**Assignment -2**

Python Programming

| | |
|---|---|
| Assignment Date | 26 September 2022 |
| Student Name | Susila S |
| Student Roll Number | 820419106063 |
| Maximum Marks | 2 Marks |

**QuestionS**

**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**

In [ ]:

```
#import libraries
import pandas as pd
import numpy as np
```

In [ ]:

```
df=pd.read_csv("/content/drive/MyDrive/Colab Notebooks/Churn_Modelling.csv")
```

In [ ]:

```
df.head()
```

Out[16]:

| | RowNumber | CustomerId | Surname | CreditScore | Geography | Gender | Age | Tenure | Balanc |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 15634602 | Hargrave | 619 | France | Female | 42 | 2 | 0.0 |
| **1** | 2 | 15647311 | Hill | 608 | Spain | Female | 41 | 1 | 83807.8 |
| **2** | 3 | 15619304 | Onio | 502 | France | Female | 42 | 8 | 159660.8 |
| **3** | 4 | 15701354 | Boni | 699 | France | Female | 39 | 1 | 0.0 |
| **4** | 5 | 15737888 | Mitchell | 850 | Spain | Female | 43 | 2 | 125510.8 |

In [ ]:

```
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [ ]:

```
#univariate analysis
df[['CustomerId','Surname','CreditScore','Geography','Age','Tenure']].describe()
```

Out[17]:

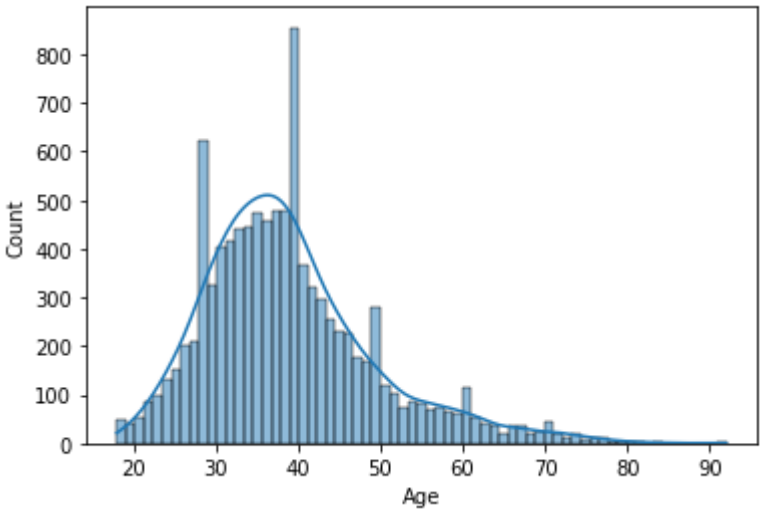
| | CustomerId | CreditScore | Age | Tenure |
|---|---|---|---|---|
| **count** | 1.000000e+04 | 10000.000000 | 10000.000000 | 10000.000000 |
| **mean** | 1.569094e+07 | 650.528800 | 38.921800 | 5.012800 |
| **std** | 7.193619e+04 | 96.653299 | 10.487806 | 2.892174 |
| **min** | 1.556570e+07 | 350.000000 | 18.000000 | 0.000000 |
| **25%** | 1.562853e+07 | 584.000000 | 32.000000 | 3.000000 |
| **50%** | 1.569074e+07 | 652.000000 | 37.000000 | 5.000000 |
| **75%** | 1.575323e+07 | 718.000000 | 44.000000 | 7.000000 |
| **max** | 1.581569e+07 | 850.000000 | 92.000000 | 10.000000 |

In [ ]:

```
sns.histplot(df.Age,kde=True)
```

Out[18]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fd927df2c90>
```



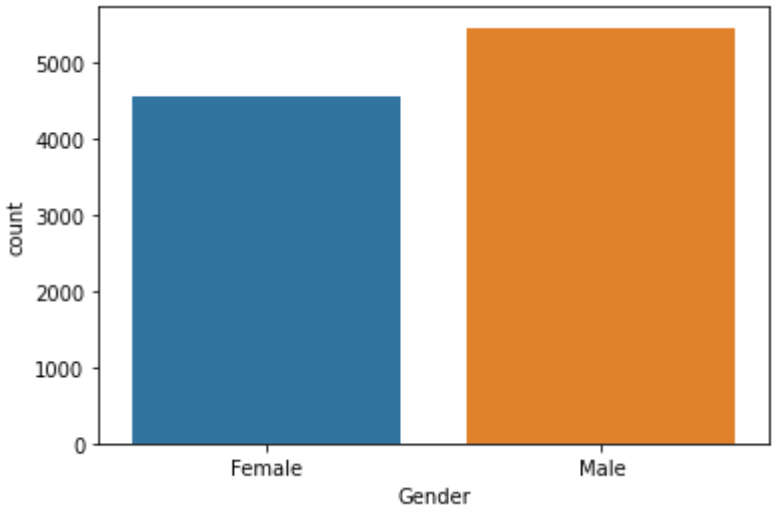

In [ ]:

```
#plot for the gender column
sns.countplot(df.Gender)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarn
ing: Pass the following variable as a keyword arg: x. From version 0.12, the
only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  FutureWarning
```

Out[19]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fd927a4f1d0>
```



In [ ]:

```
#Bivariate Analysis
df[['CustomerId','Surname','CreditScore','Geography','Gender','Age']].corr()
```

Out[20]:

| | CustomerId | CreditScore | Age |
|---|---|---|---|
| **CustomerId** | 1.000000 | 0.005308 | 0.009497 |
| **CreditScore** | 0.005308 | 1.000000 | -0.003965 |
| **Age** | 0.009497 | -0.003965 | 1.000000 |

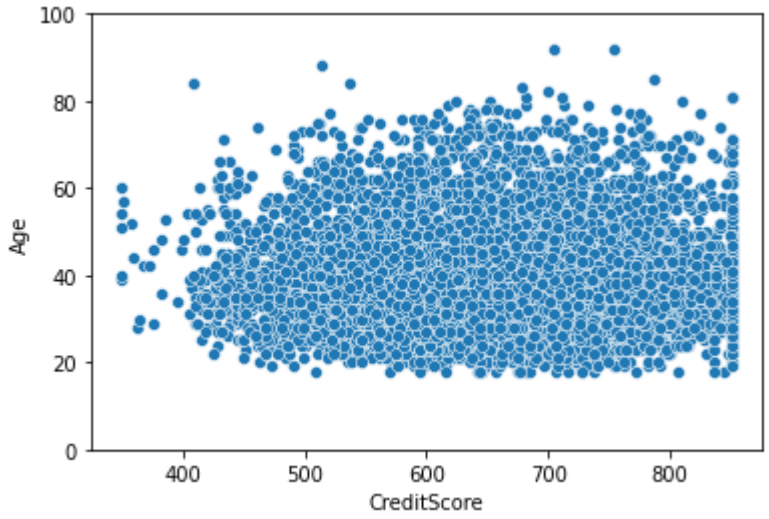
In [ ]:

```
sns.scatterplot(df.CreditScore,df.Age)
plt.ylim(0,100)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarn
ing: Pass the following variables as keyword args: x, y. From version 0.12,
the only valid positional argument will be `data`, and passing other argumen
ts without an explicit keyword will result in an error or misinterpretation.
  FutureWarning
```

Out[21]:

```
(0.0, 100.0)
```

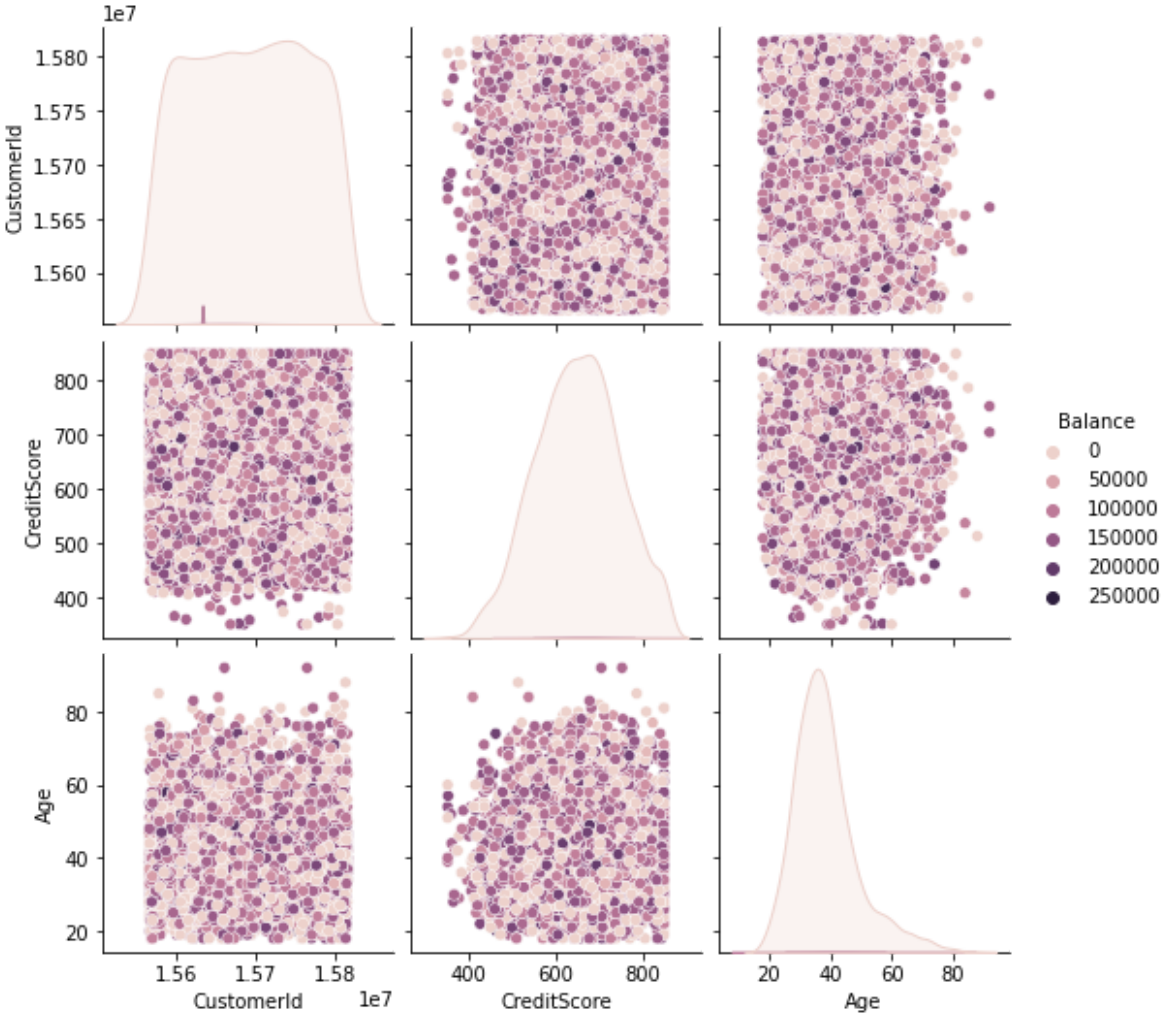


In [ ]:

```
#Multivariate Analysis
sns.pairplot(data=df[['CustomerId','Geography','Gender','CreditScore','Age','Balance']],hue
```

Out[22]:

```
<seaborn.axisgrid.PairGrid at 0x7fd927106990>
```



In [ ]:

```
data.describe()
```

Out[4]:

| | RowNumber | CustomerId | CreditScore | Age | Tenure | Balance | N |
|---|---|---|---|---|---|---|---|
| **count** | 10000.00000 | 1.000000e+04 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.000000 | |
| **mean** | 5000.50000 | 1.569094e+07 | 650.528800 | 38.921800 | 5.012800 | 76485.889288 | |
| **std** | 2886.89568 | 7.193619e+04 | 96.653299 | 10.487806 | 2.892174 | 62397.405202 | |
| **min** | 1.00000 | 1.556570e+07 | 350.000000 | 18.000000 | 0.000000 | 0.000000 | |
| **25%** | 2500.75000 | 1.562853e+07 | 584.000000 | 32.000000 | 3.000000 | 0.000000 | |
| **50%** | 5000.50000 | 1.569074e+07 | 652.000000 | 37.000000 | 5.000000 | 97198.540000 | |
| **75%** | 7500.25000 | 1.575323e+07 | 718.000000 | 44.000000 | 7.000000 | 127644.240000 | |
| **max** | 10000.00000 | 1.581569e+07 | 850.000000 | 92.000000 | 10.000000 | 250898.090000 | |

In [ ]:

```
#mode
df['Age'].mode()
```

Out[23]:

```
0    37
dtype: int64
```

In [ ]:

```
#calculation of the mean(for Age)
df['Age'].mean()
```

Out[24]:

```
38.9218
```

In [ ]:

```
#calculation of the mean and round the result(for Age)
round(df["Age"].mean(),2)
```

Out[25]:

```
38.92
```

In [ ]:

```
#calculation of the median(for Age)
df["Age"].median()
```

Out[26]:

```
37.0
```

In [ ]:

```
#check for missing values
data.isnull().sum()
```

Out[5]:

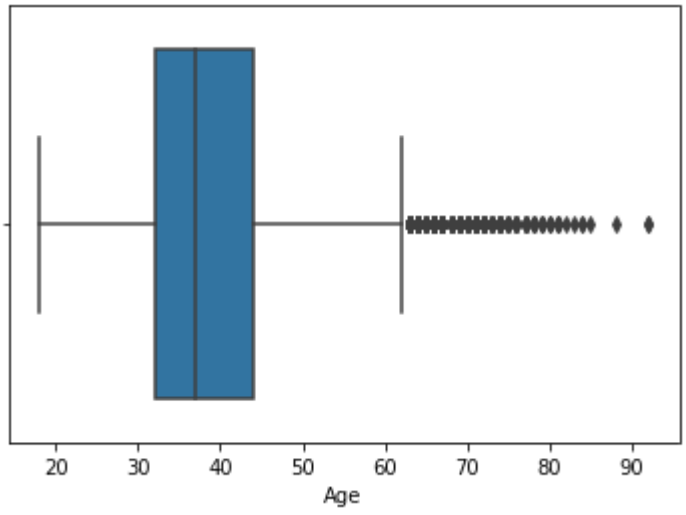
```
RowNumber          0
CustomerId         0
Surname            0
CreditScore        0
Geography          0
Gender             0
Age                0
Tenure             0
Balance            0
NumOfProducts      0
HasCrCard          0
IsActiveMember     0
EstimatedSalary    0
Exited             0
dtype: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

In [ ]:

```
#find the outliers and replace the outliers
import seaborn as sns
sns.boxplot(x=df['Age'])
```

Out[27]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fd922451290>
```

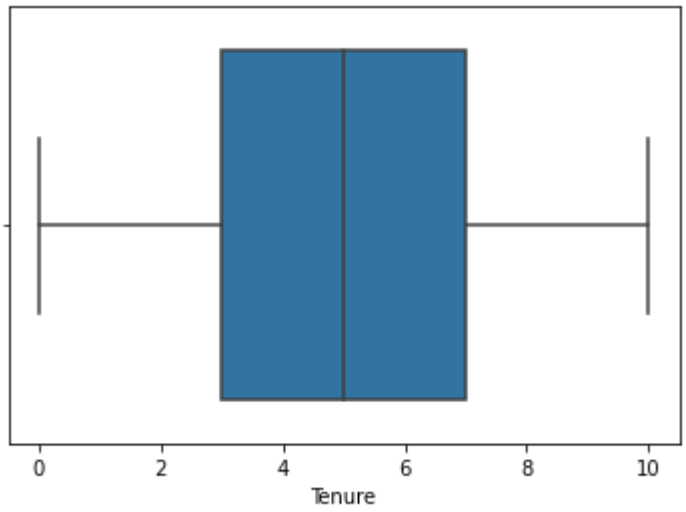


In [ ]:

```
sns.boxplot(x=df['Tenure'])
```

Out[28]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fd927106950>
```




In [ ]:

```
#encoding
from sklearn.preprocessing import LabelEncoder
```

In [ ]:

```
le=LabelEncoder()
```

In [ ]:

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

In [ ]:

```
data.head()
```

Out[11]:

| | RowNumber | CustomerId | Surname | CreditScore | Geography | Gender | Age | Tenure | Balanc |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 15634602 | Hargrave | 619 | 0 | 0 | 42 | 2 | 0.0 |
| **1** | 2 | 15647311 | Hill | 608 | 2 | 0 | 41 | 1 | 83807.8 |
| **2** | 3 | 15619304 | Onio | 502 | 0 | 0 | 42 | 8 | 159660.8 |
| **3** | 4 | 15701354 | Boni | 699 | 0 | 0 | 39 | 1 | 0.0 |
| **4** | 5 | 15737888 | Mitchell | 850 | 2 | 0 | 43 | 2 | 125510.8 |

In [ ]:

```
y=data['EstimatedSalary']
x=data.drop(columns=['EstimatedSalary'],axis=1)
```

In [ ]:

```
names=x.columns
```

In [ ]:

```
names
```

Out[17]:

```
Index(['RowNumber', 'CustomerId', 'Surname', 'CreditScore', 'Geography',
       'Gender', 'Age', 'Tenure', 'Balance', 'NumOfProducts', 'HasCrCard',
       'IsActiveMember', 'Exited'],
      dtype='object')
```

In [ ]:

```
#x -Independent
#y -Dependent
x=df.drop('Exited',axis=1)
y=df['Exited']
```

In [ ]:

```
x.head()
```

Out[42]:

| | RowNumber | CustomerId | Surname | CreditScore | Geography | Gender | Age | Tenure | Balanc |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | 15634602 | Hargrave | 619 | France | Female | 42 | 2 | 0.0 |
| **1** | 2 | 15647311 | Hill | 608 | Spain | Female | 41 | 1 | 83807.8 |
| **2** | 3 | 15619304 | Onio | 502 | France | Female | 42 | 8 | 159660.8 |
| **3** | 4 | 15701354 | Boni | 699 | France | Female | 39 | 1 | 0.0 |
| **4** | 5 | 15737888 | Mitchell | 850 | Spain | Female | 43 | 2 | 125510.8 |

In [ ]:

```
y.head()
```

Out[43]:

```
0    1
1    0
2    1
3    0
4    0
Name: Exited, dtype: int64
```

In [ ]:

```
#scale the independent variables
from sklearn import linear_model
from sklearn.preprocessing import StandardScaler
scale=StandardScaler()
```

In [ ]:

```
X=df[['Balance','Tenure']]
scaledX=scale.fit_transform(X)
print(scaledX)
```

```
[[-1.22584767 -1.04175968]
 [ 0.11735002 -1.38753759]
 [ 1.33305335  1.03290776]
 ...
 [-1.22584767  0.68712986]
 [-0.02260751 -0.69598177]
 [ 0.85996499 -0.35020386]]
```

In [ ]:

```
#splitting data into train and testing
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=0)
print('X Train shape:{},Y.Train shape:{}'.format(x_train.shape,y_train.shape))
print('X Test Shape:{},Y Test Shape{}'.format(x_test.shape,y_test.shape))
```

```
X Train shape:(8000, 13),Y.Train shape:(8000,)
X Test Shape:(2000, 13),Y Test Shape(2000,)
```