

ASSIGNMENT – 2  
Python Programming

Assignment Date	12-10-2022
Team Id	PNT2022TMID37915
Project Name	AI-powered Nutrition Analyzer for Fitness Enthusiasts
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 x 14 columns

### 3. Visualizations

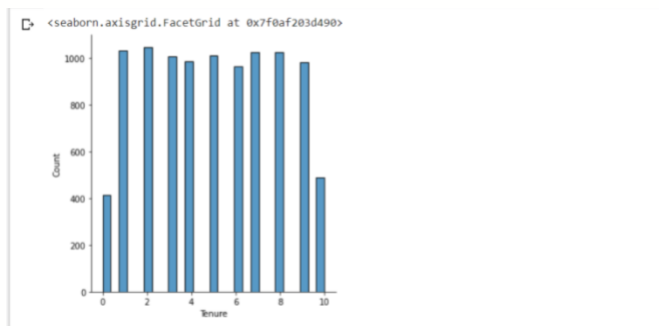
Question-3 :

#### 3.1 Univariate Analysis

**Solution:**

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

**Output:**

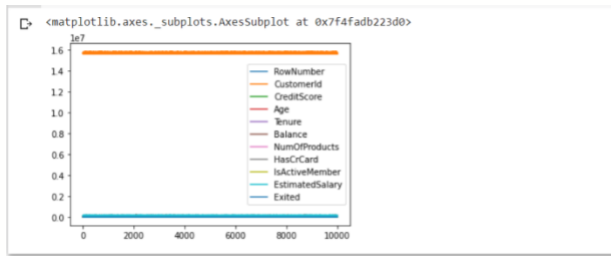


#### 3.2 Bi-Variate Analysis

**Solution:**

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

**Output:**

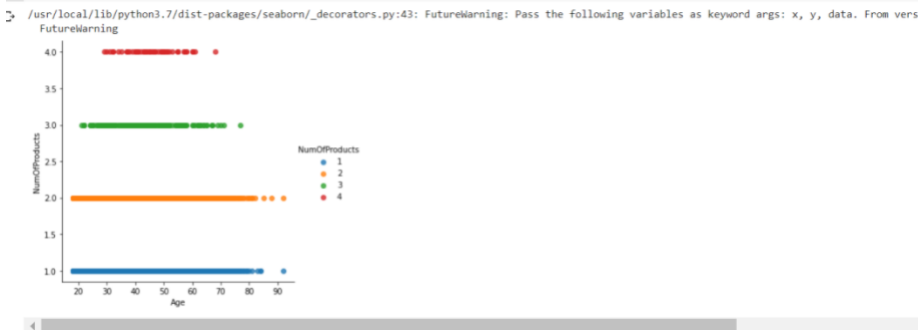


### 3.3 Multi - Variate Analysis

#### 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
0          1             1  ...           0           0           0           0           0           0           0           0           0           0
1          0             1  ...           0           0           0           0           0           0           0           0           0           0
2          1             0  ...           0           0           0           0           0           0           0           0           0           0
3          0             0  ...           0           0           0           0           0           0           0           0           0           0
4          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 'Hargrave' ... 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 15634502 Hargrave 619 France Female 42
1 0.0001 15647311 Hill 608 Spain Female 41
2 0.0002 15619304 Onio 582 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)
```

## Output:

```
(8000, 13)
(8000,)
(1000, 13)
(1000,)
(1000, 13)
(1000,)
(None, None)
```

