practice-assignment-5

May 4, 2025

[3]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

[5]:
```
vm=pd.read_csv("Social_Network_Ads.csv")
vm
```

[5]:
```
      Age  EstimatedSalary  Purchased
0      19            19000          0
1      35            20000          0
2      26            43000          0
3      27            57000          0
4      19            76000          0
..    …               …        …
395    46            41000          1
396    51            23000          1
397    50            20000          1
398    36            33000          0
399    49            36000          1

[400 rows x 3 columns]
```

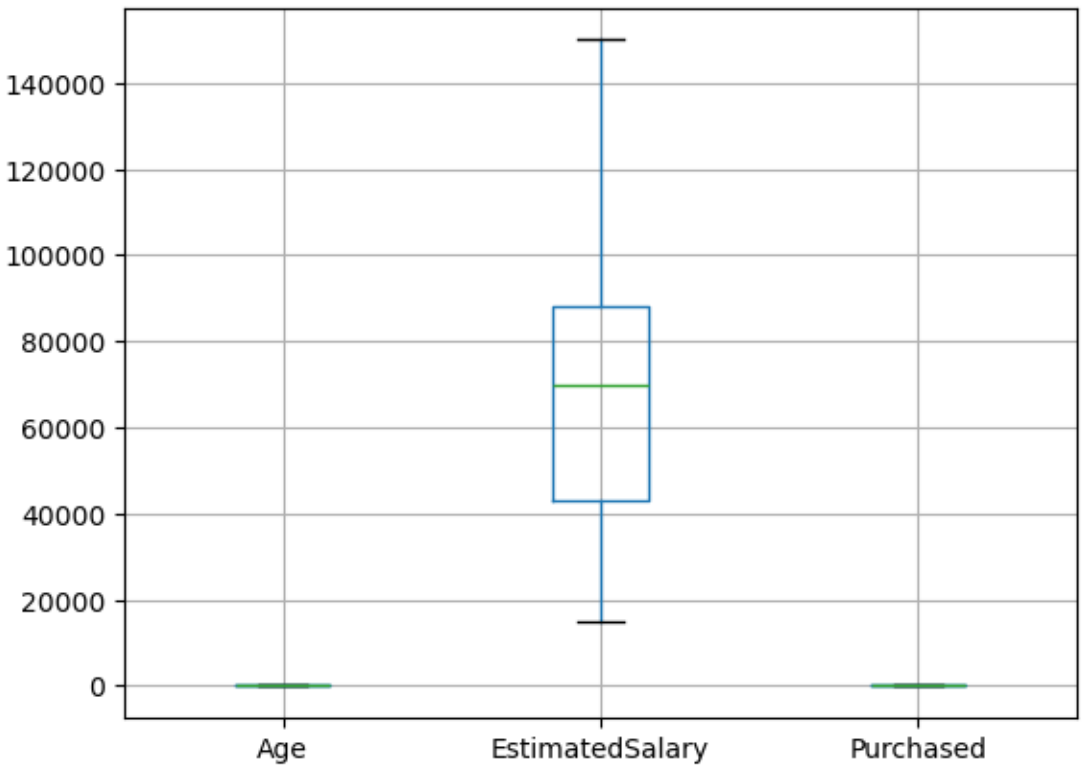
[9]:
```
print(vm.head())
print(vm.tail())
print(vm.info())
print(vm.describe())
print(vm.isnull().sum())
```

```
   Age  EstimatedSalary  Purchased
0   19            19000          0
1   35            20000          0
2   26            43000          0
3   27            57000          0
4   19            76000          0
     Age  EstimatedSalary  Purchased
395   46            41000          1
396   51            23000          1
```

```
397   50            20000          1
398   36            33000          0
399   49            36000          1
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 3 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   Age              400 non-null    int64
 1   EstimatedSalary  400 non-null    int64
 2   Purchased        400 non-null    int64
dtypes: int64(3)
memory usage: 9.5 KB
None
              Age  EstimatedSalary   Purchased
count  400.000000       400.000000  400.000000
mean    37.655000     69742.500000    0.357500
std     10.482877     34096.960282    0.479864
min     18.000000     15000.000000    0.000000
25%     29.750000     43000.000000    0.000000
50%     37.000000     70000.000000    0.000000
75%     46.000000     88000.000000    1.000000
max     60.000000    150000.000000    1.000000
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

[12]:
```
vm.boxplot()
```

[12]: <Axes: >



[14]:
```
X=vm.drop(['Purchased'],axis=1)
Y=vm['Purchased']
```

[16]:
```
print(X)
print(Y)
```

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

[400 rows x 2 columns]
0      0
1      0
```

```
2      0
3      0
4      0
      ..
395    1
396    1
397    1
398    0
399    1
Name: Purchased, Length: 400, dtype: int64
```

[18]:
```
#Split the dataset into training and testing datasets
from sklearn.model_selection import train_test_split
xtrain, xtest, ytrain, ytest = train_test_split(X, Y, test_size =0.
 ↪2,random_state = 0)
```

[26]:
```
from sklearn.linear_model import LogisticRegression
lr=LogisticRegression()
```

[30]:
```
lr.fit(xtrain,ytrain)
```

[30]:
```
LogisticRegression()
```

[32]:
```
y_pred=lr.predict(xtest)
```

[34]:
```
print(xtrain)
print("------------\n")
print(xtest)
print("------------\n")
print(ytrain)
print("------------\n")
print(ytest)
print("------------\n")
print(y_pred)
```

```
     Age  EstimatedSalary
336   58           144000
64    59            83000
55    24            55000
106   26            35000
300   58            38000
..    …              …
323   48            30000
192   29            43000
117   36            52000
47    27            54000
172   26           118000
```

```
[320 rows x 2 columns]
------------

     Age  EstimatedSalary
132   30            87000
309   38            50000
341   35            75000
196   30            79000
246   35            50000
..   …              …
14    18            82000
363   42            79000
304   40            60000
361   53            34000
329   47           107000

[80 rows x 2 columns]
------------

336    1
64     0
55     0
106    0
300    1
      ..
323    1
192    0
117    0
47     0
172    0
Name: Purchased, Length: 320, dtype: int64
------------

132    0
309    0
341    0
196    0
246    0
      ..
14     0
363    0
304    0
361    1
329    1
Name: Purchased, Length: 80, dtype: int64
------------

[0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 0 0 0 0 0 1 0 0 0 0
```

```
0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 1 0 0 0
0 0 1 0 1 1]
```

[36]:
```
from sklearn.metrics import␣
↪accuracy_score,classification_report,confusion_matrix,precision_score,recall_score,f1_score
```

[44]:
```
cm=confusion_matrix(ytest,y_pred)
cm
```

[44]:
```
array([[56,  2],
       [ 5, 17]], dtype=int64)
```

[46]:
```
ac=accuracy_score(ytest,y_pred)
ac
```

[46]:
```
0.9125
```

[50]:
```
tn,fp,fn,tp=confusion_matrix(ytest,y_pred).ravel()
print(tn)
print(tp)
print(fn)
print(fp)
```

```
56
17
5
2
```

[52]:
```
err_rate=1-ac
print(err_rate)
```

```
0.08750000000000002
```

[54]:
```
print(classification_report(ytest,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.92      0.97      0.94        58
           1       0.89      0.77      0.83        22

    accuracy                           0.91        80
   macro avg       0.91      0.87      0.89        80
weighted avg       0.91      0.91      0.91        80
```

[56]:
```
print(precision_score(ytest,y_pred))
print(recall_score(ytest,y_pred))
print(f1_score(ytest,y_pred))
```

```
0.8947368421052632
0.7727272727272727
0.8292682926829268
```

[ ]: