Heart Disease Prediction using ML

Steps to produce the predictions

- Steps
  - Firstly import All required or used modules
  - Then import data
  - Do **Data Cleaning**, it means find the missing data and replace this null data with median or mean of the column
  - After data cleaning, we have to group the data into **Features** and **Labels** (X and Y respectively)
  - Now we have to prepare a selection model.
  - We use **test_train_split** selection model that we imported from sklearn
  - We follow 80:20 ratio, which is the Training data size is 80% of the total data size and 20% of it for test data.
  - Now we use our training model imported from sklearn.
  - We train the model with our training dataset.
  - We then predict the the outputes of the model with `model.predict(xtrained, ytrained)`
  - This gives the predicted training model outputs
  - From this we can find out the training model accuracy using `accuracy_score()`
  - We will do the same steps following for the test_data,
  - Hence we will find the model accuracy with test data.

Importing modules

In [90]:
```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score

from sklearn.svm import SVC
from sklearn.preprocessing import StandardScaler
from sklearn.pipeline import make_pipeline

import matplotlib.pyplot as plt
import seaborn as sns
```

Reading data

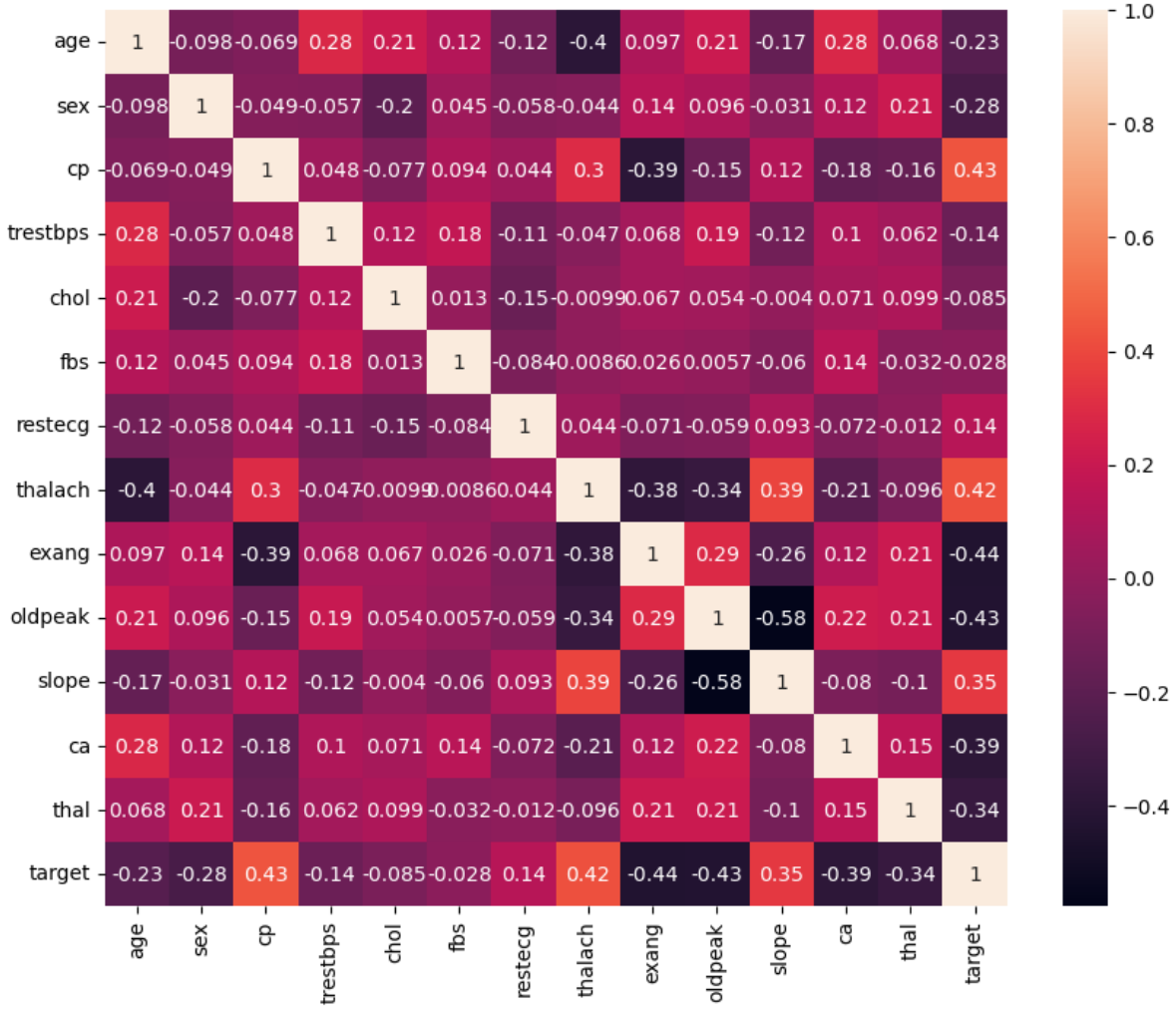
In [91]:
```
data = pd.read_csv("hdp data.csv")
data.head()
```

Out[91]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1
1	37	1	2	130	250	0	1	187	0	3.5	0	0	2	1
2	41	0	1	130	204	0	0	172	0	1.4	2	0	2	1
3	56	1	1	120	236	0	1	178	0	0.8	2	0	2	1
4	57	0	0	120	354	0	1	163	1	0.6	2	0	2	1

Plotting the data for finding correlation between columns

In [92]:
```
corr = data.corr()
plt.figure(figsize=(10,8))
sns.heatmap(corr, annot=True)
plt.show()
```



Grouping the data, (Features{x}, lables{y})

In [93]:
```
x = data.drop(["target"], axis = 1)
y = data.target

print(x.head())
print(y.head())
```

```
   age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang  oldpeak  slope  \
0   63    1   3       145   233    1        0      150      0      2.3      0
1   37    1   2       130   250    0        1      187      0      3.5      0
2   41    0   1       130   204    0        0      172      0      1.4      2
3   56    1   1       120   236    0        1      178      0      0.8      2
4   57    0   0       120   354    0        1      163      1      0.6      2

   ca  thal
0   0     1
1   0     2
2   0     2
3   0     2
4   0     2
0    1
1    1
2    1
3    1
4    1
Name: target, dtype: int64
```

Now we have to split the training and testing data

In [94]:
```
xTrain,xTest, yTrain, yTest = train_test_split(x, y, test_size = 0.3)
print(xTrain.size, xTest.size)
```

```
2756 1183
```

We import our training model

In [95]:
```
model = LogisticRegression(solver="lbfgs",max_iter = 1000)
```

In [96]:
```
model.fit(xTrain, yTrain)
```

Out[96]:
```
LogisticRegression(max_iter=1000)
```

Prediction of training dataset

In [97]:
```
predction = model.predict(xTrain)
predction
```

Out[97]:
```
array([0, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0,
       0, 1, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1,
       0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1,
       1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 0, 1,
       1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1,
       1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0,
       1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0,
       1, 1, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0,
       0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0, 0, 0, 1, 1, 1, 0,
       1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1], dtype=int64)
```

In [98]:
```
trainAcc = accuracy_score(predction, yTrain)
print("Training Acc of the model ", trainAcc)
```

```
Training Acc of the model  0.8915094339622641
```

Prediction of Test dataset

In [99]:
```
testPred = model.predict(xTest)
```

In [100…
```
testPred
```

Out[100]:
```
array([1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0,
       1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0, 1,
       0, 1, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 0, 0, 1,
       0, 1, 1, 0, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1,
       1, 1, 1], dtype=int64)
```

In [101…
```
testAcc = accuracy_score(testPred, yTest)
print("Accuracy of testing dataset ", testAcc)
```

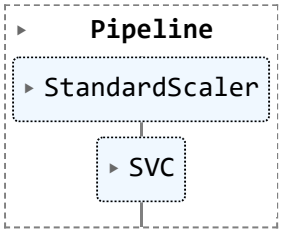
```
Accuracy of testing dataset  0.7692307692307693
```

we use another model, svm classifier(svc support vector classifier)

In [102…
```
clf = make_pipeline(StandardScaler(), SVC(gamma = "auto"))
```

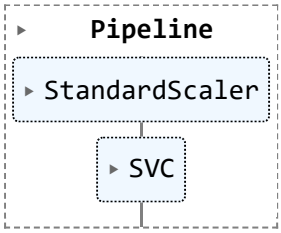
In [103…
```
clf.fit(xTrain,yTrain)
```

Out[103]:



In [104…
```
clf
```

Out[104]:



In [105…
```
pred = clf.predict(xTrain)
```

In [106…
```
pred
```

Out[106]:
```
array([0, 1, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0,
       0, 1, 1, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 1,
       0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 1,
       1, 1, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 1, 1, 0, 1, 1, 0, 1,
       0, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1,
       1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 0,
       1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0,
       1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0,
       0, 1, 1, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1, 0, 1, 0, 0, 0, 1, 1, 1, 1,
       1, 0, 0, 1, 1, 0, 0, 1, 1, 0, 1, 0, 0, 1], dtype=int64)
```

In [107…
```
trainSvcAcc = accuracy_score(pred, yTrain)
print("Training accuracy using svc model ", trainSvcAcc)
```

```
Training accuracy using svc model  0.9339622641509434
```

In [108…
```
testPred = clf.predict(xTest)
```

In [109…
```
testSvcAcc = accuracy_score(testPred, yTest)
print("Testing accuracy of svc model ", testSvcAcc)
```

```
Testing accuracy of svc model  0.7692307692307693
```

In [ ]:
```
```