

ASSIGNMENT – 2
Python Programming

| | |
|---------------------|-----------------|
| Assignment Date | 25-09-2022 |
| Student Name | Mr Karuppaiya I |
| Student Roll Number | 923819104020 |
| Maximum Marks | 2 Mark |

Question-1 :

1 . Importing Required Package

Solution :

```
import pandas as pd
import seaborn as sns
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
```

Question-2 :

2. Loading the Dataset

Solution :

```
df = pd.read_csv("/content/Churn_Modelling.csv")
df
```

Output:

| | RowNumber | CustomerId | Surname | Creditscore | Geography | Gender | Age | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember | EstimatedSalary | Exited |
|------|-----------|------------|-----------|-------------|-----------|--------|-----|--------|-----------|---------------|-----------|----------------|-----------------|--------|
| 0 | 1 | 15634602 | Hargrave | 619 | France | Female | 42 | 2 | 0.00 | 1 | 1 | 1 | 101348.88 | 1 |
| 1 | 2 | 15647311 | Hill | 608 | Spain | Female | 41 | 1 | 83807.86 | 1 | 0 | 1 | 112542.58 | 0 |
| 2 | 3 | 15619304 | Onio | 502 | France | Female | 42 | 8 | 159660.80 | 3 | 1 | 0 | 113931.57 | 1 |
| 3 | 4 | 15701354 | Boni | 699 | France | Female | 39 | 1 | 0.00 | 2 | 0 | 0 | 93826.63 | 0 |
| 4 | 5 | 15737888 | Mitchell | 850 | Spain | Female | 43 | 2 | 125510.82 | 1 | 1 | 1 | 79084.10 | 0 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 9995 | 9996 | 15606229 | Obijaku | 771 | France | Male | 39 | 5 | 0.00 | 2 | 1 | 0 | 96270.64 | 0 |
| 9996 | 9997 | 15569892 | Johnstone | 516 | France | Male | 35 | 10 | 57369.61 | 1 | 1 | 1 | 101699.77 | 0 |
| 9997 | 9998 | 15584532 | Liu | 709 | France | Female | 36 | 7 | 0.00 | 1 | 0 | 1 | 42085.58 | 1 |
| 9998 | 9999 | 15682355 | Sabbatini | 772 | Germany | Male | 42 | 3 | 75075.31 | 2 | 1 | 0 | 92888.52 | 1 |
| 9999 | 10000 | 15628319 | Walker | 792 | France | Female | 28 | 4 | 130142.79 | 1 | 1 | 0 | 38190.78 | 0 |

10000 rows × 14 columns

3. Visualizations

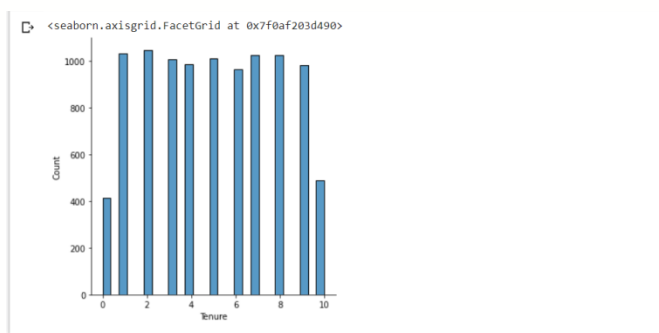
Question-3 :

3.1 Univariate Analysis

Solution:

```
sns.displot(df.Tenure)
```

Output:

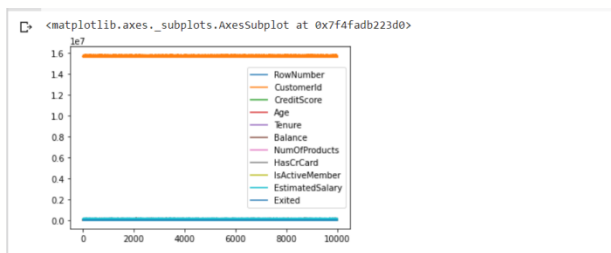


3.2 Bi-Variate Analysis

Solution:

```
df.plot.line()
```

Output:

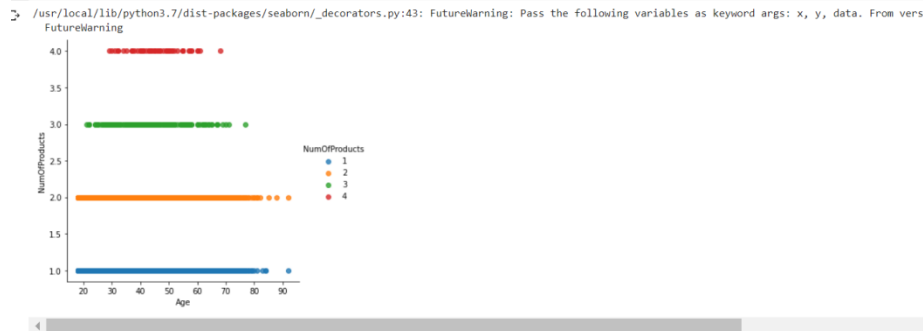


3.3 Multi - Variate Analysis

Solution:

```
sns.lmplot("Age", "NumOfProducts", df, hue="NumOfProducts", fit_reg=False);
```

Output:



4. Perform descriptive statistics on the dataset.

Question-4 :

Solution:

```
df.describe()
```

Output:

| | RowNumber | CustomerId | Creditscore | Age | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember | EstimatedSalary | Exited |
|-------|-------------|--------------|--------------|--------------|--------------|---------------|---------------|-------------|----------------|-----------------|--------------|
| count | 10000.00000 | 1.000000e+04 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.00000 | 10000.000000 | 10000.000000 | 10000.000000 |
| mean | 5000.50000 | 1.569094e+07 | 650.528800 | 38.921800 | 5.012800 | 76485.889288 | 1.530200 | 0.70550 | 0.515100 | 100090.239881 | 0.203700 |
| std | 2886.89568 | 7.193619e+04 | 96.653299 | 10.487806 | 2.892174 | 62397.405202 | 0.581654 | 0.45584 | 0.499797 | 57510.492818 | 0.402769 |
| min | 1.00000 | 1.556570e+07 | 350.000000 | 18.000000 | 0.000000 | 0.000000 | 1.000000 | 0.00000 | 0.000000 | 11.580000 | 0.000000 |
| 25% | 2500.75000 | 1.562853e+07 | 584.000000 | 32.000000 | 3.000000 | 0.000000 | 1.000000 | 0.00000 | 0.000000 | 51002.110000 | 0.000000 |
| 50% | 5000.50000 | 1.569074e+07 | 652.000000 | 37.000000 | 5.000000 | 97198.540000 | 1.000000 | 1.00000 | 1.000000 | 100193.915000 | 0.000000 |
| 75% | 7500.25000 | 1.575323e+07 | 718.000000 | 44.000000 | 7.000000 | 127644.240000 | 2.000000 | 1.00000 | 1.000000 | 149388.247500 | 0.000000 |
| max | 10000.00000 | 1.581569e+07 | 850.000000 | 92.000000 | 10.000000 | 250898.090000 | 4.000000 | 1.00000 | 1.000000 | 199992.480000 | 1.000000 |

5. Handle the Missing values.

Question-5 :

Solution:

```
data = pd.read_csv("Churn_Modelling.csv")  
pd.isnull(data["Gender"])
```

Output:

```
0      False
1      False
2      False
3      False
4      False
...
9995    False
9996    False
9997    False
9998    False
9999    False
Name: Gender, Length: 10000, dtype: bool
```

Question-6:

6. Find the outliers and replace the outliers.

Solution:

```
df["Tenure"] = np.where(df["Tenure"] > 10, np.median(df["Tenure"]),
df["Tenure"])
```

Output:

```
0      2
1      1
2      8
3      1
4      2
...
9995    5
9996   10
9997    7
9998    3
9999    4
Name: Tenure, Length: 10000, dtype: object
```

Question-7 :

7. Check for Categorical columns and perform encoding.

Solution

```
pd.get_dummies(df, columns=["Gender", "Age"], prefix=["Age", "Gender"])
.head()
```

Output:

```
RowNumber  CustomerId  Surname  CreditScore  Geography  Tenure  Balance  NumOfProducts  HasCrCard  IsActiveMember  ...  Gender_78
0          1    15634602   Hargrave         619      France      2      0.00             1           1           1  ...      0
1          2    15647311     Hill         608      Spain       1    83807.86             1           0           1  ...      0
2          3    15619304     Onio         502      France      8    159660.80             3           1           0  ...      0
3          4    15701354     Boni         699      France      1      0.00             2           0           0  ...      0
4          5    15737888   Mitchell         850      Spain       2    125510.82             1           1           1  ...      0
```

5 rows × 84 columns

Output:

| HasCrCard | IsActiveMember | ... | Gender_78 | Gender_79 | Gender_80 | Gender_81 | Gender_82 | Gender_83 | Gender_84 | Gender_85 | Gender_88 | Gender_92 |
|-----------|----------------|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | 1 | ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Question-8:

8. Split the data into dependent and independent variables

8.1 Split the data into Independent variables.

Solution:

```
X = df.iloc[:, :-2].values
print(X)
```

Output:

```
[[1 15634602 'Hangrave' ... 1 1 1]
 [2 15647311 'Hill' ... 1 0 1]
 [3 15619304 'Onio' ... 3 1 0]
 ...
 [9998 15584532 'Liu' ... 1 0 1]
 [9999 15682355 'Sabbatini' ... 2 1 0]
 [10000 15628319 'Walker' ... 1 1 0]]
```

8.2 Split the data into Dependent variables.

Solution:

```
Y = df.iloc[:, -1].values
print(Y)
```

Output:

```
[1 0 1 ... 1 1 0]
```

Question-9 :

9. Scale the independent variables

Solution:

```
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
df[["RowNumber"]] = scaler.fit_transform(df[["RowNumber"]])
print(df)
```

Output:

| | RowNumber | CustomerId | Surname | CreditScore | Geography | Gender | Age |
|------|-----------|------------|-----------|-------------|-----------|--------|-----|
| 0 | 0.0000 | 15634602 | Hargrave | 619 | France | Female | 42 |
| 1 | 0.0001 | 15647311 | Hill | 608 | Spain | Female | 41 |
| 2 | 0.0002 | 15619304 | Onio | 502 | France | Female | 42 |
| 3 | 0.0003 | 15701354 | Boni | 699 | France | Female | 39 |
| 4 | 0.0004 | 15737888 | Mitchell | 850 | Spain | Female | 43 |
| ... | ... | ... | ... | ... | ... | ... | ... |
| 9995 | 0.9996 | 15606229 | Obijaku | 771 | France | Male | 39 |
| 9996 | 0.9997 | 15569892 | Johnstone | 516 | France | Male | 35 |
| 9997 | 0.9998 | 15584532 | Liu | 709 | France | Female | 36 |
| 9998 | 0.9999 | 15682355 | Sabbatini | 772 | Germany | Male | 42 |
| 9999 | 1.0000 | 15628319 | Walker | 792 | France | Female | 28 |

| | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember |
|------|--------|-----------|---------------|-----------|----------------|
| 0 | 2 | 0.00 | 1 | 1 | 1 |
| 1 | 1 | 83807.86 | 1 | 0 | 1 |
| 2 | 8 | 159660.80 | 3 | 1 | 0 |
| 3 | 1 | 0.00 | 2 | 0 | 0 |
| 4 | 2 | 125510.82 | 1 | 1 | 1 |
| ... | ... | ... | ... | ... | ... |
| 9995 | 5 | 0.00 | 2 | 1 | 0 |
| 9996 | 10 | 57369.61 | 1 | 1 | 1 |
| 9997 | 7 | 0.00 | 1 | 0 | 1 |
| 9998 | 3 | 75075.31 | 2 | 1 | 0 |
| 9999 | 4 | 130142.79 | 1 | 1 | 0 |

| | EstimatedSalary | Exited |
|------|-----------------|--------|
| 0 | 101348.88 | 1 |
| 1 | 112542.58 | 0 |
| 2 | 113931.57 | 1 |
| 3 | 93826.63 | 0 |
| 4 | 79084.10 | 0 |
| ... | ... | ... |
| 9995 | 96270.64 | 0 |
| 9996 | 101699.77 | 0 |
| 9997 | 42085.58 | 1 |
| 9998 | 92888.52 | 1 |
| 9999 | 38190.78 | 0 |

[10000 rows x 14 columns]

Question-10 :

10. Split the data into training and testing

Solution:

```
from sklearn.model_selection import train_test_split
train_size=0.8
X = df.drop(columns = ['Tenure']).copy()
y = df['Tenure']
X_train, X_rem, y_train, y_rem = train_test_split(X,y, train_size=0.8)
test_size = 0.5
X_valid, X_test, y_valid, y_test = train_test_split(X_rem,y_rem, test_size=0.5)
print(X_train.shape), print(y_train.shape)
print(X_valid.shape), print(y_valid.shape)
print(X_test.shape), print(y_test.shape)
```

