

## Assignment 2

Problem Statement:

**Real Time Communication System Powered By AI For Specially Abled**

Student Name	S.Akash
Student Roll Number	814719106007

Assignment 2: Download the Set and Load the Set



```
##### ASSIGNMENT 2 #####

In [ ]:

##### 1. DOWNLOADED THE DATASET #####

In [ ]:

##### 2. LOAD THE DATASET #####

In [1]:
import pandas as pd
import numpy as np

In [4]:
df = pd.read_csv('Churn_Modelling.csv')

In [5]:
df

Out[5]:
   RowNumber  CustomerId  Surname  CreditScore  Geography  Gender  Age  Tenure  Balance  NumOfProducts  HasCrCard  IsActiveMember  EstimatedSalary  Exited
0           0           1  15634602   Hargrave         France  Female  42      2      0.00              1           1           1           101348.88      1
1           1           2  15647311      Hill         Spain  Female  41      1   83807.86              1           0           1           112542.58      0
2           2           3  15619304     Onio         France  Female  42      8  159660.80              3           1           0           113931.57      1
3           3           4  15701354     Boni         France  Female  39      1      0.00              2           0           0           93826.63      0
4           4           5  15737888   Mitchell         Spain  Female  43      2  125510.82              1           1           1           79084.10      0
...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...
9995          9996  15606229   Obijaku         France  Male   39      5      0.00              2           1           0           96270.64      0
9996          9997  15609892  Johnstone         France  Male   35     10   57369.61              1           1           1           101699.77      0
9997          9998  15684532      Liu         France  Female  36      7      0.00              1           0           1           42085.58      1
9998          9999  15682355  Sabbatini         Germany  Male   42      3   75075.31              2           1           0           92888.52      1
9999         10000  15628319    Walker         France  Female  28      4  130142.79              1           1           0           38190.78      0

10000 rows x 14 columns

In [6]:
##### 3. PERFORM BELOW VISUALIZATIONS #####

In [7]:
##### UNIVARIATE #####

In [8]:
df['Age'].mean()

Out[8]:
38.9218

In [9]:
df['Balance'].median()

Out[9]:
97198.54080808081

In [10]:
##### BIVARIATE #####

In [11]:
import matplotlib.pyplot as plt
import seaborn as sns

In [13]:
sns.barplot(x = df['Exited'], y = df['Balance']);

In [14]:
##### MULTIVARIATE #####

In [15]:
sns.heatmap(df.corr());

In [16]:
sns.pairplot(df)

Out[16]:
<seaborn.axisgrid.PairGrid at 0x21c790207c0>

In [17]:
##### 4. PERFORM DESCRIPTIVE STATISTICS ON THE DATASET #####

In [18]:
df.describe()

Out[18]:
   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  10000.00000  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

In [19]:
##### 5. HANDLE THE MISSING VALUES #####

In [20]:
df.isnull().sum()

Out[20]:
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 [21]:
##### 6. FIND THE OUTLIERS AND REPLACE THE OUTLIERS #####

In [22]:
sns.boxplot(df['Age']);

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: 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 without an explicit keyword will result in an error or misinterpretation.
warnings.warn(

In [23]:
sns.boxplot(df['EstimatedSalary']);

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: 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 without an explicit keyword will result in an error or misinterpretation.
warnings.warn(

In [25]:
sns.boxplot(df['Balance']);

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: 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 without an explicit keyword will result in an error or misinterpretation.
warnings.warn(

Out[25]:
<AxesSubplot: xlabel='Balance'>

In [26]:
sns.boxplot(df['Tenure']);

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: 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 without an explicit keyword will result in an error or misinterpretation.
warnings.warn(

Out[26]:
<AxesSubplot: xlabel='Tenure'>

In [27]:
sns.boxplot(df['HasCrCard']);

C:\Users\Admin\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: 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 without an explicit keyword will result in an error or misinterpretation.
warnings.warn(

Out[27]:
<AxesSubplot: xlabel='HasCrCard'>

In [30]:
##### 7. CHECK FOR CATEGORICAL COLUMNS AND PERFORM ENCODING #####

In [31]:
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 14 columns):
#   Column  Non-Null Count  Dtype
---  -
0  RowNumber  10000 non-null  int64
1  CustomerId  10000 non-null  int64
2  Surname     10000 non-null  object
3  CreditScore  10000 non-null  int64
4  Geography   10000 non-null  object
5  Gender      10000 non-null  object
6  Age         10000 non-null  int64
7  Tenure      10000 non-null  int64
8  Balance     10000 non-null  float64
9  NumOfProducts  10000 non-null  int64
10 HasCrCard  10000 non-null  int64
11 IsActiveMember  10000 non-null  int64
12 EstimatedSalary  10000 non-null  float64
13 Exited     10000 non-null  int64
dtypes: float64(2), int64(9), object(3)
memory usage: 1.1+ MB

In [32]:
from sklearn.preprocessing import LabelEncoder

In [33]:
le = LabelEncoder()

In [34]:
df['Geography'] = le.fit_transform(df['Geography'])

In [35]:
df['CreditScore'] = le.fit_transform(df['CreditScore'])

In [36]:
df

Out[36]:
   RowNumber  CustomerId  Surname  CreditScore  Geography  Gender  Age  Tenure  Balance  NumOfProducts  HasCrCard  IsActiveMember  EstimatedSalary  Exited
0           0           1  15634602   Hargrave         France  Female  42      2      0.00              1           1           1           101348.88      1
1           1           2  15647311      Hill         Spain  Female  41      1   83807.86              1           0           1           112542.58      0
2           2           3  15619304     Onio         France  Female  42      8  159660.80              3           1           0           113931.57      1
3           3           4  15701354     Boni         France  Female  39      1      0.00              2           0           0           93826.63      0
4           4           5  15737888   Mitchell         Spain  Female  43      2  125510.82              1           1           1           79084.10      0
...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...
9995          9996  15606229   Obijaku         France  Male   39      5      0.00              2           1           0           96270.64      0
9996          9997  15609892  Johnstone         France  Male   35     10   57369.61              1           1           1           101699.77      0
9997          9998  15684532      Liu         France  Female  36      7      0.00              1           0           1           42085.58      1
9998          9999  15682355  Sabbatini         Germany  Male   42      3   75075.31              2           1           0           92888.52      1
9999         10000  15628319    Walker         France  Female  28      4  130142.79              1           1           0           38190.78      0

10000 rows x 14 columns

In [37]:
##### 8. SPLIT THE DATA INTO DEPENDENT AND INDEPENDENT VARIABLES #####

In [38]:
##### 10. SPLIT THE DATA INTO TRAINING AND TESTING #####

In [39]:
df.drop(columns = ['RowNumber'])

Out[39]:
   CustomerId  Surname  CreditScore  Geography  Gender  Age  Tenure  Balance  NumOfProducts  HasCrCard  IsActiveMember  EstimatedSalary  Exited
0           1  15634602   Hargrave         France  Female  42      2      0.00              1           1           1           101348.88      1
1           2  15647311      Hill         Spain  Female  41      1   83807.86              1           0           1           112542.58      0
2           3  15619304     Onio         France  Female  42      8  159660.80              3           1           0           113931.57      1
3           4  15701354     Boni         France  Female  39      1      0.00              2           0           0           93826.63      0
4           5  15737888   Mitchell         Spain  Female  43      2  125510.82              1           1           1           79084.10      0
...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...      ...
9995          9996  15606229   Obijaku         France  Male   39      5      0.00              2           1           0           96270.64      0
9996          9997  15609892  Johnstone         France  Male   35     10   57369.61              1           1           1           101699.77      0
9997          9998  15684532      Liu         France  Female  36      7      0.00              1           0           1           42085.58      1
9998          9999  15682355  Sabbatini         Germany  Male   42      3   75075.31              2           1           0           92888.52      1
9999          10000  15628319    Walker         France  Female  28      4  130142.79              1           1           0           38190.78      0

10000 rows x 13 columns

In [49]:
x = df.iloc[:, 0:13].values
y = df.iloc[:, 13:14].values

In [50]:
from sklearn.model_selection import train_test_split

In [51]:
xtrain, xtest, ytrain, ytest = train_test_split(x, y, test_size = 0.3, random_state = 0)

In [52]:
xtrain.shape, xtest.shape

Out[52]:
((7000, 13), (3000, 13))

In [40]:
##### 9. SCALE THE INDEPENDENT VARIABLES #####

In [41]:
from sklearn.preprocessing import MinMaxScaler
from sklearn.preprocessing import StandardScaler

In [42]:
n = MinMaxScaler()
s = StandardScaler()

In [43]:
x = df[['Age', 'Tenure']].values
y = df['Gender'].values

In [45]:
n_xtrain = n.fit_transform(xtrain)

In [ ]:
n_xtest = n.fit_transform(xtest)
```