Assignment -2

Assignment Date	26 September 2022
Student Name	Boomika V.G
Student Roll Number	621319106009
Maximum Marks	2 Marks

Question-1 Download the dataset:

Importing Libraries

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

Question-2 Load the dataset

Loading Dataset

```
ds=pd.read_csv('/content/Churn_Modelling (1).csv')
```
Python

```
ds.shape
```
Python

```
(10000, 14)
```

```
ds.head()
```
Python

Question-3 perform below visualization

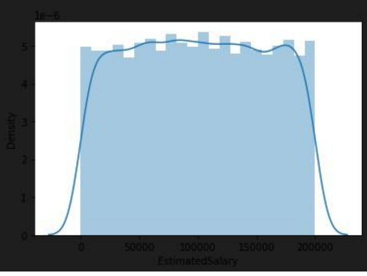
- **Univariate Analysis**

Univariate

```
sns.distplot(ds['EstimatedSalary'],hist=True)
```
Python

```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff8984ee950>
```

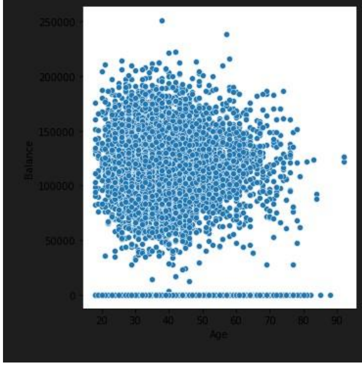


- **Bi-variate Analysis**

```
sns.relplot(x='Age',y='Balance',data=ds)
```

Python

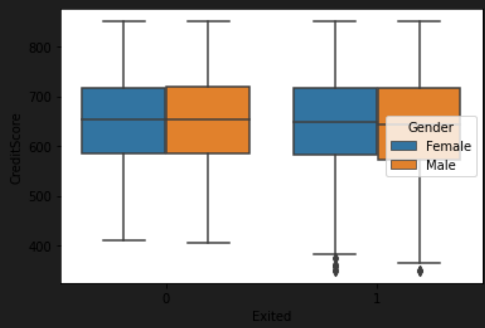
```
<seaborn.axisgrid.FacetGrid at 0x7ff8983e3bd0>
```



- **Multi-variate Analysis**

```
sns.boxplot(x='Exited',y='CreditScore',hue='Gender',data=ds)
```

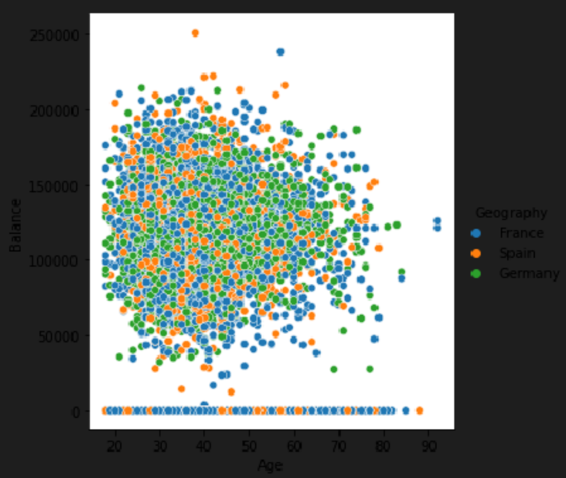
```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff893db1650>
```



Multivariate

```
sns.relplot(x='Age',y='Balance',hue='Geography',data=ds)
```

```
<seaborn.axisgrid.FacetGrid at 0x7ff897ebe810>
```



Question-4 perform descriptive statistics on the dataset.

```
ds.describe()
```

	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	10000.000000	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

Question-5 Handle the Missing values

```
ds.isnull().any()
```

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

```
ds.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
```

Question-6 Find the outliers and replace the outliers

```
ds.skew()
```

Python

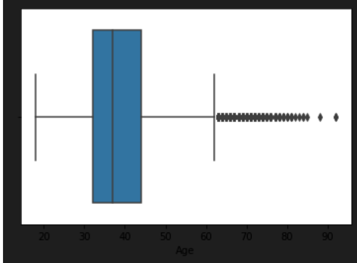
```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: FutureWarning: Dropping of nuisance columns in DataFrame reductions (with 'numeric_only=None') is deprecated; in a future version this will raise TypeError.  Select only valid columns before calling the reduction.
  """Entry point for launching an IPython kernel.

RowNumber          0.000000
CustomerId         0.001149
CreditScore       -0.071607
Age                1.011320
Tenure             0.010991
Balance           -0.141109
NumOfProducts      0.745568
HasCrCard         -0.901812
IsActiveMember    -0.060437
EstimatedSalary    0.002085
Exited             1.471611
dtype: float64
```

```
sns.boxplot(ds["Age"])
```

Python

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

```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff893caec90>
```



```
q0 = ds["Age"].describe()["25%"]
q1 = ds["Age"].describe()["75%"]
iqr=q1-q0
lb = q0 -(1.5*iqr)
ub = q1 + (1.5*iqr)
ds[ds["Age"]<lb]
ds[ds["Age"]>ub]
```

Python

```
#Replacing the outlier
outlier_list = list(ds[ds["Age"] > ub]["Age"])
```

Python

```
print(outlier_list)
```

Python

```
[66, 75, 65, 73, 65, 72, 67, 67, 79, 80, 68, 75, 66, 66, 70, 63, 72, 64, 64, 70, 67, 82, 63, 69, 65, 69, 64, 65, 74, 67, 66, 67, 63, 70, 71, 72, 67, 74, 76, 66,
63, 66, 68, 67, 63, 71, 66, 69, 73, 65, 66, 64, 69, 64, 77, 74, 65, 70, 67, 69, 67, 74, 69, 74, 74, 64, 63, 63, 70, 74, 65, 72, 77, 66, 65, 74, 88, 63, 71, 63,
64, 67, 70, 68, 72, 71, 66, 75, 67, 73, 69, 76, 63, 85, 67, 74, 76, 66, 69, 66, 72, 63, 71, 63, 74, 67, 72, 72, 66, 84, 71, 66, 63, 74, 69, 84, 67, 64, 68, 66,
77, 70, 67, 79, 67, 76, 73, 66, 67, 64, 73, 76, 72, 64, 71, 63, 70, 65, 66, 65, 80, 66, 63, 63, 63, 63, 66, 74, 69, 63, 64, 76, 75, 68, 69, 77, 64, 66, 74, 71,
67, 68, 64, 68, 70, 64, 75, 66, 64, 78, 65, 74, 64, 64, 71, 77, 79, 70, 81, 64, 68, 68, 63, 79, 66, 64, 70, 69, 71, 72, 66, 68, 63, 71, 72, 72, 64, 78, 75, 65,
65, 67, 63, 68, 71, 73, 64, 66, 71, 69, 71, 66, 76, 69, 73, 64, 64, 75, 73, 71, 72, 63, 67, 68, 73, 67, 64, 63, 92, 65, 75, 67, 71, 64, 66, 64, 66, 67, 77, 92,
67, 63, 66, 66, 68, 65, 72, 71, 76, 63, 67, 67, 66, 67, 63, 65, 70, 72, 77, 74, 72, 73, 77, 67, 71, 64, 72, 81, 76, 69, 68, 74, 64, 64, 71, 68, 63, 67, 63, 64,
76, 63, 63, 68, 67, 72, 70, 81, 67, 73, 66, 68, 71, 66, 63, 75, 69, 64, 69, 70, 71, 71, 66, 70, 63, 64, 65, 63, 67, 71, 67, 65, 66, 63, 73, 66, 64, 72, 71, 69,
67, 64, 81, 73, 63, 67, 74, 83, 69, 71, 78, 63, 70, 69, 72, 70, 63, 74, 80, 69, 72, 67, 76, 71, 67, 71, 78, 63, 63, 68, 64, 70, 78, 69, 68, 64, 64, 77, 77]
```

```
outlier_dict = {}.fromkeys(outlier_list,ub)
print(outlier_dict)
```

Python

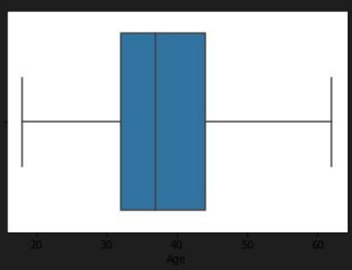
```
{66: 62.0, 75: 62.0, 65: 62.0, 73: 62.0, 72: 62.0, 67: 62.0, 79: 62.0, 80: 62.0, 68: 62.0, 70: 62.0, 63: 62.0, 64: 62.0, 82: 62.0, 69: 62.0, 74: 62.0, 71: 62.0,
76: 62.0, 77: 62.0, 88: 62.0, 85: 62.0, 84: 62.0, 78: 62.0, 81: 62.0, 92: 62.0, 83: 62.0}
```

```
ds["Age"] = ds["Age"].replace(outlier_dict)
sns.boxplot(ds["Age"])
```

Py

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

```
<matplotlib.axes._subplots.AxesSubplot at 0x7ff8987b26d0>
```



```
ds[ds["Age"]>ub]
```

Question -7 Check for Categorical columns and perform encoding.

Check for Categorical columns and perform encoding

```
from sklearn.compose import ColumnTransformer
from sklearn.preprocessing import OneHotEncoder
ct=ColumnTransformer([('oh',OneHotEncoder(),[1,2])],remainder='passthrough')
x=ct.fit_transform(x)
print(x.shape)
```

```
(10000, 13)
```

```
# saving the data
import joblib
joblib.dump(ct,"churnct.pkl")
```

```
['churnct.pkl']
```

Question-8 Split the data into dependent and independent variables.

```
x=ds.iloc[:,3:13].values
print(x.shape)
y=ds.iloc[:,13:14].values
print(y.shape)
```

```
(10000, 10)
(10000, 1)
```

Question-10 Split the data into training 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)
print(x_test.shape)
```

```
(8000, 13)
(2000, 13)
```

```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x_train=sc.fit_transform(x_train)
x_test=sc.transform(x_test)
joblib.dump(sc,"churnsc.pkl")
```

```
['churnsc.pkl']
```