Assignment -2

Data Visualization and Pre-processing

Assignment Date	17 October 2022
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Maximum Marks	2 Marks

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

Result Screenshots:

In [2]:
```
# Step - 1 : importing the required libraries
import pandas
import numpy
```

In [3]:
```
# Step - 2 : Loading the dataset
data_frame = pandas.read_csv(r"F:\Naalaiya Thiran\Churn_Modelling.csv")
```

In [4]:
```
data_frame
```

Out[4]:

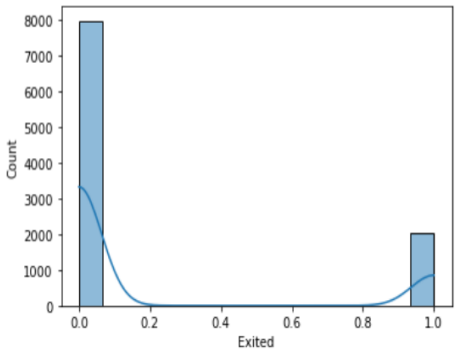
	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSa
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	10134
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	11254
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	11393
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	9382
4	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1	7908
...	...	...	...	...	...	...	...	...	...	...	...	...	...
9995	9996	15606229	Obijiaku	771	France	Male	39	5	0.00	2	1	0	9627
9996	9997	15569892	Johnstone	516	France	Male	35	10	57369.61	1	1	1	10169
9997	9998	15584532	Liu	709	France	Female	36	7	0.00	1	0	1	4208
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	75075.31	2	1	0	9288
9999	10000	15628319	Walker	792	France	Female	28	4	130142.79	1	1	0	3819

10000 rows × 14 columns

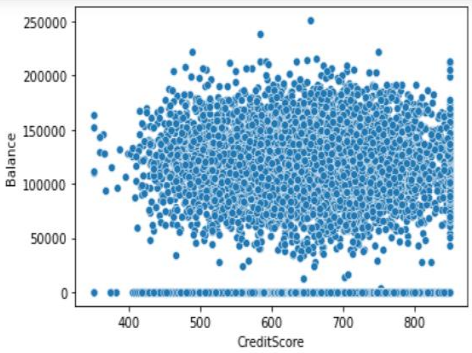
In [5]:
```
# Step - 3 : Visualizations
```

In [6]:
```
import seaborn
from matplotlib import pyplot
```

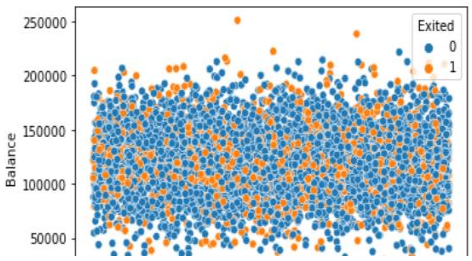
In [7]:
```
# Univariate Analysis
seaborn.histplot(data = data_frame['Exited'], kde = True)
pyplot.show()
```



In [8]:
```
# Bivariate Analysis
seaborn.scatterplot(data = data_frame, x = 'CreditScore', y = 'Balance')
pyplot.show()
```



In [11]:
```
# Multivariate analysis
seaborn.scatterplot(data = data_frame, x = 'EstimatedSalary', y = 'Balance', hue = 'Exited')
pyplot.show()
```



In [12]:
```
# Step - 4 : Handle missing values
data_frame.isnull().sum()
```

Out[12]:
```
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 [13]:
```
# Step - 5 : checking for categorical columns and performing encoding
data_frame.head(1)
```

Out[13]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	1	15634602	Hargrave	619	France	Female	42	2	0.0	1	1	1	101348.88

In [14]:
```
input_data = data_frame.iloc[:, 3:13]
result_data = data_frame.iloc[:, 13:14]
```

In [15]:
```
input_data
```

Out[15]:

	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	619	France	Female	42	2	0.00	1	1	1	101348.88
1	608	Spain	Female	41	1	83807.86	1	0	1	112542.58
2	502	France	Female	42	8	159660.80	3	1	0	113931.57
3	699	France	Female	39	1	0.00	2	0	0	93826.63
4	850	Spain	Female	43	2	125510.82	1	1	1	79084.10
...	...	...	...	...	...	...	...	...	...	...
9995	771	France	Male	39	5	0.00	2	1	0	96270.64
9996	516	France	Male	35	10	57369.61	1	1	1	101699.77
9997	709	France	Female	36	7	0.00	1	0	1	42085.58
9998	772	Germany	Male	42	3	75075.31	2	1	0	92888.52
9999	792	France	Female	28	4	130142.79	1	1	0	38190.78

10000 rows × 10 columns

In [16]:
```
result_data
```

Out[16]:

	Exited
0	1
1	0
2	1
3	0
4	0
...	...
9995	0
9996	0
9997	1
9998	1
9999	0

10000 rows × 1 columns

In [17]:
```
# converting dataframe into arrays
input_data = input_data.values
result_data = result_data.values
```

In [18]:
```
input_data
```

Out[18]:
```
array([[619, 'France', 'Female', ..., 1, 1, 101348.88],
       [608, 'Spain', 'Female', ..., 0, 1, 112542.58],
       [502, 'France', 'Female', ..., 1, 0, 113931.57],
       ...,
       [709, 'France', 'Female', ..., 0, 1, 42085.58],
       [772, 'Germany', 'Male', ..., 1, 0, 92888.52],
       [792, 'France', 'Female', ..., 1, 0, 38190.78]], dtype=object)
```

In [19]:
```
result_data
```

Out[19]:
```
array([[1],
       [0],
       [1],
       ...,
       [1],
       [1],
       [0]], dtype=int64)
```

In [20]:
```
# finding out unique categorical values
data_frame['Gender'].unique()
```

Out[20]:
```
array(['Female', 'Male'], dtype=object)
```

In [21]:
```
data_frame['Geography'].unique()
```

Out[21]:
```
array(['France', 'Spain', 'Germany'], dtype=object)
```

In [25]:
```
#Step-6: Applying encoding
```

In [22]:
```
from sklearn.preprocessing import OneHotEncoder
from sklearn.compose import ColumnTransformer
```

In [23]:
```
ct = ColumnTransformer([("oh",OneHotEncoder(),[1,2])],remainder = "passthrough")
input_data = ct.fit_transform(input_data)
```

In [26]:
```
input_data[0:10, 1:2]
```

Out[26]:
```
array([[0.0],
       [0.0],
       [0.0],
       [0.0],
       [0.0],
       [0.0],
       [0.0],
       [1.0],
       [0.0],
       [0.0]], dtype=object)
```

In [27]:
```
input_data.shape
```

Out[27]:
```
(10000, 13)
```

In [36]:
```
result_data.shape
```

Out[36]:
```
(10000, 1)
```

In [37]:
```
#Step-7: Splitting data into train and test data
```

In [29]:
```
from sklearn.model_selection import train_test_split
input_data_train,input_data_test,result_data_train,result_data_test = train_test_split(input_data,result_data,test_size = 0.3,ran
```

In [30]:
```
input_data_train
```

Out[30]:
```
array([[1.0, 0.0, 0.0, ..., 1, 1, 55796.83],
       [1.0, 0.0, 0.0, ..., 1, 0, 19823.02],
       [1.0, 0.0, 0.0, ..., 0, 1, 13848.58],
       ...,
       [1.0, 0.0, 0.0, ..., 1, 0, 181429.87],
       [0.0, 0.0, 1.0, ..., 1, 1, 148750.16],
       [0.0, 1.0, 0.0, ..., 1, 0, 118855.26]], dtype=object)
```

In [34]:
```
input_data_train.shape
```

Out[34]:
```
(7000, 13)
```

In [32]:
```
input_data_test
```

Out[32]:
```
array([[0.0, 1.0, 0.0, ..., 1, 1, 192852.67],
       [1.0, 0.0, 0.0, ..., 1, 0, 128702.1],
       [0.0, 0.0, 1.0, ..., 1, 1, 75732.25],
       ...,
       [1.0, 0.0, 0.0, ..., 1, 1, 167400.29],
       [1.0, 0.0, 0.0, ..., 1, 1, 70849.47],
       [0.0, 1.0, 0.0, ..., 1, 1, 33759.41]], dtype=object)
```

In [33]:
```
input_data_test.shape
```

Out[33]: (3000, 13)

In [38]:
```
result_data_train
```

Out[38]:
```
array([[1],
       [0],
       [0],
       ...,
       [0],
       [0],
       [1]], dtype=int64)
```

In [39]:
```
result_data_train.shape
```

Out[39]: (7000, 1)

In [40]:
```
result_data_test
```

Out[40]:
```
array([[0],
       [1],
       [0],
       ...,
       [0],
       [0],
       [1]], dtype=int64)
```

In [41]:
```
result_data_test.shape
```

Out[41]: (3000, 1)