Data Visualization and Pre-processing

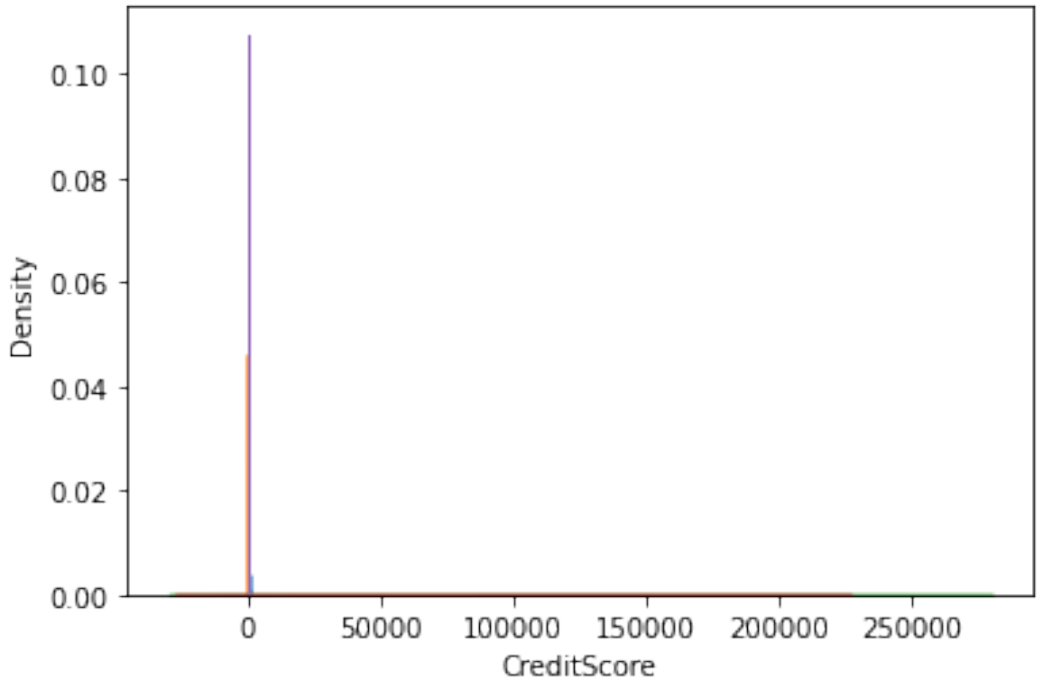
1. **Download the dataset: Dataset**
2. **Load the dataset**

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
data=pd.read_csv('/content/chrun_modelling.csv')
```

3.**Perform Below Visualizations**

```
sns.kdeplot(data['CreditScore'], shade=True)
sns.kdeplot(data['Age'], shade=True)
sns.kdeplot(data['Balance'], shade=True)
sns.kdeplot(data['EstimatedSalary'], shade=True)
sns.kdeplot(data['Tenure'], shade=True)
```

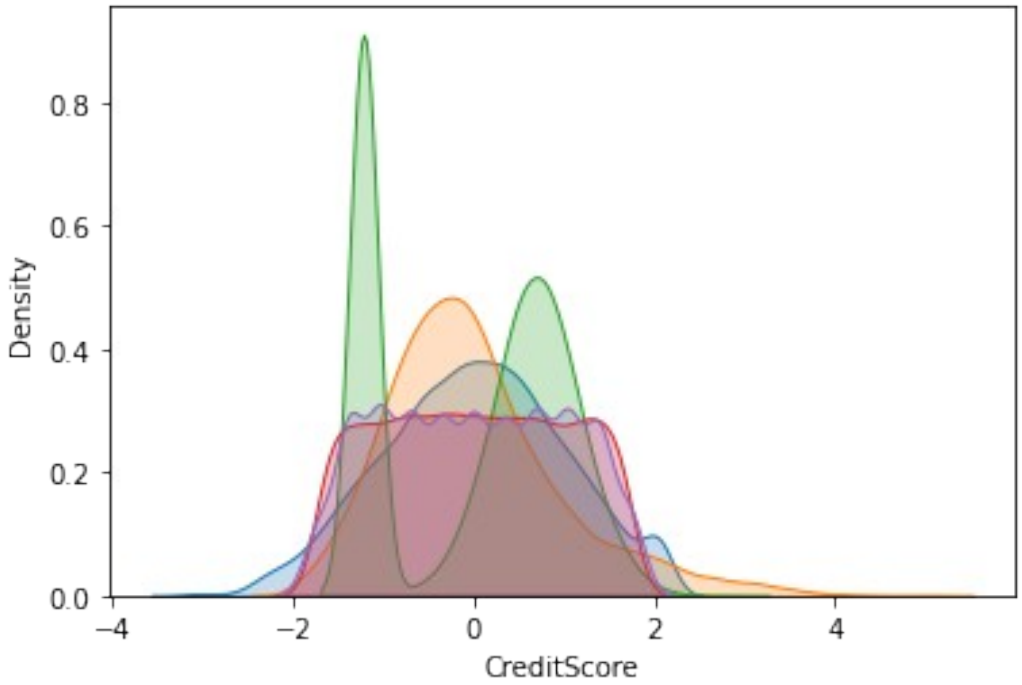
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc73ba72d90>
```




```
from sklearn.preprocessing import StandardScaler
stand= StandardScaler()
for column in
['CreditScore','Age','Balance','EstimatedSalary','Tenure']:
    data[column] = stand.fit_transform(data[column].values.reshape(-
1,1))
```

```
sns.kdeplot(data['CreditScore'], shade=True)
sns.kdeplot(data['Age'], shade=True)
sns.kdeplot(data['Balance'], shade=True)
sns.kdeplot(data['EstimatedSalary'], shade=True)
sns.kdeplot(data['Tenure'], shade=True)
```

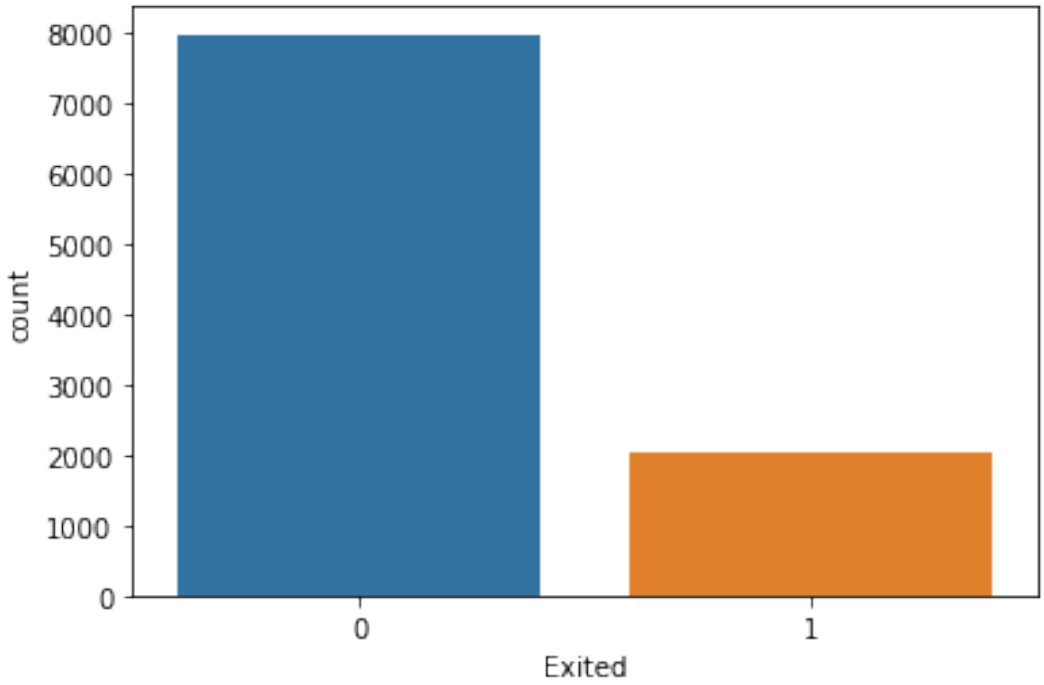
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc73b4a6fd0>
```




```
sns.countplot(data['Exited'])
```

```
/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 0x7fc73ac92950>
```



1. **Perform descriptive statistics on the dataset**

```
data.describe()
```

```
         RowNumber    CustomerId   CreditScore           Age
Tenure  \
count  10000.00000  1.000000e+04  1.000000e+04  1.000000e+04
1.000000e+04
mean    5000.50000  1.569094e+07 -4.824585e-16  2.318146e-16 -
1.078249e-16
std     2886.89568  7.193619e+04  1.000050e+00  1.000050e+00
1.000050e+00
min        1.00000  1.556570e+07 -3.109504e+00 -1.994969e+00 -
1.733315e+00
25%     2500.75000  1.562853e+07 -6.883586e-01 -6.600185e-01 -
6.959818e-01
50%     5000.50000  1.569074e+07  1.522218e-02 -1.832505e-01 -
4.425957e-03
75%     7500.25000  1.575323e+07  6.981094e-01  4.842246e-01
6.871299e-01
max    10000.00000  1.581569e+07  2.063884e+00  5.061197e+00
1.724464e+00

            Balance  NumOfProducts    HasCrCard  IsActiveMember  \
count  1.000000e+04   10000.000000  10000.00000    10000.000000
mean  -6.252776e-17       1.530200      0.70550        0.515100
std    1.000050e+00       0.581654      0.45584        0.499797
min   -1.225848e+00       1.000000      0.00000        0.000000
25%   -1.225848e+00       1.000000      0.00000        0.000000
50%    3.319639e-01       1.000000      1.00000        1.000000
```

```
75%    8.199205e-01       2.000000      1.00000        1.000000
max    2.795323e+00       4.000000      1.00000        1.000000

       EstimatedSalary        Exited
count     1.000000e+04  10000.000000
mean     -2.877698e-17      0.203700
std       1.000050e+00      0.402769
min      -1.740268e+00      0.000000
25%      -8.535935e-01      0.000000
50%       1.802807e-03      0.000000
75%       8.572431e-01      0.000000
max       1.737200e+00      1.000000
```

5 .**Handle the Missing values**

```
data.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
```

6.**Find the outliers and replace the outliers**

```
lowerlimit=data['Age'].quantile(0.05)
lowerlimit
data[data['Age']<lowerlimit]
upperlimit=data['Age'].quantile(0.95)
upperlimit
data[data['Age']<upperlimit]
data=data[(data['Age']>lowerlimit)&(data['Age']<upperlimit)]
data
```

```
      RowNumber  CustomerId    Surname  CreditScore Geography  Gender
Age  \
0             1    15634602   Hargrave          619    France  Female
42
1             2    15647311       Hill          608     Spain  Female
41
2             3    15619304       Onio          502    France  Female
```

```
42
3            4    15701354       Boni          699    France  Female
39
4            5    15737888   Mitchell          850     Spain  Female
43
...        ...         ...        ...          ...       ...     ...
...
9995      9996    15606229   Obijiaku          771    France    Male
39
9996      9997    15569892  Johnstone          516    France    Male
35
9997      9998    15584532        Liu          709    France  Female
36
9998      9999    15682355  Sabbatini          772   Germany    Male
42
9999     10000    15628319     Walker          792    France  Female
28

      Tenure    Balance  NumOfProducts  HasCrCard  IsActiveMember  \
0          2       0.00              1          1               1
1          1   83807.86              1          0               1
2          8  159660.80              3          1               0
3          1       0.00              2          0               0
4          2  125510.82              1          1               1
...      ...        ...            ...        ...             ...
9995       5       0.00              2          1               0
9996      10   57369.61              1          1               1
9997       7       0.00              1          0               1
9998       3   75075.31              2          1               0
9999       4  130142.79              1          1               0

      EstimatedSalary  Exited
0           101348.88       1
1           112542.58       0
2           113931.57       1
3            93826.63       0
4            79084.10       0
...               ...     ...
9995         96270.64       0
9996        101699.77       0
9997         42085.58       1
9998         92888.52       1
9999         38190.78       0

[8863 rows x 14 columns]
```

7.**Check for Categorical columns and perform encoding**

```
x = pd.get_dummies(x)

x.head()
```

```
   RowNumber  CustomerId  CreditScore       Age    Tenure   Balance  \
0          1    15634602    -0.326221  0.293517 -1.041760 -1.225848
1          2    15647311    -0.440036  0.198164 -1.387538  0.117350
2          3    15619304    -1.536794  0.293517  1.032908  1.333053
3          4    15701354     0.501521  0.007457 -1.387538 -1.225848
4          5    15737888     2.063884  0.388871 -1.041760  0.785728

   NumOfProducts  Surname_Abazu  Surname_Abbie  Surname_Abbott  ...  \
0              1              0              0               0  ...
1              1              0              0               0  ...
2              3              0              0               0  ...
3              2              0              0               0  ...
4              1              0              0               0  ...

   Surname_Zubarev  Surname_Zubareva  Surname_Zuev  Surname_Zuyev  \
0                0                 0             0              0
1                0                 0             0              0
2                0                 0             0              0
3                0                 0             0              0
4                0                 0             0              0

   Surname_Zuyeva  Geography_France  Geography_Germany
Geography_Spain  \
0               0                1                  0
0
1               0                0                  0
1
2               0                1                  0
0
3               0                1                  0
0
4               0                0                  0
1

   Gender_Female  Gender_Male
0              1            0
1              1            0
2              1            0
3              1            0
4              1            0

[5 rows x 2944 columns]
```

8.**Split the data into dependent and independent variables**

```
x = data.iloc[:,0:10]
y = data.iloc[:,10]

print(x.shape)
print(y.shape)
```

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

9.**Scale the independent variables**

```
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test=
train_test_split(x,y,test_size=0.25,random_state=0)
sc = StandardScaler()
x_train=sc.fit_transform(x_train)
x_test = sc.fit_transform(x_test)

x_train = pd.DataFrame(x_train)
x_train.head()
```

```
       0         1         2         3         4         5         6
\
0 -0.702176 -1.343330 -0.735507  0.015266  0.008860  0.673160
2.535034
1 -1.485722  1.558330  1.024427 -0.652609  0.008860 -1.207724
0.804242
2 -0.524522 -0.655156  0.808295 -0.461788  1.393293 -0.356937
0.804242
3 -1.167396  1.200594  0.396614 -0.080145  0.008860 -0.009356 -
0.926551
4 -1.451159  0.778798 -0.467915  1.255605  0.701077 -1.207724
0.804242

       7     8       9     ...      2934  2935      2936      2937
2938  \
0 -0.016332   0.0 -0.0231  ... -0.011548   0.0 -0.011548 -0.011548 -
0.016332
1 -0.016332   0.0 -0.0231  ... -0.011548   0.0 -0.011548 -0.011548 -
0.016332
2 -0.016332   0.0 -0.0231  ... -0.011548   0.0 -0.011548 -0.011548 -
0.016332
3 -0.016332   0.0 -0.0231  ... -0.011548   0.0 -0.011548 -0.011548 -
0.016332
4 -0.016332   0.0 -0.0231  ... -0.011548   0.0 -0.011548 -0.011548 -
0.016332

       2939      2940      2941      2942      2943
0 -1.015588  1.760216 -0.574682  1.087261 -1.087261
1  0.984651 -0.568112 -0.574682  1.087261 -1.087261
```

```
2 -1.015588 -0.568112  1.740094  1.087261 -1.087261
3 -1.015588 -0.568112  1.740094 -0.919743  0.919743
4  0.984651 -0.568112 -0.574682 -0.919743  0.919743

[5 rows x 2944 columns]
```

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=0.25,random_state=0)
print(' x_train.shape : ',x_train.shape)
print(' y_train.shape : ',y_train.shape)
print(' x_test.shape : ',x_test.shape)
print(' y_test.shape : ',y_test.shape)
```

```
 x_train.shape :  (7500, 10)
 y_train.shape :  (7500,)
 x_test.shape :  (2500, 10)
 y_test.shape :  (2500,)
```