression (leveraging standard error and p-values from statsmodels) for feature selection