haridas DSBDA5

April 1, 2025

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import StandardScaler
```

[3]:
```
hari=pd.read_csv('Social_Network_Ads.csv')
```

[4]:
```
hari
```

[4]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
..	…	…	…	…	…
395	15691863	Female	46	41000	1
396	15706071	Male	51	23000	1
397	15654296	Female	50	20000	1
398	15755018	Male	36	33000	0
399	15594041	Female	49	36000	1

[400 rows x 5 columns]

[5]:
```
#preprocessing
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
```

[9]:
```
hari['Gender']=le.fit_transform(hari['Gender'])
```

[10]:
```
hari
```

[10]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	1	19	19000	0
1	15810944	1	35	20000	0
2	15668575	0	26	43000	0
3	15603246	0	27	57000	0

```
4    15804002       1   19             76000           0
..        …     …   …                …               …
395  15691863       0   46             41000           1
396  15706071       1   51             23000           1
397  15654296       0   50             20000           1
398  15755018       1   36             33000           0
399  15594041       0   49             36000           1

[400 rows x 5 columns]
```

[11]:
```
#data cleaning
hari.isnull().sum()
```

[11]:
```
User ID            0
Gender             0
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

[13]:
```
x=hari[['Gender','Age','EstimatedSalary']]
x
```

[13]:
```
     Gender  Age  EstimatedSalary
0         1   19            19000
1         1   35            20000
2         0   26            43000
3         0   27            57000
4         1   19            76000
..      …  …               …
395       0   46            41000
396       1   51            23000
397       0   50            20000
398       1   36            33000
399       0   49            36000

[400 rows x 3 columns]
```

[14]:
```
y=hari[['Purchased']]
y
```

[14]:
```
     Purchased
0            0
1            0
2            0
3            0
4            0
```

```
..          …
395           1
396           1
397           1
398           0
399           1

[400 rows x 1 columns]
```

[15]:
```
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)
```

[16]:
```
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_test=sc.transform(x_test)
```

[17]:
```
from sklearn import linear_model
```

[18]:
```
model=linear_model.LogisticRegression()
```

[19]:
```
model.fit(x_train,y_train)
```

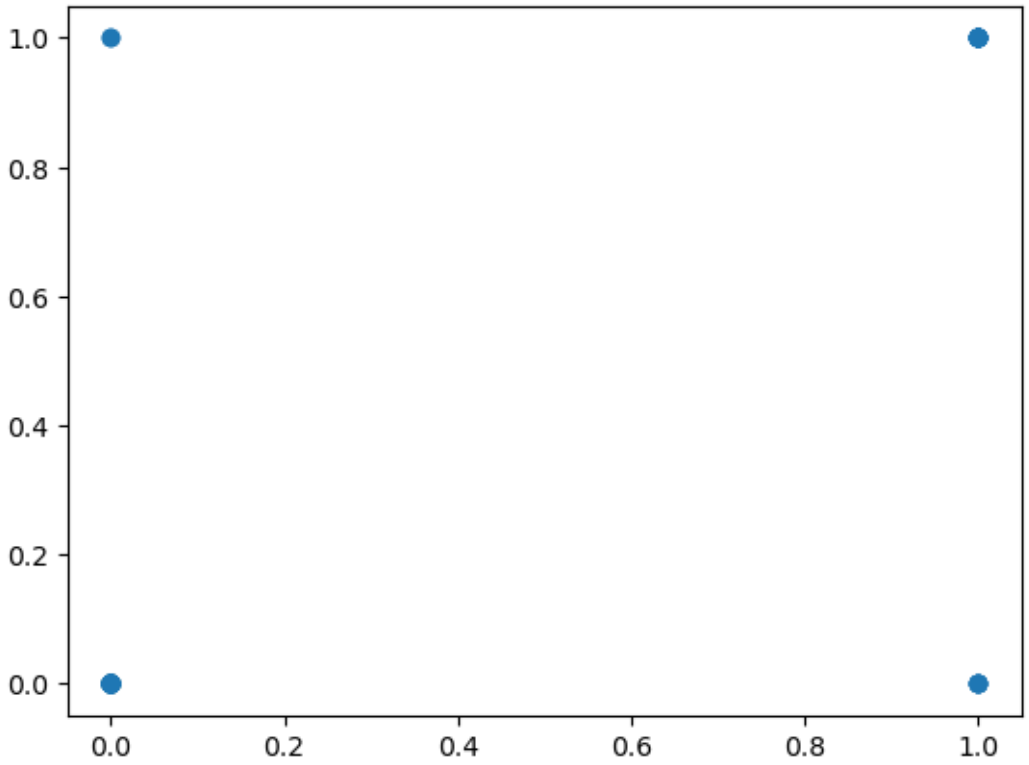
```
C:\Users\Haridas Bankar\anaconda3\Lib\site-
packages\sklearn\utils\validation.py:1339: DataConversionWarning: A column-
vector y was passed when a 1d array was expected. Please change the shape of y
to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

[19]:
```
LogisticRegression()
```

[20]:
```
y_pred=model.predict(x_test)
```

[22]:
```
plt.scatter(y_test,y_pred)
```

[22]:
```
<matplotlib.collections.PathCollection at 0x2ed37921880>
```



[23]:
```
from sklearn.metrics import confusion_matrix,ConfusionMatrixDisplay
```

[24]:
```
cm=confusion_matrix(y_test,y_pred)
```

[25]:
```
print(cm)
```

```
[[56  2]
 [ 5 17]]
```

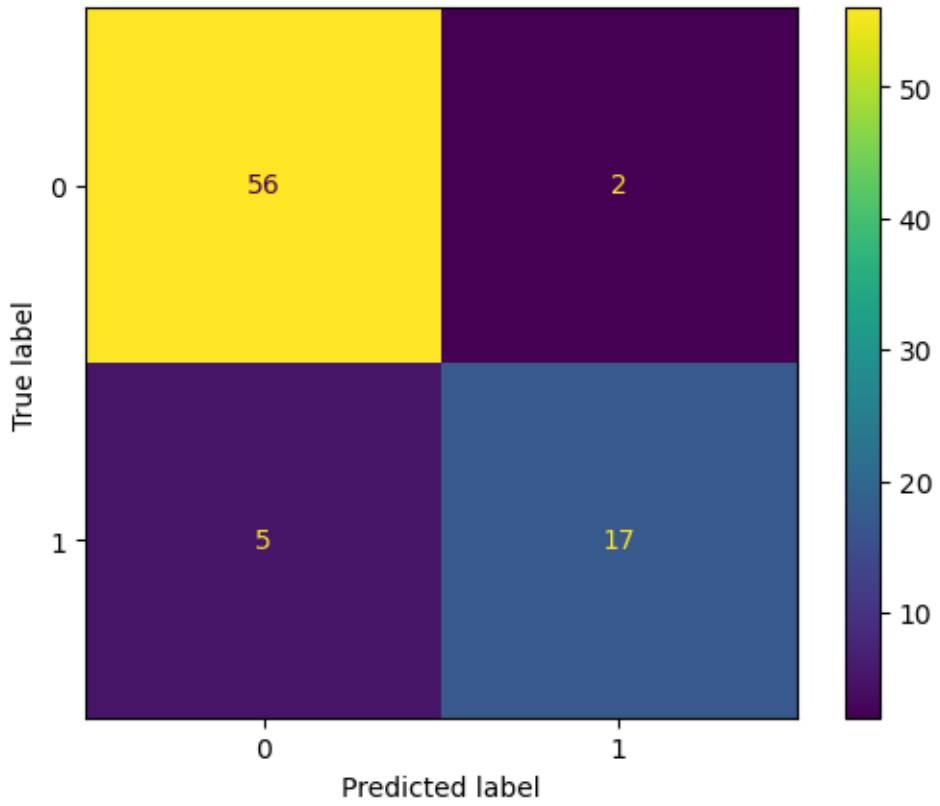
[26]:
```
TN=cm[0][0]
TP=cm[1][1]
FN=cm[1][0]
FP=cm[0][1]
print(f"TP: {TP}")
print(f"TN: {TN}")
print(f"FP: {FP}")
print(f"FN: {FN}")
```

```
TP: 17
TN: 56
FP: 2
FN: 5
```

[27]:
```
confuDisp=ConfusionMatrixDisplay(cm)
```

[28]:
```
confuDisp.plot()
```

[28]:
```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x2ed3790a270>
```



[29]:
```
from sklearn.metrics import precision_score,accuracy_score
```

[30]:
```
print(accuracy_score (y_test,y_pred))
```

```
0.9125
```

[36]:
```
acc=(TP+TN)/(TP+TN+FP+FN)
print(acc)
```

```
0.9125
```

[37]:
```
errorRate=1-acc
print(errorRate)
```

```
0.08750000000000002
```

[38]:
```
prec=(TP)/(TP+FP)
print(prec)
```

```
0.8947368421052632
```

[39]:
```
Recall=(TP)/(TP+FN)
print(Recall)
```

```
0.7727272727272727
```

[ ]:
```

```