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```
import pandas as pd
df=pd.read_csv('https://raw.githubusercontent.com/shivang98/Social-Network-ads-Boost/maste
df.sample(15)
```

	User ID	Gender	Age	EstimatedSalary	Purchased
336	15664907	Male	58	144000	1
235	15646227	Male	46	79000	1
311	15622585	Male	39	96000	1
204	15660866	Female	58	101000	1
389	15668521	Female	48	35000	1
325	15695679	Female	41	60000	0
379	15749381	Female	58	23000	1
275	15727467	Male	57	74000	1
126	15610801	Male	42	65000	0
279	15759684	Female	50	36000	1
287	15761950	Female	48	138000	1
61	15673619	Male	25	87000	0
269	15583137	Male	40	61000	0
398	15755018	Male	36	33000	0
158	15762605	Male	26	30000	0

```
df.drop(columns=['User ID'],inplace=True)
df.sample(15)
```

	Gender	Age	EstimatedSalary	Purchased
95	Female	35	44000	0
87	Female	28	85000	0
279	Female	50	36000	1
26	Male	49	28000	1

```
df.dtypes
```

```
Gender             object
Age                 int64
EstimatedSalary     int64
Purchased           int64
dtype: object
```

```
df['Gender']=df['Gender'].astype('category')
df.dtypes
```

```
Gender             category
Age                   int64
EstimatedSalary       int64
Purchased             int64
dtype: object
```

```
df['Gender']=df['Gender'].cat.codes
df.sample(10)
```

	Gender	Age	EstimatedSalary	Purchased
100	1	27	88000	0
182	0	32	117000	1
329	0	47	107000	1
88	1	26	81000	0
91	0	30	116000	0
151	1	41	45000	0
278	0	52	38000	1
80	1	30	80000	0
67	0	23	82000	0
383	1	49	28000	1

```
df['Gender'].value_counts()
```

```
0    204
1    196
Name: Gender, dtype: int64
```

```
def DetectOutlier(df,var):
  high, low = df[var].mean() + 3* df[var].std() , df[var].mean() - 3* df[var].std()

  print("Highest allowed in variable:", var, high)
  print("lowest allowed in variable:", var, low)

  count = df[(df[var] > high) | (df[var] < low)][var].count()

  print('Total outliers in:',var,':',count)
```

```
DetectOutlier(df,'Age')
```

```
Highest allowed in variable: Age 69.10362979192377
lowest allowed in variable: Age 6.206370208076244
Total outliers in: Age : 0
```

```
DetectOutlier(df,'EstimatedSalary')
```

```
Highest allowed in variable: EstimatedSalary 172033.38084727435
lowest allowed in variable: EstimatedSalary -32548.380847274355
Total outliers in: EstimatedSalary : 0
```

```
df.isna().sum()
```

```
Gender             0
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

```
import seaborn as sns
sns.heatmap(df.corr(),annot=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3464353d10>
```


```
x=df[['Age','EstimatedSalary']]
y=df['Purchased']
```

```
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)
```

```
from sklearn.linear_model import LogisticRegression
model=LogisticRegression()
model.fit(x_train,y_train)
print ('Model Score:',model.score(x_test,y_test))
```

```
Model Score: 0.65
```

```
x=df[['Age','Gender','EstimatedSalary']]
y=df['Purchased']
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)
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from sklearn.linear_model import LogisticRegression
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print ('Model Score:',model.score(x_test,y_test))
```

```
Model Score: 0.65
```

```
df.describe()
```

	Gender	Age	EstimatedSalary	Purchased
count	400.000000	400.000000	400.000000	400.000000
mean	0.490000	37.655000	69742.500000	0.357500
std	0.500526	10.482877	34096.960282	0.479864
min	0.000000	18.000000	15000.000000	0.000000
25%	0.000000	29.750000	43000.000000	0.000000
50%	0.000000	37.000000	70000.000000	0.000000
75%	1.000000	46.000000	88000.000000	1.000000
max	1.000000	60.000000	150000.000000	1.000000

```
x=df[['Age','EstimatedSalary']]
y=df['Purchased']
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)
```

```
from sklearn.preprocessing import MinMaxScaler
norm=MinMaxScaler().fit(x_train)
x_train=norm.transform(x_train)
norm=MinMaxScaler().fit(x_test)
x_test=norm.transform(x_test)
```

```
from sklearn.linear_model import LogisticRegression
model=LogisticRegression()
model.fit(x_train,y_train)
print ('Model Score:',model.score(x_test,y_test))
```

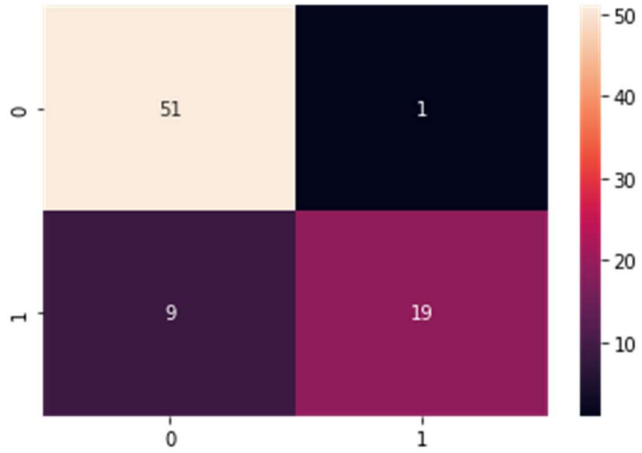
```
Model Score: 0.875
```

```
from sklearn.linear_model import LogisticRegression
model=LogisticRegression()
model.fit(x_train,y_train)
y_pred=model.predict(x_test)
print('model score:',model.score(x_test,y_test))
from sklearn.metrics import confusion_matrix
cf_matrix=confusion_matrix(y_test,y_pred)#actual o/p and predicted output
print(cf_matrix)
```

```
model score: 0.875
[[51  1]
 [ 9 19]]
```

```
import seaborn as sns
sns.heatmap(cf_matrix,annot=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f34619b0810>
```




```
from sklearn.metrics import precision_recall_fscore_support
precision_recall_fscore_support(y_test,y_pred,average='macro')
```

```
(0.8999999999999999, 0.8296703296703296, 0.8511904761904763, None)
```

```
precision_recall_fscore_support(y_test,y_pred,average='micro')
```

```
(0.875, 0.875, 0.875, None)
```

```
precision_recall_fscore_support(y_test,y_pred,average='weighted')
```

```
(0.885, 0.875, 0.869047619047619, None)
```

```
from sklearn.metrics import precision_recall_fscore_support
```

```
score=precision_recall_fscore_support(y_test,y_pred,average='micro')
print('Precision of Model:',score[0])
print('Recall of Model:',score[1])
print('F-score of Model:',score[2])
```

```
Precision of Model: 0.875
Recall of Model: 0.875
F-score of Model: 0.875
```