Task 1 Download the dataset

The Churn_Modelling.csv dataset is downloaded

Task 2 Load the Dataset

```
import pandas as pd
import numpy as np
```

```
df = pd.read_csv('/content/Churn_Modelling.csv')
```

```
df
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	B
0	1	15634602	Hargrave	619	France	Female	42	2	
1	2	15647311	Hill	608	Spain	Female	41	1	83
2	3	15619304	Onio	502	France	Female	42	8	159
3	4	15701354	Boni	699	France	Female	39	1	
4	5	15737888	Mitchell	850	Spain	Female	43	2	125
...	...	...	...	...	...	...	...	...	
9995	9996	15606229	Obijiaku	771	France	Male	39	5	
9996	9997	15569892	Johnstone	516	France	Male	35	10	57
9997	9998	15584532	Liu	709	France	Female	36	7	
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	75
9999	10000	15628319	Walker	792	France	Female	28	4	130

10000 rows × 14 columns

Task 3 Perform Visualizations

Univariate Analysis

```
df['Age'].mean()
```

```
38.9218
```

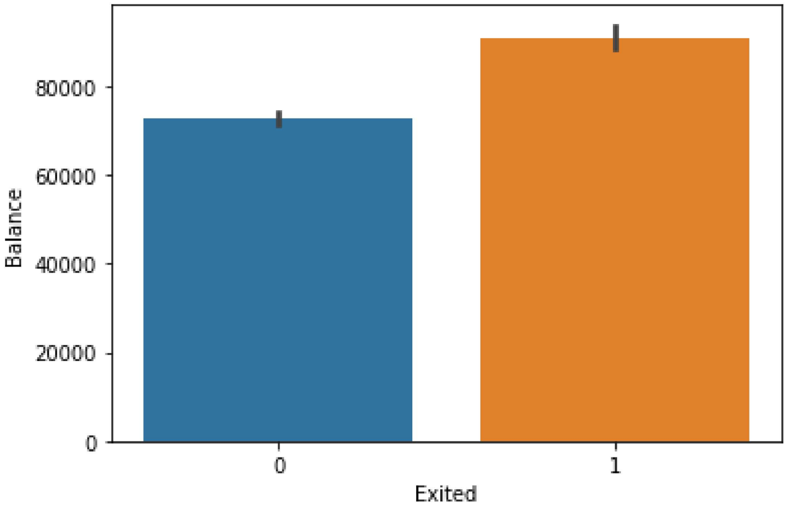
```
df['Balance'].median()
```

```
97198.54000000001
```

Bivariate Analysis

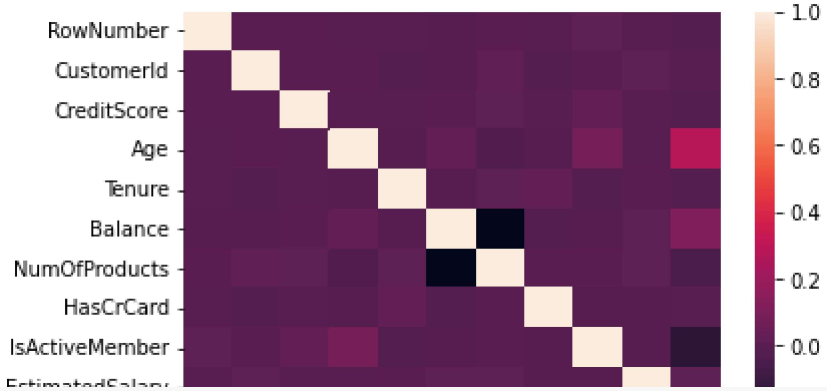
```
import matplotlib.pyplot as plt
import seaborn as sns
```

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



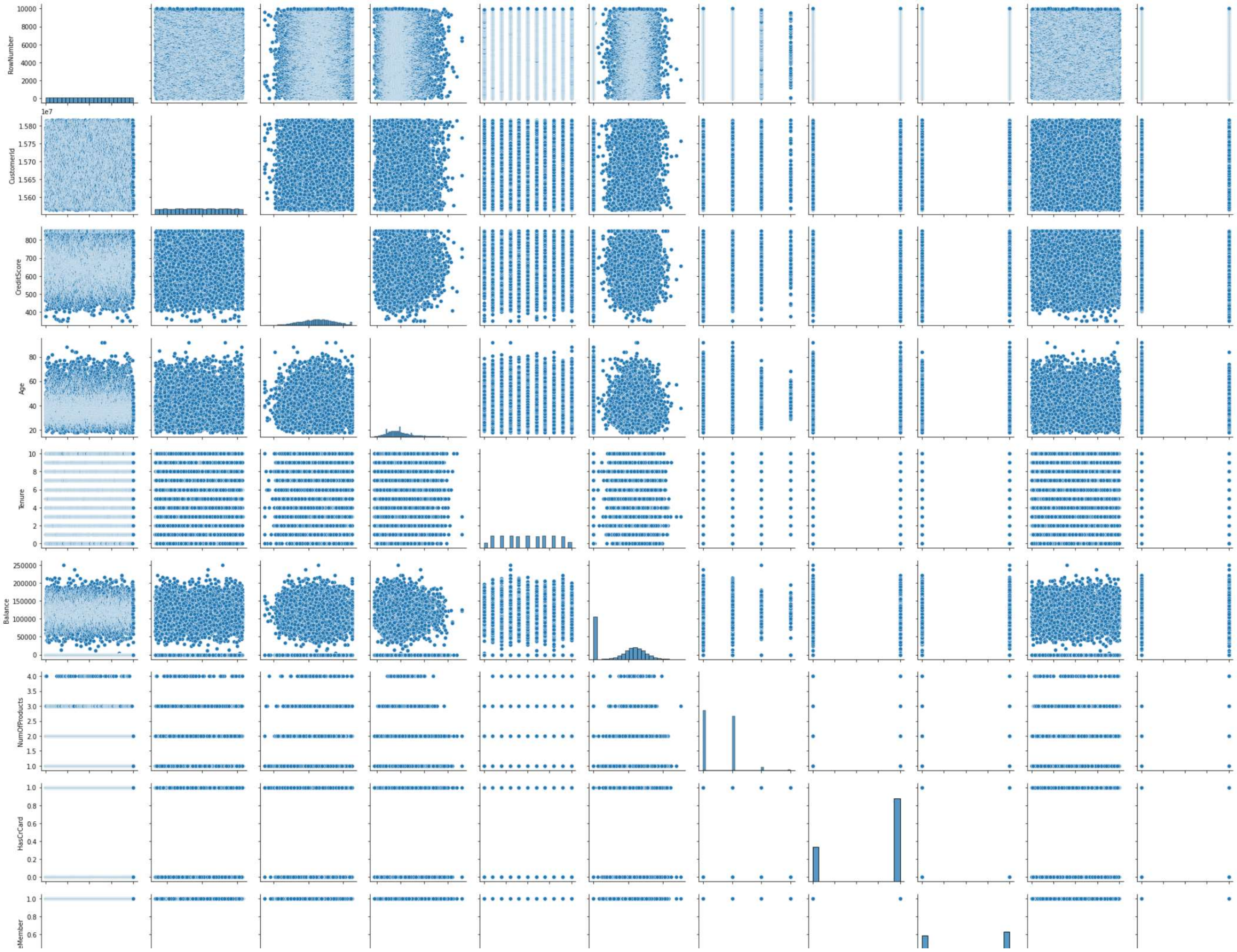
Multi Variate Analysis

```
sns.heatmap(df.corr());
```

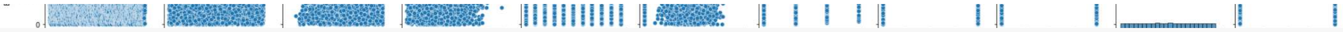


```
sns.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x7f544f833c50>
```



Task 4 Perform descriptive statistics on the dataset



```
df.describe()
```

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance
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

Task 5 Handle the Missing values

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

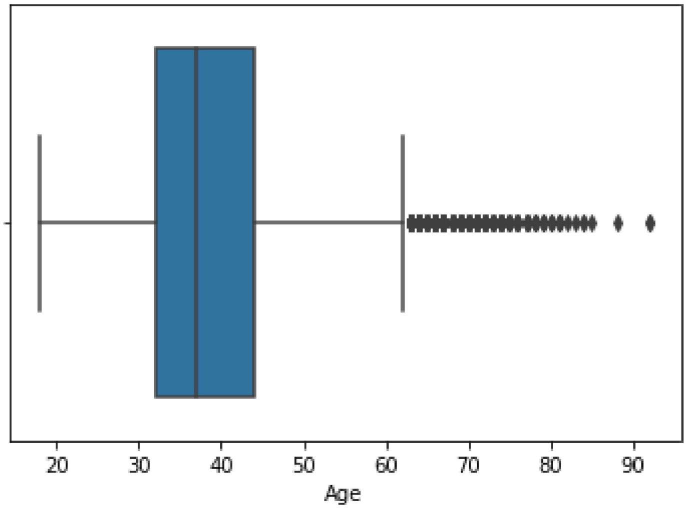
```
RowNumber          0
CustomerId         0
Surname            0
CreditScore        0
Geography          0
Gender             0
Age                0
Tenure             0
Balance            0
NumOfProducts      0
HasCrCard          0
IsActiveMember     0
EstimatedSalary    0
Exited             0
dtype: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

There are no null values present in the given dataset

Task 6 Find the outliers and replace the outliers

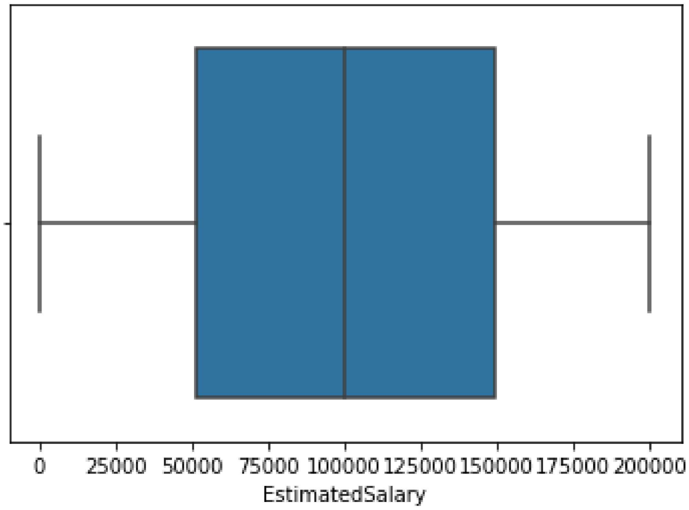
```
sns.boxplot(df['Age']);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass th
  FutureWarning
```



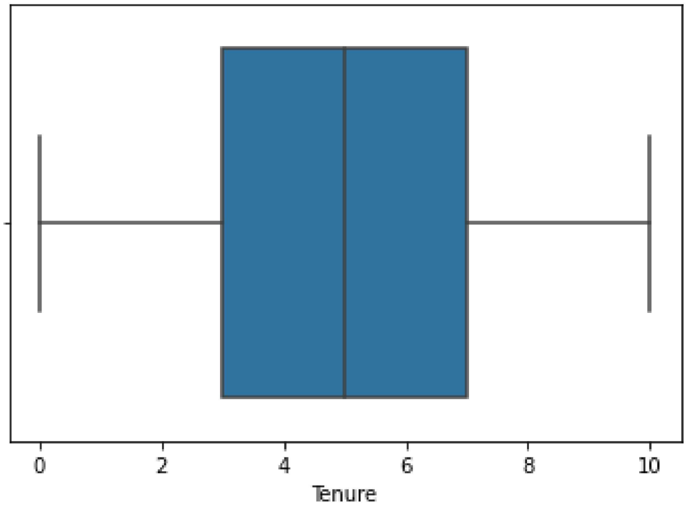
```
sns.boxplot(df['EstimatedSalary']);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass th
  FutureWarning
```



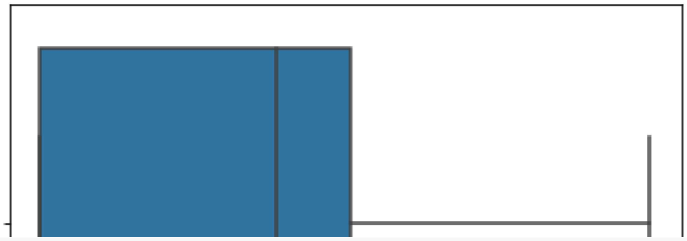
```
sns.boxplot(df['Tenure']);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass th
  FutureWarning
```



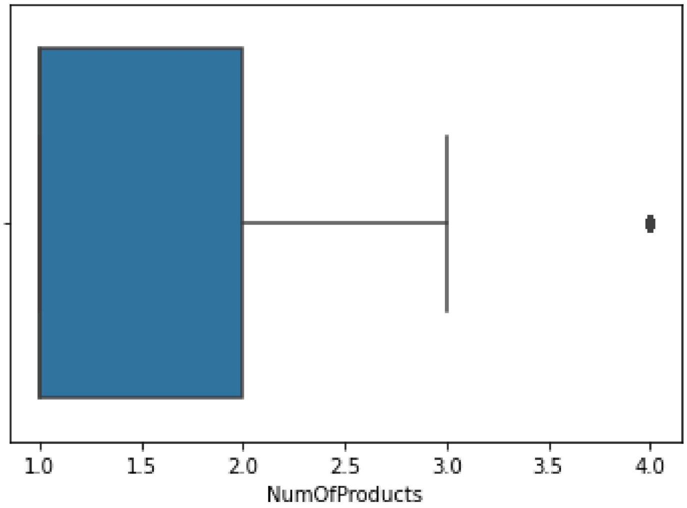
```
sns.boxplot(df['Balance']);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass th
  FutureWarning
```



```
sns.boxplot(df['NumOfProducts']);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass th
  FutureWarning
```



```
outliers=[]
def detect_outliers(data):
  threshold=3
  mean = np.mean(data)
  std =np.std(data)
  for i in data:
    z_score= (i - mean)/std
    if np.abs(z_score) > threshold:
      outliers.append(y)
      return outliers
outlier_pt=detect_outliers(df)
outlier_pt
```

Task 7 Check for Categorical columns and perform encoding

```
df.info() #There are few columns that are in obljects data type instead of int64 or float 64 t
```

```
<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
```

```
from sklearn.preprocessing import LabelEncoder
```

```
le = LabelEncoder()
```

```
df['Geography'] = le.fit_transform(df['Geography'])
```

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

```
df
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Ba
0	1	15634602	Hargrave	619	0	0	42	2	
1	2	15647311	Hill	608	2	0	41	1	83

Task 8 and Task 10 Split the data into dependent and independent variables

```
df.drop(columns = ['RowNumber'])
```

	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	Num
0	15634602	Hargrave	619	0	0	42	2	0.00	
1	15647311	Hill	608	2	0	41	1	83807.86	
2	15619304	Onio	502	0	0	42	8	159660.80	
3	15701354	Boni	699	0	0	39	1	0.00	
4	15737888	Mitchell	850	2	0	43	2	125510.82	
...	...	...	...	...	...	...	...	...	
9995	15606229	Obijiaku	771	0	1	39	5	0.00	
9996	15569892	Johnstone	516	0	1	35	10	57369.61	
9997	15584532	Liu	709	0	0	36	7	0.00	
9998	15682355	Sabbatini	772	1	1	42	3	75075.31	
9999	15628319	Walker	792	0	0	28	4	130142.79	

10000 rows × 13 columns

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

```
from sklearn.model_selection import train_test_split
```

```
xtrain , xtest , ytrain , ytest = train_test_split(x , y , test_size = 0.3 , random_state = 0
```

```
xtrain.shape , xtest.shape
```

```
((7000, 13), (3000, 13))
```

Task 9 Scale the independent variables

```
from sklearn.preprocessing import MinMaxScaler
from sklearn.preprocessing import StandardScaler
```

```
n = MinMaxScaler()
s = StandardScaler()
```

```
x = df[['Age', 'Tenure']].values
y = df['Gender'].values
```

```
n_xtrain = n.fit_transform(xtrain)
```

```
n_xtest = n.fit_transform(xtest)
```