practical-5-dsbda

May 4, 2025

```
[2]: #practical 5
     import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
     from sklearn.linear_model import LogisticRegression
     from sklearn.model_selection import train_test_split
     from sklearn.metrics import␣
      ↪confusion_matrix,accuracy_score,precision_score,recall_score
```

```
[3]: df = pd.read_csv("Social_Network_Ads.csv")
     df.head()
```

```
[3]:     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
```

```
[5]: df.describe()
```

```
[5]:             User ID         Age  EstimatedSalary   Purchased
     count  4.000000e+02  400.000000       400.000000  400.000000
     mean   1.569154e+07   37.655000     69742.500000    0.357500
     std    7.165832e+04   10.482877     34096.960282    0.479864
     min    1.556669e+07   18.000000     15000.000000    0.000000
     25%    1.562676e+07   29.750000     43000.000000    0.000000
     50%    1.569434e+07   37.000000     70000.000000    0.000000
     75%    1.575036e+07   46.000000     88000.000000    1.000000
     max    1.581524e+07   60.000000    150000.000000    1.000000
```

```
[6]: df.isnull().sum()
```

```
[6]: User ID            0
     Gender             0
     Age                0
```

```
EstimatedSalary    0
Purchased          0
dtype: int64
```

[7]:
```
df['Gender'] = df['Gender'].map({'Male': 0 , 'Female':1})
```

[8]:
```
df.dtypes
```

[8]:
```
User ID            int64
Gender             int64
Age                int64
EstimatedSalary    int64
Purchased          int64
dtype: object
```

[9]:
```
x = df[['Age','EstimatedSalary']]
y = df['Purchased']
```

[12]:
```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.
 ↪2,random_state=0)
```

[13]:
```
model = LogisticRegression()
model.fit(x_train,y_train)
```

[13]:
```
LogisticRegression()
```

[14]:
```
y_pred = model.predict(x_test)
```

[18]:
```
cm = confusion_matrix(y_test,y_pred)
TP = cm[1,1]
TN = cm[0,0]
FP = cm[0,1]
FN = cm[1,0]

print("Confusion Matrix:\n",cm)
print(f"True Positive (TP) : {TP}")
print(f"True Negative (TN) : {TN}")
print(f"False Positive (FP) : {FP}")
print(f"False Negative (FN) : {FN}")

accuracy = accuracy_score(y_test,y_pred)
error_rate = 1-accuracy
precision = precision_score(y_test,y_pred)
recall = recall_score(y_test,y_pred)

print(f"\nAccuracy : {accuracy:.2f}")
print(f"Error rate : {error_rate:.2f}")
print(f"Precision Score : {precision:.2f}")
print(f"Recall Score : {recall:.2f}")
```

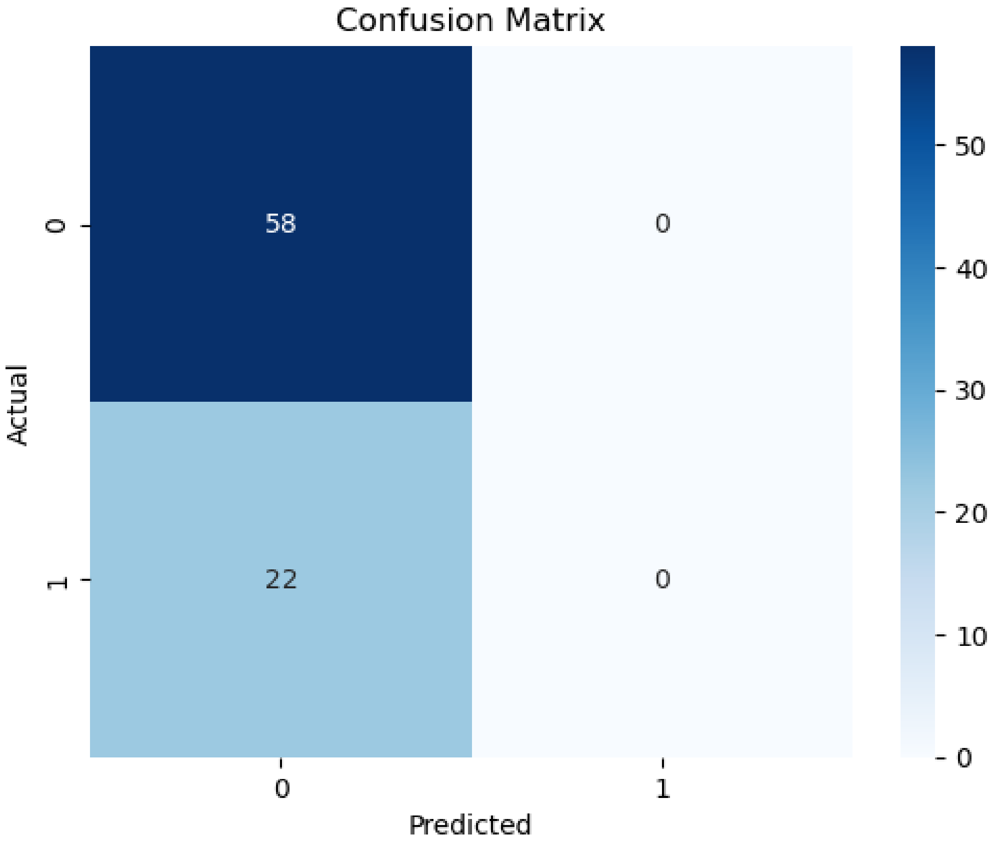
```
Confusion Matrix:
 [[58  0]
 [22  0]]
True Positive (TP) : 0
True Negative (TN) : 58
False Positive (FP) : 0
False Negative (FN) : 22

Accuracy : 0.72
Error rate : 0.28
Precision Score : 0.00
Recall Score : 0.00
```

```
C:\Users\GAURI\anaconda3\Lib\site-
packages\sklearn\metrics\_classification.py:1469: UndefinedMetricWarning:
Precision is ill-defined and being set to 0.0 due to no predicted samples. Use
`zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

[32]:

```
sns.heatmap(cm,annot = True,fmt = 'd',cmap='Blues')
plt.title("Confusion Matrix")
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.show()
```


Confusion Matrix
58
0
22
0
Actual
0
1
Predicted
0
1
50
40
30
20
10
0

```
[ ]:
```