Assignment 2

Tasks:-

1. Download the dataset: Dataset
2. Load the dataset.
3. Perform Below Visualizations.
    - Univariate Analysis
    - Bi - Variate Analysis
    - Multi - Variate Analysis
4. Perform descriptive statistics on the dataset.
5. Handle the Missing values.
6. Find the outliers and replace the outliers
7. Check for Categorical columns and perform encoding.
8. Split the data into dependent and independent variables.
9. Scale the independent variables
10. Split the data into training and testing

Mounting Drive for dataset

```
from google.colab import drive
drive.mount('/content/drive')
```

Importing libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.preprocessing import LabelEncoder,MinMaxScaler
from sklearn.model_selection import train_test_split
```

Downloading and Importing the Dataset

```
data = pd.read_csv('/content/drive/MyDrive/IBM/Churn_Modelling.csv')
```

```
data = data.iloc[:,3:]
data
```

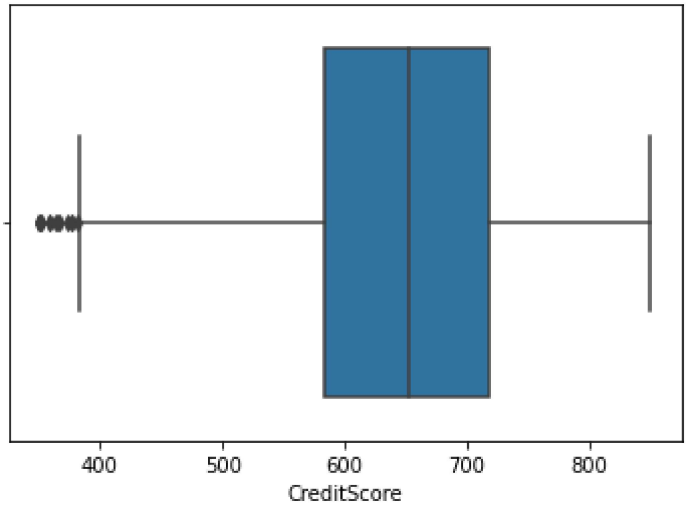
	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard
0	619	France	Female	42	2	0.00	1	1
1	608	Spain	Female	41	1	83807.86	1	0
2	502	France	Female	42	8	159660.80	3	1
3	699	France	Female	39	1	0.00	2	0
4	850	Spain	Female	43	2	125510.82	1	1
...	...	...	...	...	...	...	...	...
9995	771	France	Male	39	5	0.00	2	1
9996	516	France	Male	35	10	57369.61	1	1
9997	709	France	Female	36	7	0.00	1	0
9998	772	Germany	Male	42	3	75075.31	2	1
9999	792	France	Female	28	4	130142.79	1	1

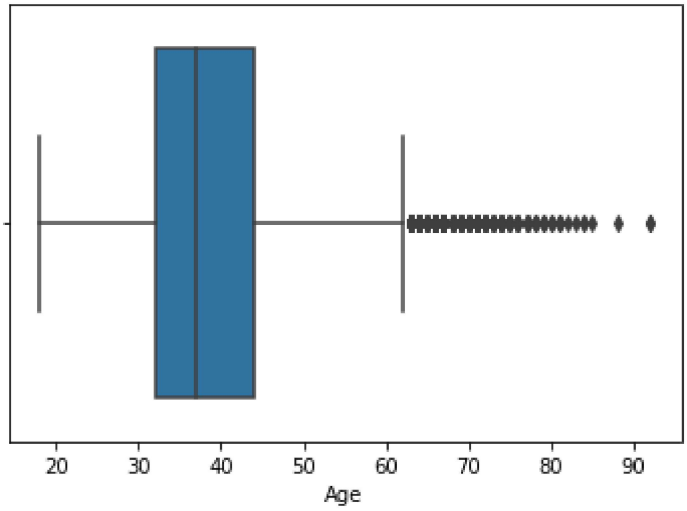
10000 rows × 11 columns

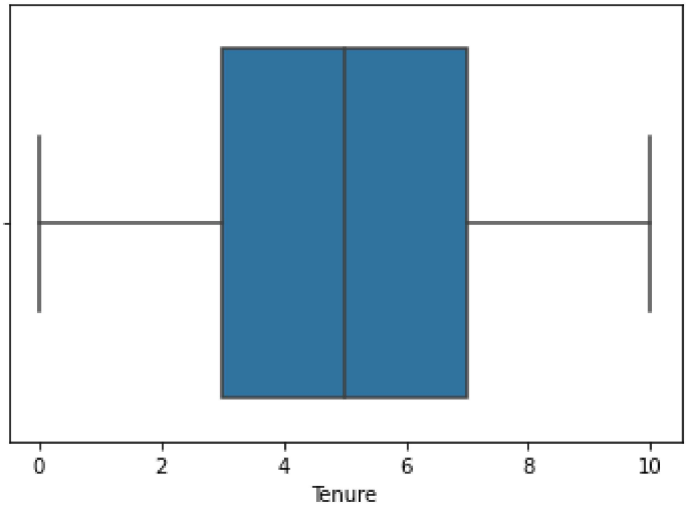
Visualizations

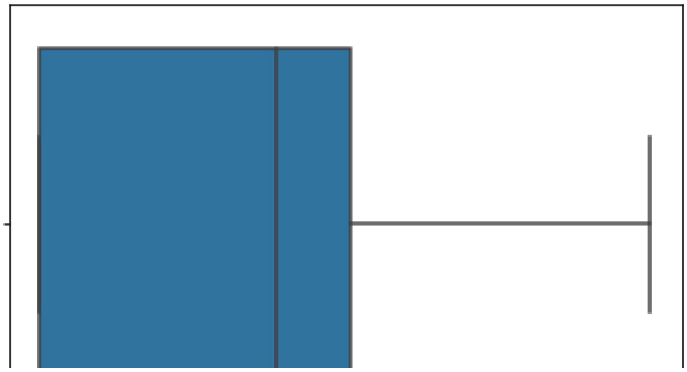
1. Univariate Analysis

```
for col in data.columns:
  if(data.dtypes[col]=='int64' or data.dtypes[col]=='float64' ):
    sns.boxplot(x=data[col]).set( xlabel=col)
    plt.show()
```


400
500
600
700
800
CreditScore


20
30
40
50
60
70
80
90
Age

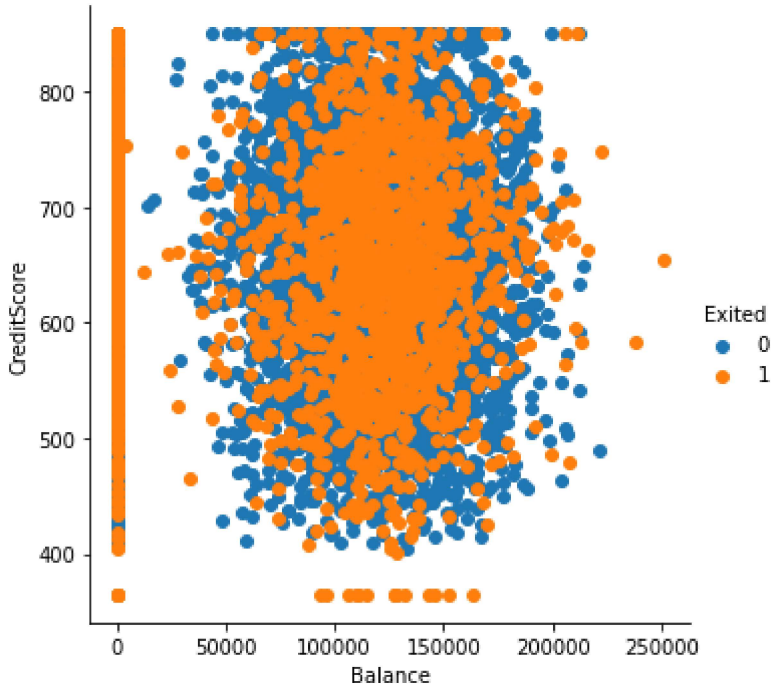

0
2
4
6
8
10
Tenure



2. Bi-Variate Analysis

```
sns.FacetGrid(data,hue='Exited',size=5).map(plt.scatter,"Balance","CreditScore").add_legend()
plt.show()
```

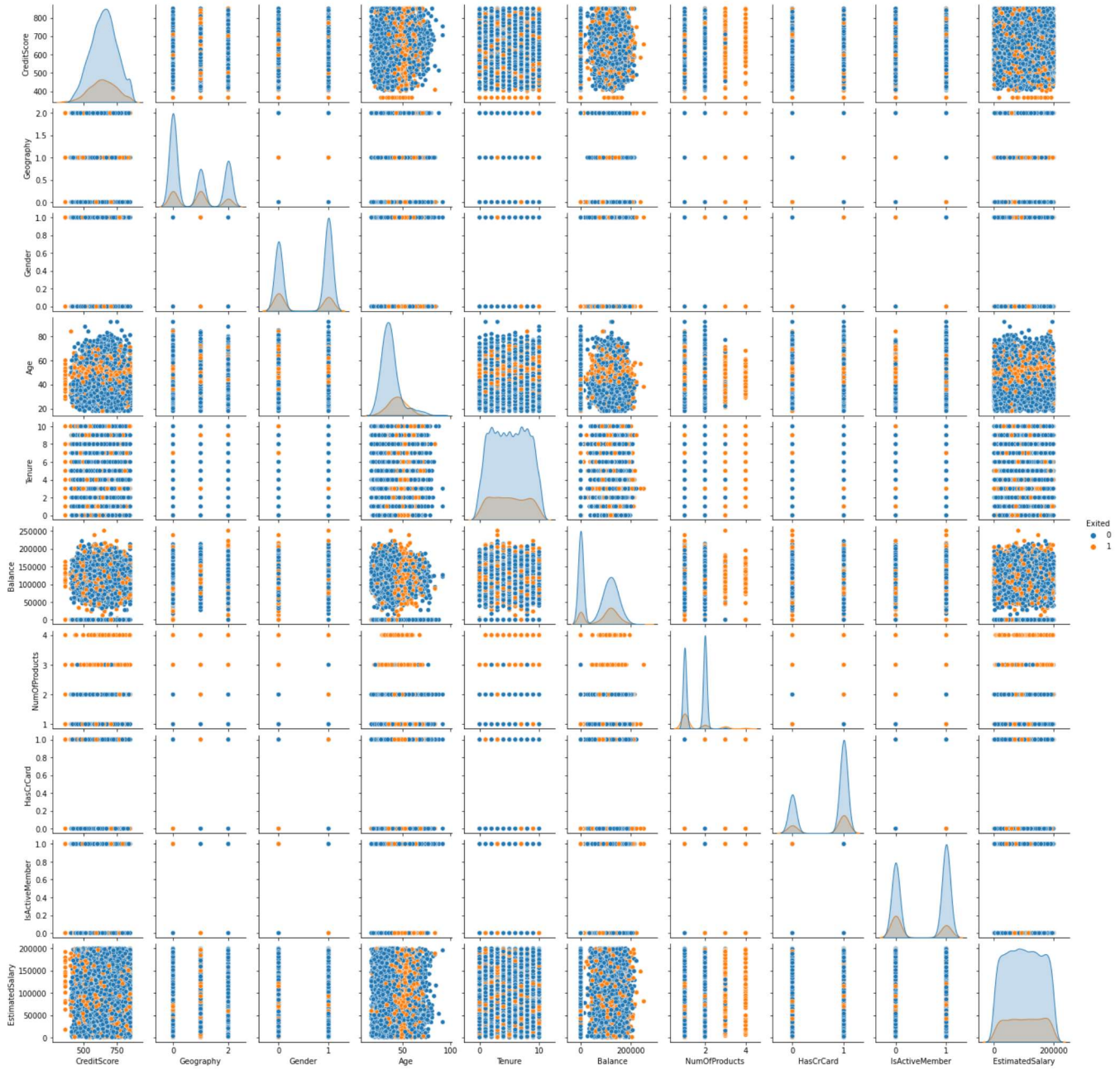
```
/usr/local/lib/python3.7/dist-packages/seaborn/axisgrid.py:337: UserWarning: The `size`
  warnings.warn(msg, UserWarning)
```



3.Multivariate

```
sns.pairplot(data, hue='Exited', height=2)
```

```
<seaborn.axisgrid.PairGrid at 0x7f4cb0b7f590>
```



Descriptive Analysis

```
data.describe()
```

	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCar
count	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.0000
mean	650.528800	38.921800	5.012800	76485.889288	1.530200	0.7055
std	96.653299	10.487806	2.892174	62397.405202	0.581654	0.4558
min	350.000000	18.000000	0.000000	0.000000	1.000000	0.0000
25%	584.000000	32.000000	3.000000	0.000000	1.000000	0.0000
50%	652.000000	37.000000	5.000000	97198.540000	1.000000	1.0000
75%	718.000000	44.000000	7.000000	127644.240000	2.000000	1.0000
max	850.000000	92.000000	10.000000	250898.090000	4.000000	1.0000

Handling Missing Values

Since there is no null values this task is skipped

```
data.isnull().sum()
```

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

Finding and Removing the Outliers

Outliers are found using the univariate BOXPLOT from Task 3

```
CreditsMedian = data.loc[data['CreditScore']<400, 'CreditScore'].median()
ProdMedian = data.loc[data['NumOfProducts']>=3.5,'NumOfProducts'].median()

data.loc[data.CreditScore < 400, 'CreditScore'] = np.nan
data.fillna(CreditsMedian,inplace=True)
```

```
data.loc[data.NumOfProducts > 3, 'NumOfProducts'] = np.nan
data.fillna(ProdMedian,inplace=True)
```

Label Encoding (Categorical)

```
labelencoder = LabelEncoder()
data['Geography']= labelencoder.fit_transform(data['Geography'])
data['Gender'] = labelencoder.fit_transform(data['Gender'])
```

Seperating Dependent and Independent Values

```
independent = data.iloc[:, :-1]
dependent = data.iloc[:,-1:]
```

Scaling the Independent Variables

```
nm =MinMaxScaler()
N_independent = nm.fit_transform(independent)
```

Spliting the Train and Test Data

```
xtrain,xtest,ytrain,ytest=train_test_split(N_independent,dependent,test_size=0.3)
print(xtrain,xtest,ytrain,ytest)
```

```
     [[0.23298969 0.         0.         ... 0.         1.         0.46664987]
      [0.37938144 0.5        1.         ... 1.         0.         0.54768615]
      [0.46391753 1.         0.         ... 0.         1.         0.9596951 ]
      ...
      [0.92371134 1.         1.         ... 0.         1.         0.57866316]
      [0.6        1.         1.         ... 1.         0.         0.6690774 ]
      [0.76082474 0.         0.         ... 1.         1.         0.06394436]] [[0.90103093 0
      [0.68453608 0.5        1.         ... 1.         1.         0.26787338]
      [0.69896907 0.5        0.         ... 1.         0.         0.85988047]
      ...
      [0.31546392 0.         1.         ... 0.         1.         0.81154255]
      [0.39793814 0.         0.         ... 1.         1.         0.71793711]
      [0.31134021 1.         0.         ... 0.         1.         0.56155148]]       Exited
     8242       1
     8063       0
     555        1
```