ASSIGNMENT–2
PythonProgramming

AssignmentDate	29-09-2022
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MaximumMarks	2 Mark

Question-1:

1 . Importing Required

PackageSolution:

```
import pandas as
pdimport seaborn as
snsimportnumpyasnp
frommatplotlibimportpyplotasplt
%matplotlibinline
```

Question-2:

2. Loading the

DatasetSolution:

```
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	Obijiaku	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

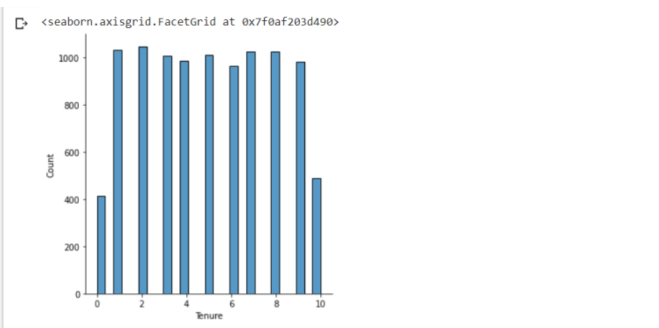
Question-3:

3.1 UnivariateAnalysis

Solution:

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

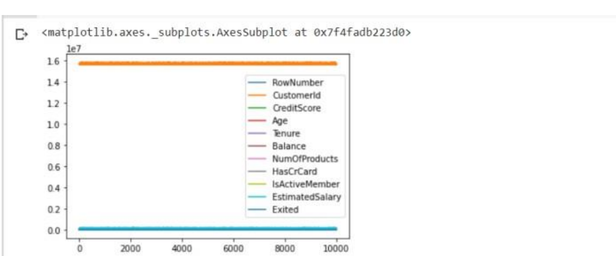
Output:



3.2 Bi-VariateAnalysis**Solution:**

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

Output:

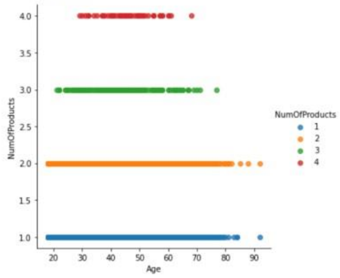


3.3 Multi-VariateAnalysis**Solution:**

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

Output:

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variables as keyword args: x, y, data. From vers
  FutureWarning
```



4. Performdescriptivestatisticsonthedataset.

Question-4:

Solution:

```python
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. HandletheMissingvalues.

Question-5:

Solution:

```
data =
pd.read_csv("Churn_Modelling.csv")pd.isnu
ll(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. Findtheoutliersandreplacetheoutliers.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. CheckforCategoricalcolumnsandperformencoding.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. Splitthedataintodependentandindependentvariables

8.1 SplitthedataintoIndependentvariables.So

lution:

```
X=df.iloc[:,:-
2].valuesprint(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 SplitthedataintoDependentvariables.Solution:

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

Output:

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

Question-9:

9. Scale the independent variablesSolution:

```
importpandasaspd
fromsklearn.preprocessingimportMinMaxScalerscaler=M
inMaxScaler()
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   Obijiaku          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. Splitthedataintotrainingandtesting**Sol**

ution:

```
fromsklearn.model_selectionimporttrain_test_splittrain_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),pr
int(y_test.shape)
```

Output:

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