ASSIGNMENT-02

DATA VISUALIZATION AND PRE PROCESSING

Assignment Date: 22 September 2022
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Maximum Marks: 2 Marks

1. Download the dataset: Dataset
   Dataset downloaded in csv form.

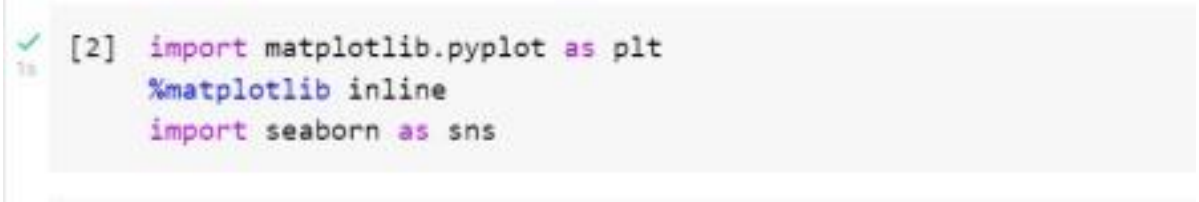
2. Load the dataset.

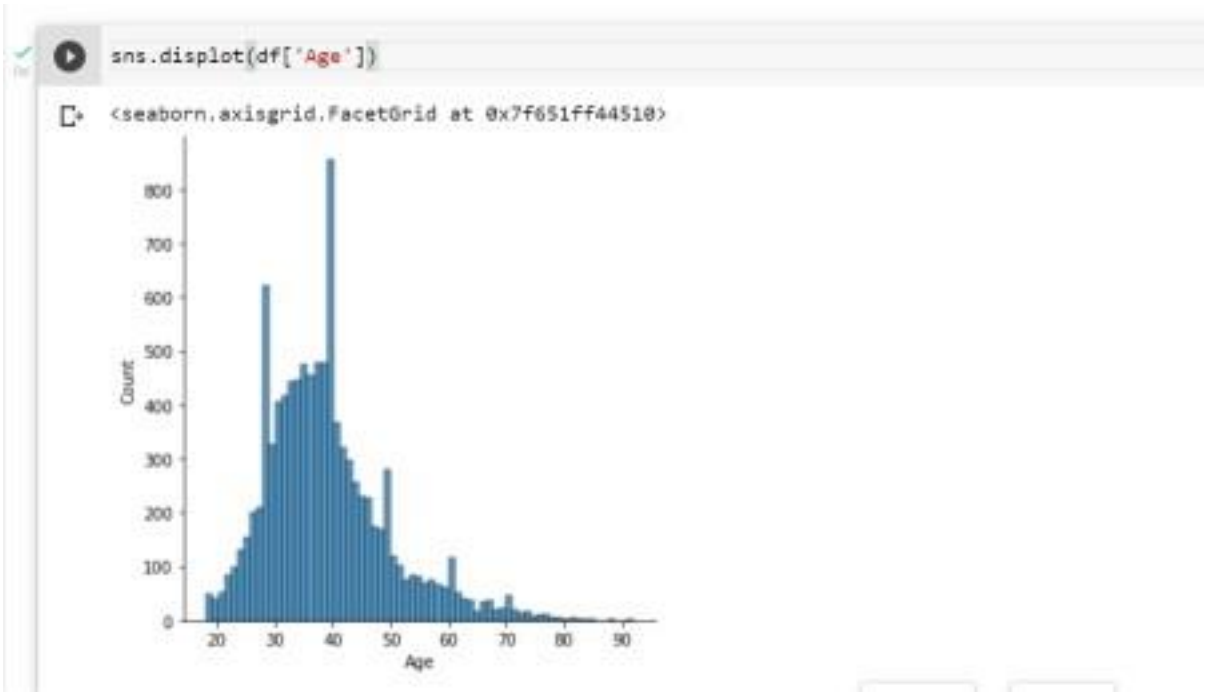
```
import pandas as pd
df = pd.read_csv("/content/drive/MyDrive/IBM Assignments/Churn_Modellin
g.csv")
```

3. Perform Below Visualizations.

- Univariate Analysis

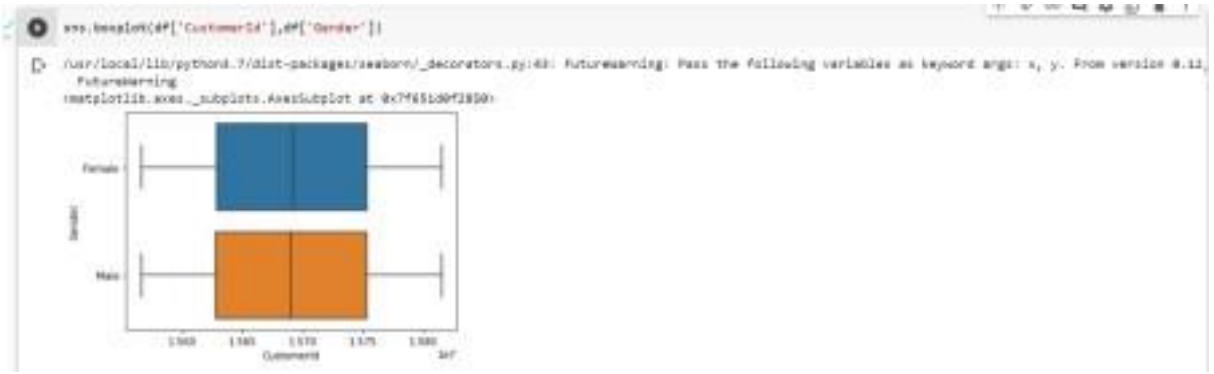
```
sns.displot(df['Age'])
```





- Bi - Variate Analysis

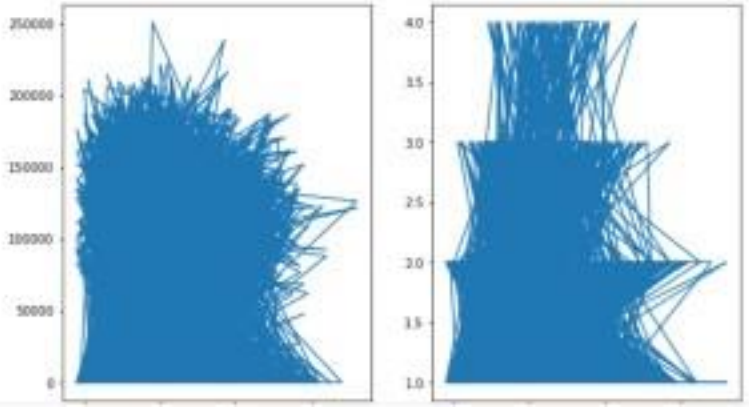
```
sns.boxplot(df['CustomerId'],df['Gender'])
```



- Multi - Variate Analysis

```
plt.figure(figsize=(10,6))
plt.subplot(1, 2, 1)
plt.plot(df['Age'],df['Balance'])
plt.subplot(1, 2, 2)
plt.plot(df['Age'],df['NumOfProducts'])
```

```
[<matplotlib.lines.Line2D at 0x7f65197ca210>]
```



4. Perform descriptive statistics on the dataset.

```
df.describe()
```

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

Mean:

```
df.mean()
```

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only
  """Entry point for launching an IPython kernel.
RowNumber          5.000500e+03
CustomerId         1.569094e+07
CreditScore        6.505288e+02
Age                3.892180e+01
Tenure             5.012800e+00
Balance            7.648589e+04
NumOfProducts      1.530200e+00
HasCrCard          7.055000e-01
IsActiveMember     5.151000e-01
EstimatedSalary    1.000902e+05
Exited             2.037000e-01
dtype: float64
```

5. Handle the Missing values.

```
df.isnull().sum()

RowNumber          0
CustomerId         0
Surname            0
CreditScore        0
Geography          0
Gender             0
Age                0
Tenure             0
Balance            0
NumOfProducts      0
HasCrCard          0
IsActiveMember     0
EstimatedSalary    0
Exited             0
dtype: int64
```

6. Find the outliers and replace the outliers

Finding Outliers:

Using Boxplot

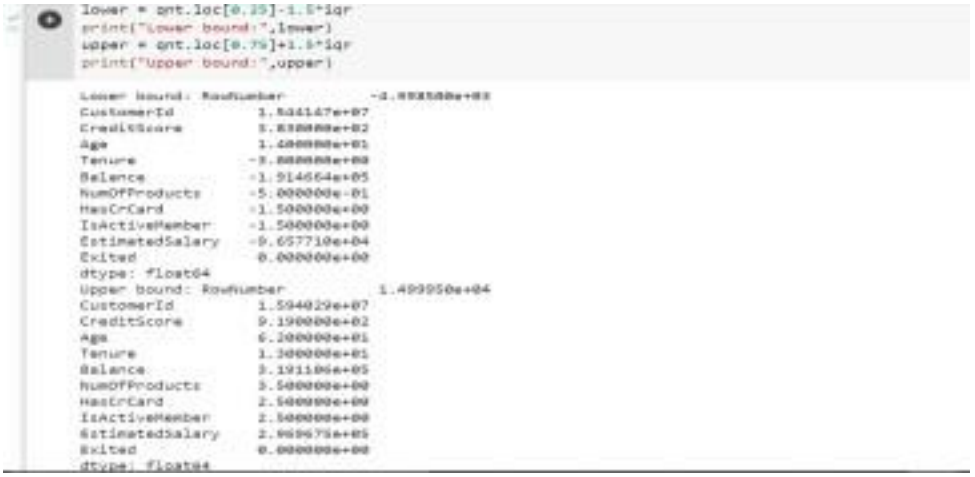
Using method

```
[83] qnt = df.quantile(q =(0.25,0.75))
     qnt
```

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0.25	2500.75	15628528.25	584.0	32.0	3.0	0.00	1.0	0.0	0.0	51002.1100	0.0
0.75	7500.25	15753233.75	718.0	44.0	7.0	127644.24	2.0	1.0	1.0	149388.2475	0.0

```
iqr = qnt.loc[0.75]-qnt.loc[0.25]
iqr

RowNumber          4999.5000
CustomerId       124705.5000
CreditScore         134.0000
Age                  12.0000
Tenure                4.0000
Balance          127644.2400
NumOfProducts         1.0000
HasCrCard             1.0000
IsActiveMember        1.0000
EstimatedSalary   98386.1375
Exited                0.0000
dtype: float64
```



```
lower = qnt.loc[0.25]-1.5*iqr
print("Lower bound:",lower)
upper = qnt.loc[0.75]+1.5*iqr
print("Upper bound:",upper)
```

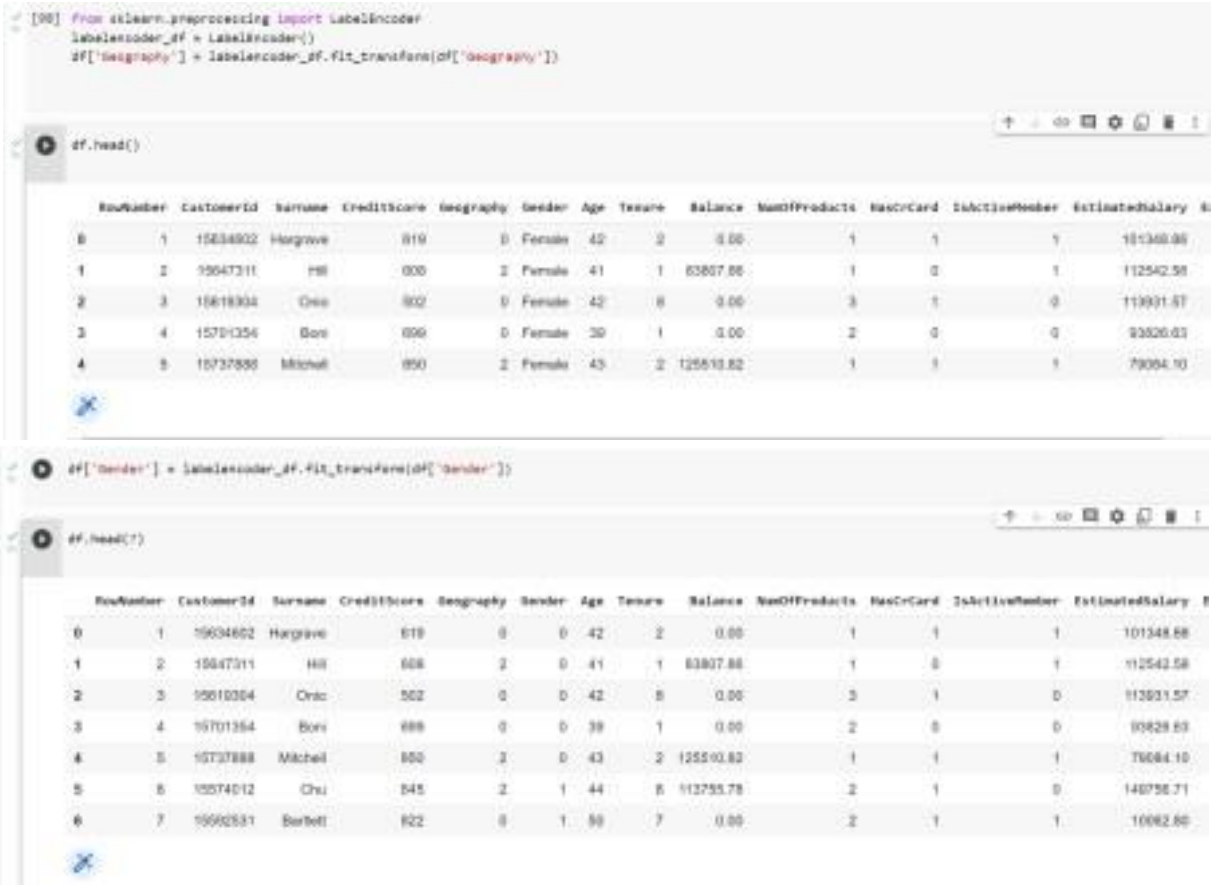
```
Lower bound: RowNumber          -4.998500e+03
CustomerId           1.534147e+07
CreditScore          5.000000e+02
Age                  1.400000e+01
Tenure              -3.000000e+00
Balance             -1.914464e+05
NumOfProducts       -5.000000e-01
HasCrCard           -1.500000e+00
IsActiveMember      -1.500000e+00
EstimatedSalary     -9.657710e+04
Exited               0.000000e+00
dtype: float64
Upper bound: RowNumber           1.499950e+04
CustomerId           1.594029e+07
CreditScore          9.190000e+02
Age                  6.200000e+01
Tenure               1.300000e+01
Balance              3.191186e+05
NumOfProducts        3.500000e+00
HasCrCard            2.500000e+00
IsActiveMember       2.500000e+00
EstimatedSalary      2.965975e+05
Exited               0.000000e+00
dtype: float64
```

Replacing Outliers:

```
''' replacing outliers '''
df['Balance'] = np.where(df['Balance']>127644,0.00,df['Balance'])
```

7. Check for Categorical columns and perform encoding.

Categorical columns: Geography,Gender



```
[98] from sklearn.preprocessing import LabelEncoder
labelencoder_df = LabelEncoder()
df['Geography'] = labelencoder_df.fit_transform(df['Geography'])
```

```
df.head()
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	1	15634602	Hargrave	619	0	Female	42	2	0.00	1	1	1	101348.88
1	2	15647311	Hill	608	2	Female	41	1	83807.86	1	0	1	112542.58
2	3	15619304	Onio	502	0	Female	42	8	0.00	3	1	0	113931.57
3	4	15701354	Boni	699	0	Female	39	1	0.00	2	0	0	93826.63
4	5	15737888	Mitchell	850	2	Female	43	2	125510.82	1	1	1	79084.10

```
df['Gender'] = labelencoder_df.fit_transform(df['Gender'])
```

```
df.head(7)
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	1	15634602	Hargrave	619	0	0	42	2	0.00	1	1	1	101348.88
1	2	15647311	Hill	608	2	0	41	1	83807.86	1	0	1	112542.58
2	3	15619304	Onio	502	0	0	42	8	0.00	3	1	0	113931.57
3	4	15701354	Boni	699	0	0	39	1	0.00	2	0	0	93826.63
4	5	15737888	Mitchell	850	2	0	43	2	125510.82	1	1	1	79084.10
5	6	15574012	Chu	645	2	1	44	8	113755.78	2	1	0	149756.71
6	7	15592531	Bartlett	822	0	1	50	7	0.00	2	1	1	10062.80

8. Split the data into dependent and independent variables.

9. Scale the independent variables

10. Split the data into training and testing