In [1]:
```
#Experiment no.1
```

In [2]:
```
#Aim :To perform and analysis of Logistic Regression Algorithm
```

In [3]:
```
#Name:Srushti Bawane
#Roll no.:5
#sec:B
#sub:ET 1
#date:21-07-2025
```

# Importing the Libraries

In [4]:
```
import pandas as pd
import numpy as np
```

# Data acquisitionuing Pandas

In [5]:
```
import os
```

In [6]:
```
os.getcwd()
```

Out[6]:
```
'C:\\Users\\RH'
```

In [7]:
```
os.chdir('C:\\Users\\RH\\Downloads')
```

In [8]:
```
data=pd.read_csv("heart - heart.csv")
```

In [9]:
```
data.head()
```

Out[9]:

| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | ca | thal | t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 52 | 1 | 0 | 125 | 212 | 0 | 1 | 168 | 0 | 1.0 | 2 | 2 | 3 | |
| **1** | 53 | 1 | 0 | 140 | 203 | 1 | 0 | 155 | 1 | 3.1 | 0 | 0 | 3 | |
| **2** | 70 | 1 | 0 | 145 | 174 | 0 | 1 | 125 | 1 | 2.6 | 0 | 0 | 3 | |
| **3** | 61 | 1 | 0 | 148 | 203 | 0 | 1 | 161 | 0 | 0.0 | 2 | 1 | 3 | |
| **4** | 62 | 0 | 0 | 138 | 294 | 1 | 1 | 106 | 0 | 1.9 | 1 | 3 | 2 | |

In [10]:
```
data.tail()
```

Out[10]:

| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | ca | thal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1020** | 59 | 1 | 1 | 140 | 221 | 0 | 1 | 164 | 1 | 0.0 | 2 | 0 | 2 |
| **1021** | 60 | 1 | 0 | 125 | 258 | 0 | 0 | 141 | 1 | 2.8 | 1 | 1 | 3 |
| **1022** | 47 | 1 | 0 | 110 | 275 | 0 | 0 | 118 | 1 | 1.0 | 1 | 1 | 2 |
| **1023** | 50 | 0 | 0 | 110 | 254 | 0 | 0 | 159 | 0 | 0.0 | 2 | 0 | 2 |
| **1024** | 54 | 1 | 0 | 120 | 188 | 0 | 1 | 113 | 0 | 1.4 | 1 | 1 | 3 |

In [11]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       1025 non-null   int64  
 1   sex       1025 non-null   int64  
 2   cp        1025 non-null   int64  
 3   trestbps  1025 non-null   int64  
 4   chol      1025 non-null   int64  
 5   fbs       1025 non-null   int64  
 6   restecg   1025 non-null   int64  
 7   thalach   1025 non-null   int64  
 8   exang     1025 non-null   int64  
 9   oldpeak   1025 non-null   float64
 10  slope     1025 non-null   int64  
 11  ca        1025 non-null   int64  
 12  thal      1025 non-null   int64  
 13  target    1025 non-null   int64  
dtypes: float64(1), int64(13)
memory usage: 112.2 KB
```

In [12]:
```
data.describe()
```

Out[12]:

| | age | sex | cp | trestbps | chol | fbs | r |
|---|---|---|---|---|---|---|---|
| **count** | 1025.000000 | 1025.000000 | 1025.000000 | 1025.000000 | 1025.00000 | 1025.000000 | 1025.0 |
| **mean** | 54.434146 | 0.695610 | 0.942439 | 131.611707 | 246.00000 | 0.149268 | 0.5 |
| **std** | 9.072290 | 0.460373 | 1.029641 | 17.516718 | 51.59251 | 0.356527 | 0.5 |
| **min** | 29.000000 | 0.000000 | 0.000000 | 94.000000 | 126.00000 | 0.000000 | 0.0 |
| **25%** | 48.000000 | 0.000000 | 0.000000 | 120.000000 | 211.00000 | 0.000000 | 0.0 |
| **50%** | 56.000000 | 1.000000 | 1.000000 | 130.000000 | 240.00000 | 0.000000 | 1.0 |
| **75%** | 61.000000 | 1.000000 | 2.000000 | 140.000000 | 275.00000 | 0.000000 | 1.0 |
| **max** | 77.000000 | 1.000000 | 3.000000 | 200.000000 | 564.00000 | 1.000000 | 2.0 |

In [13]:
```
data.shape
```

Out[13]: (1025, 14)

In [14]:
```
data.size
```

Out[14]: 14350

In [15]:
```
data.ndim
```

Out[15]: 2

# Data preprocessing _ data cleaning _ missing value treatment

In [16]:
```
# check Missing Value by record

data.isna()
```

Out[16]:

| | age | sex | cp | trestbps | chol | fbs | restecg | thalach | exang | oldpeak | slope | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **1** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **2** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **3** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **4** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| **1020** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **1021** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **1022** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **1023** | False | False | False | False | False | False | False | False | False | False | False | Fa |
| **1024** | False | False | False | False | False | False | False | False | False | False | False | Fa |

1025 rows × 14 columns

In [17]:
```
data.isna().any()
```

Out[17]:
```
age         False
sex         False
cp          False
trestbps    False
chol        False
fbs         False
restecg     False
thalach     False
exang       False
oldpeak     False
slope       False
ca          False
thal        False
target      False
dtype: bool
```

In [18]:
```
data.isna().sum()
```

Out[18]:
```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

# Independent and Dependent Variables

In [20]:
```
x=data.drop("target", axis=1)
y=data["target"]
```

# Splitting of DataSet into train and Test

In [22]:
```
 #splitting the data into training and testing data sets
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2 ,random_state=42)
```

# Support Vector Classifier / Machine (SVC/SVM)

In [23]:
```
from sklearn import svm
svm=svm.SVC()  #svc=svm
svm.fit(x_train, y_train)
from sklearn.metrics import accuracy_score
```

In [24]:
```
y_pred3=svm.predict(x_test)
```

In [25]:
```
accuracy_score (y_test,y_pred3)
```

Out[25]:
```
0.6829268292682927
```

In [ ]: