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

df = pd.read_csv('/cleveland.csv')
df.head(10)
```

	age	gender	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	th
0	63	1	1	145	233	1	2	150	0	2.3	3	0.0	
1	67	1	4	160	286	0	2	108	1	1.5	2	3.0	
2	67	1	4	120	229	0	2	129	1	2.6	2	2.0	
3	37	1	3	130	250	0	0	187	0	3.5	3	0.0	
4	41	0	2	130	204	0	2	172	0	1.4	1	0.0	
5	56	1	2	120	236	0	0	178	0	0.8	1	0.0	
6	62	0	4	140	268	0	2	160	0	3.6	3	2.0	
7	57	0	4	120	354	0	0	163	1	0.6	1	0.0	
8	63	1	4	130	254	0	2	147	0	1.4	2	1.0	
9	53	1	4	140	203	1	2	155	1	3.1	3	0.0	

```
df.isnull().sum()
```

```
age         0
gender      0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          4
thal        2
CHD         0
dtype: int64
```

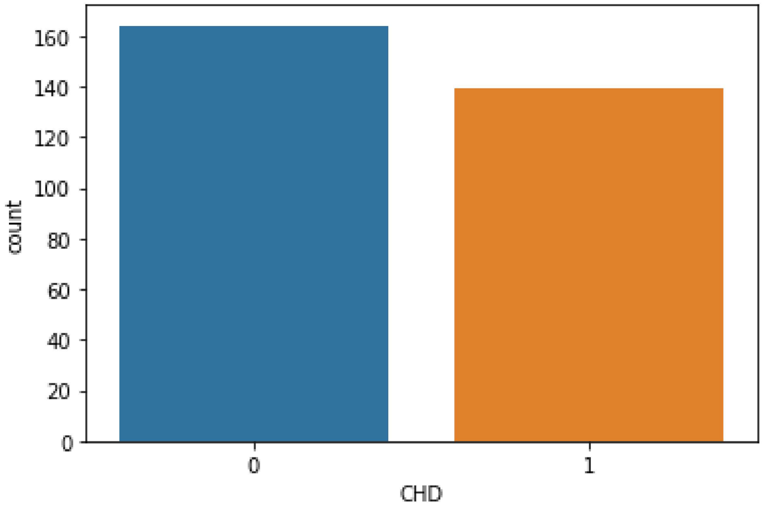
```
df['CHD'] = df.CHD.map({0: 0, 1: 1, 2: 1, 3: 1, 4: 1})
df['gender'] = df.gender.map({0: 'female', 1: 'male'})
df['thal'] = df.thal.fillna(df.thal.mean())
df['ca'] = df.ca.fillna(df.ca.mean())
```

```
df.describe()
```

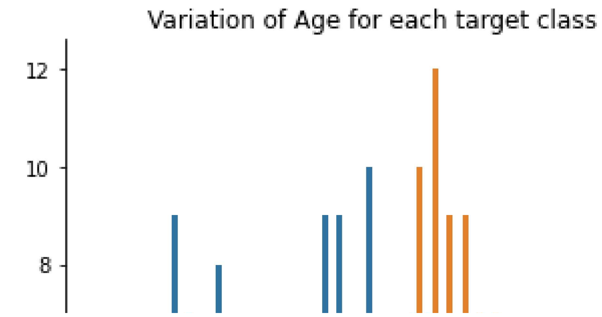
	age	cp	trestbps	chol	fbs	restecg	thalach
count	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000
mean	54.438944	3.158416	131.689769	246.693069	0.148515	0.990099	149.607261
std	9.038662	0.960126	17.599748	51.776918	0.356198	0.994971	22.875003
min	29.000000	1.000000	94.000000	126.000000	0.000000	0.000000	71.000000
25%	48.000000	3.000000	120.000000	211.000000	0.000000	0.000000	133.500000
50%	56.000000	3.000000	130.000000	241.000000	0.000000	1.000000	153.000000
75%	61.000000	4.000000	140.000000	275.000000	0.000000	2.000000	166.000000
max	77.000000	4.000000	200.000000	564.000000	1.000000	2.000000	202.000000

```
sns.countplot(x='CHD',data=df)
```

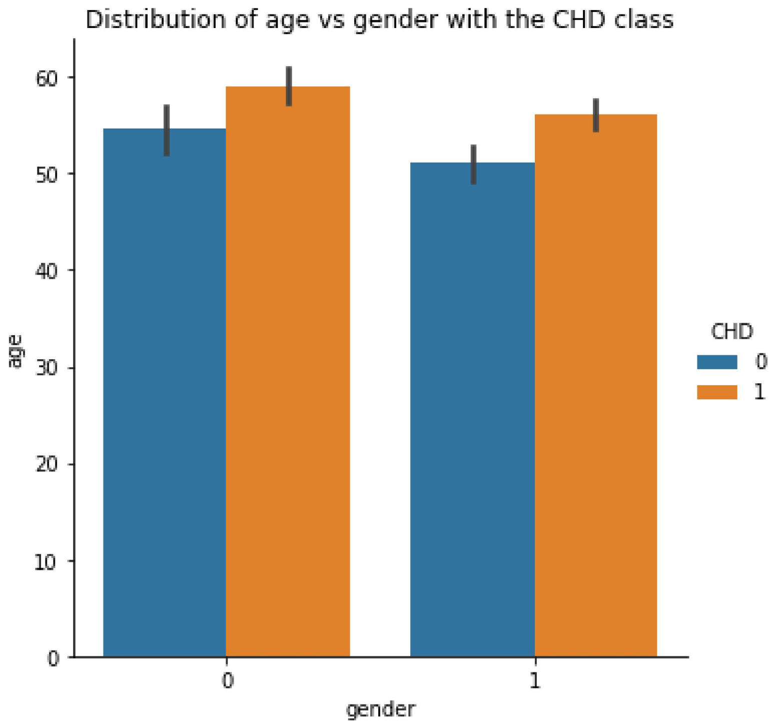
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5397a12a10>
```



```
sns.catplot(kind = 'count', data = df, x = 'age', hue = 'CHD', order = df['age'].sort_values(
plt.title('Variation of Age for each target class')
plt.show()
```



```
df['gender'] = df.gender.map({'female': 0, 'male': 1})
sns.catplot(kind = 'bar', data = df, y = 'age', x = 'gender', hue = 'CHD')
plt.title('Distribution of age vs gender with the CHD class')
plt.show()
```



```
from sklearn.model_selection import train_test_split
X = df.iloc[:, :-1].values
y = df.iloc[:, -1].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)

from sklearn.preprocessing import StandardScaler
sc=StandardScaler()

X_train=sc.fit_transform(X_train)
X_test=sc.transform(X_test)


X = df.iloc[:, :-1].values
y = df.iloc[:, -1].values
```

```
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 = 0)

from sklearn.linear_model import LogisticRegression
classifier = LogisticRegression()
result=classifier.fit(X_train, y_train)
```

```
/usr/local/lib/python3.7/dist-packages/sklearn/linear_model/_logistic.py:818: Convergen
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  extra_warning_msg=_LOGISTIC_SOLVER_CONVERGENCE_MSG,
```

```
y_pred = classifier.predict(X_test)

from sklearn.metrics import confusion_matrix
cm_test = confusion_matrix(y_pred, y_test)

y_pred_train = classifier.predict(X_train)
cm_train = confusion_matrix(y_pred_train, y_train)
```

```
#Testing Accuracy Score

from sklearn.metrics import accuracy_score
predictions = result.predict(X_test)
accuracy_score(y_test,predictions)
```

```
0.8032786885245902
```

Prediction of New Values : Requires 13 values : age | gender | chestPain | restBP | cholestoral | fastbloodSugar | restECG | MaxHeartRate | exerciseInduceAngina | oldpeak | slopeSTsegmnt | ca | thal; pred_new = classifier.predict([[, , , , , , , , , , , ,]]) pred_new ####################################Here 0 : No CHD , 1 : CHD#################

```
pred_new = classifier.predict([[ 41, 0,2 ,130 ,204 ,0 ,2 ,172 ,0 ,1.4 ,1 ,0.0 ,3.0 ]])
pred_new
```

```
array([0])
```

```
pred_new = classifier.predict([[53, 1,  4,  140,    203,    1,  2   ,155    ,1  ,3.1,   3   ,
pred_new
```

```
array([1])
```

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