ANALYSIS AND PREDICTION OF HEART ATTACKS

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CONTENT

PROBLEM

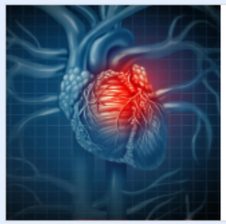
THE PROBLEM

Heart attacks are a major health problem globally. Knowing who is at high risk for a heart attack isn't always easy because many different things, like age, lifestyle, and health, can affect it. Finding out early who might have a heart attack can save lives. We want to use machine learning to make a tool that can better predict who is at risk of a heart attack.

DATASET

OUR DATASET

The **Heart Attack** dataset is a collection of data related to the risk factors for heart attacks. The dataset was compiled by Kaggle and it includes demographic information such as age and gender, as well as medical information such as blood pressure and cholesterol level. The goal of the dataset is to predict the likelihood of a person having a heart attack based on various risk factors.



Heart Attack

Heart Attack dataset

kaggle.com

DATASET GENERAL INFORMATION

- 303 Observations
- 14 Variables, which include 13 patient attributes, and one target variable
- Types of variables in the dataset are:
    1. Binary
    2. Numeric
    3. Categorical.

DATASET GENERAL INFORMATION

BINARY PATIENT ATTRIBUTES:

- Sex
- exercise-induced angina
- fasting blood sugar > 120 mg/dl

DATASET GENERAL INFORMATION

NUMERIC PATIENT ATTRIBUTES:

- age
- resting blood pressure
- ST depression induced by exercise
- serum cholesterol level
- maximum heart rate achieved during exercise

DATASET GENERAL INFORMATION

CATEGORICAL PATIENT ATTRIBUTES:

- chest pain type
- slope of the peak exercise ST segment
- number of major vessels colored by fluoroscopy
- thallium stress test result
- electrocardiographic result

DATASET GENERAL INFORMATION

THE TARGET VARIABLE:

Our dataset contains a binary target variable indicating whether heart disease is present or absent. This variable can be termed as the class or label and offers two outcomes: label 0 for patients without heart disease and label 1 for those with it.

MACHINE LEARNING TECHNIQUES

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The primary objective of this project is to classify patients as either susceptible or not susceptible to heart attacks. To achieve this prediction, we will employ two distinct types of machine learning techniques:

-Supervised learning

-Unsupervised learning

MACHINE LEARNING TECHNIQUES

FOR SUPERVISED LEARNING

LOGISTIC REGRESSION

DECISION TREE

MACHINE LEARNING TECHNIQUES

SUPERVISED LEARNING (LOGISTIC REGRESSION):

Logistic regression is one of the most popular machine learning algorithms falling under the supervised learning category. It is used to predict categorical dependent variables based on a set of independent variables. It predicts outcomes like Yes/No. Logistic regression is tailored for classification tasks. The algorithm assigns probabilities between 0 and 1, indicating the likelihood of an event. Logistic regression handles both continuous and discrete datasets, providing probabilities and aiding in variable selection for effective classification.

MACHINE LEARNING TECHNIQUES

SUPERVISED LEARNING (DECISION TREE):

The decision tree is a classification algorithm that constructs a tree-like model to make decisions and determine their potential outcomes.

The C4.5 algorithm will be employed to construct the decision tree, facilitating the classification of patients as either prime targets for heart attacks or not.

MACHINE LEARNING TECHNIQUES

UNSUPERVISED LEARNING

In the realm of unsupervised learning, we will employ K-Means, a clustering algorithm designed to identify similar observations within a dataset and group them into clusters. Each cluster will be associated with a centroid. The algorithm takes the number of clusters, denoted as K, and the dataset as inputs, and it produces the dataset partitioned into K clusters as outputs.

RESULTS AND FINDINGS

MATRICS:

LOGISTIC REGRESSION METRICS:

- ACCURACY = 75.41%
- ERROR RATE = 24.59%
- ROC AREA UNDER CURVE = 0.75
- PRECISION = 0.72
- RECALL = 0.84
- F1 = 0.78

DECISION TREE METRICS:

- ACCURACY = 77.05%
- ERROR RATE = 22.95%
- ROC AREA UNDER CURVE = 0.77
- PRECISION = 0.76
- RECALL = 0.81
- F1 = 0.78

PRECISION AND RECALL VALUES:

K=2:

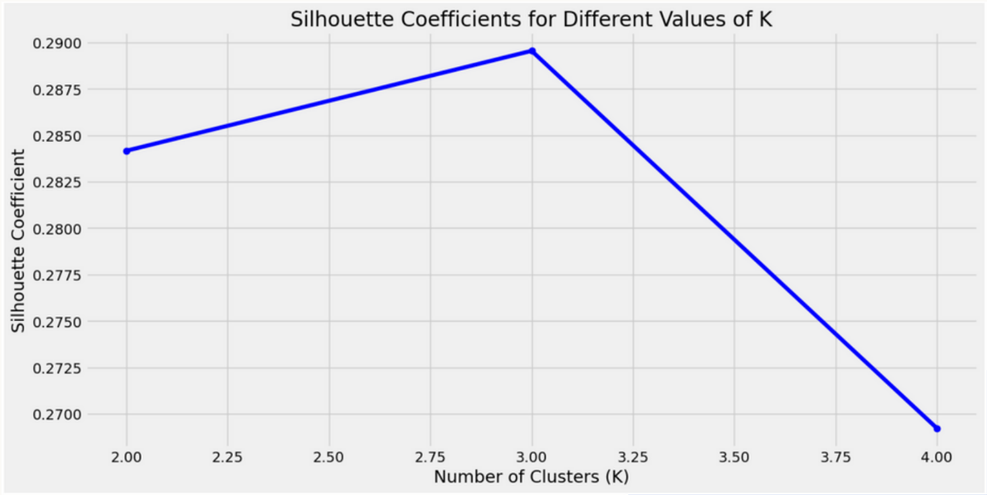
- PRECISION FOR K=2: 0.4388
- RECALL FOR K=2: 0.4290

K=3:

- PRECISION FOR K=3: 0.4391
- RECALL FOR K=3: 0.3630

K=4:

- PRECISION FOR K=4: 0.4071
- RECALL FOR K=4: 0.2211



THANK YOU!

REFERENCES

[1] . https://www.kaggle.com/datasets/pritsheta/heart-attack?resource=download