# ASSIGNMENT 2

| | |
|---|---|
| **DATE** | **26 SEPTEMEBR 2022.** |
| **TEAM ID** | **PNT2022TMID38676.** |
| **PROJECT NAME** | **Exploratory Analysis of Rain Fall Data In India For Agriculture.** |
| **NAME** | **Aravind A (TM 3)** |

1.Download the dataset

2.Load the dataset

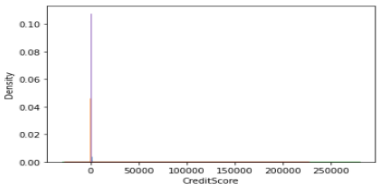
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plot
import seaborn as sns
data=pd.read_csv('Churn_Modelling.csv')
```

3. perform below visualization

- Univarient
- Bi-varient
- Multi-varient

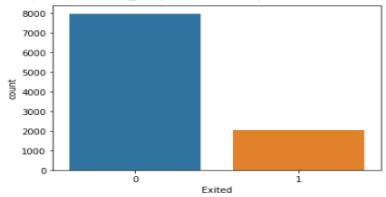
```
sns.kdeplot(data['CreditScore'], shade=True)
sns.kdeplot(data['Age'], shade=True)
sns.kdeplot(data['Balance'], shade=True)
sns.kdeplot(data['EstimatedSalary'], shade=True)
sns.kdeplot(data['Tenure'], shade=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f5bef0e5a50>
```




```
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 posit
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7f5beee59910>
```

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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 0x7f5bef089210>
```

## 4.Perform the descriptive statistics on the datase

```
data.describe()
```

| | RowNumber | CustomerId | CreditScore | Age | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember | EstimatedSalary | Exited |
|---|---|---|---|---|---|---|---|---|---|---|---|
| count | 10000.00000 | 1.000000e+04 | 1.000000e+04 | 1.000000e+04 | 1.000000e+04 | 1.000000e+04 | 10000.000000 | 10000.00000 | 10000.000000 | 1.000000e+04 | 10000.000000 |
| mean | 5000.50000 | 1.569094e+07 | -4.824585e-16 | 2.318146e-16 | -1.078249e-16 | -6.252776e-17 | 1.530200 | 0.70550 | 0.515100 | -2.877698e-17 | 0.203700 |
| std | 2886.89568 | 7.193619e+04 | 1.000050e+00 | 1.000050e+00 | 1.000050e+00 | 1.000050e+00 | 0.581654 | 0.45584 | 0.499797 | 1.000050e+00 | 0.402769 |
| min | 1.00000 | 1.556570e+07 | -3.109504e+00 | -1.994969e+00 | -1.733315e+00 | -1.225848e+00 | 1.000000 | 0.00000 | 0.000000 | -1.740268e+00 | 0.000000 |
| 25% | 2500.75000 | 1.562853e+07 | -6.883586e-01 | -6.600185e-01 | -6.959818e-01 | -1.225848e+00 | 1.000000 | 0.00000 | 0.000000 | -8.535935e-01 | 0.000000 |
| 50% | 5000.50000 | 1.569074e+07 | 1.522218e-02 | -1.832505e-01 | -4.425957e-03 | 3.319639e-01 | 1.000000 | 1.00000 | 1.000000 | 1.802807e-03 | 0.000000 |
| 75% | 7500.25000 | 1.575323e+07 | 6.981094e-01 | 4.842246e-01 | 6.871299e-01 | 8.199205e-01 | 2.000000 | 1.00000 | 1.000000 | 8.572431e-01 | 0.000000 |
| max | 10000.00000 | 1.581569e+07 | 2.063884e+00 | 5.061197e+00 | 1.724464e+00 | 2.795323e+00 | 4.000000 | 1.00000 | 1.000000 | 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 | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember | EstimatedSalary | Exited |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 15634602 | Hargrave | -0.326221 | France | Female | 0.293517 | -1.041760 | -1.225848 | 1 | 1 | 1 | 0.021886 | 1 |
| 1 | 2 | 15647311 | Hill | -0.440036 | Spain | Female | 0.198164 | -1.387538 | 0.117350 | 1 | 0 | 1 | 0.216534 | 0 |
| 2 | 3 | 15619304 | Onio | -1.536794 | France | Female | 0.293517 | 1.032908 | 1.333053 | 3 | 1 | 0 | 0.240687 | 1 |
| 3 | 4 | 15701354 | Boni | 0.501521 | France | Female | 0.007457 | -1.387538 | -1.225848 | 2 | 0 | 0 | -0.108918 | 0 |
| 4 | 5 | 15737888 | Mitchell | 2.063884 | Spain | Female | 0.388871 | -1.041760 | 0.785728 | 1 | 1 | 1 | -0.365276 | 0 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 9994 | 9995 | 15719294 | Wood | 1.546545 | France | Female | -0.946079 | -1.041760 | -1.225848 | 2 | 0 | 0 | 1.176945 | 0 |
| 9995 | 9996 | 15606229 | Obijiaku | 1.246488 | France | Male | 0.007457 | -0.004426 | -1.225848 | 2 | 1 | 0 | -0.066419 | 0 |
| 9996 | 9997 | 15569892 | Johnstone | -1.391939 | France | Male | -0.373958 | 1.724464 | -0.306379 | 1 | 1 | 1 | 0.027988 | 0 |
| 9997 | 9998 | 15584532 | Liu | 0.604988 | France | Female | -0.278604 | 0.687130 | -1.225848 | 1 | 0 | 1 | -1.008643 | 1 |

## 7.Check the categorical columns and perform encoding

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

x = pd.get_dummies (x)

x.head()
```

| | RowNumber | CustomerId | CreditScore | Age | Tenure | Balance | NumOfProducts | Surname_Abazu | Surname_Abbie | Surname_Abbott | ... | Surname_Zubarev | Surname_Zubareva | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 15634602 | -0.326221 | 0.293517 | -1.041760 | -1.225848 | 1 | 0 | 0 | 0 | ... | 0 | 0 | |
| 1 | 2 | 15647311 | -0.440036 | 0.198164 | -1.387538 | 0.117350 | 1 | 0 | 0 | 0 | ... | 0 | 0 | |
| 2 | 3 | 15619304 | -1.536794 | 0.293517 | 1.032908 | 1.333053 | 3 | 0 | 0 | 0 | ... | 0 | 0 | |
| 3 | 4 | 15701354 | 0.501521 | 0.007457 | -1.387538 | -1.225848 | 2 | 0 | 0 | 0 | ... | 0 | 0 | |
| 4 | 5 | 15737888 | 2.063884 | 0.388871 | -1.041760 | 0.785728 | 1 | 0 | 0 | 0 | ... | 0 | 0 | |

5 rows × 2556 columns

8.Split the dataset into ipdendent and dependent variables.

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

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

```
(7667, 10)
(7667,)
```

9.Scale the independent  variable

```
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 | 7 | 8 | 9 | ... | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | 0.145368 | 1.623398 | -0.037578 | -0.876820 | -0.349486 | -1.237505 | -0.902777 | -0.013189 | -0.013189 | -0.018653 | ... | -0.018653 | 0.0 | -0.013189 | 0.0 | -0.018653 | 1.004532 | -0.581768 |
| **1** | 1.122137 | 0.648053 | -0.825401 | 0.306681 | -0.004677 | -1.237505 | 0.803655 | -0.013189 | -0.013189 | -0.018653 | ... | -0.018653 | 0.0 | -0.013189 | 0.0 | -0.018653 | 1.004532 | -0.581768 |
| **2** | -0.150224 | 0.760613 | -0.815035 | 1.490183 | -1.039102 | -1.237505 | 0.803655 | -0.013189 | -0.013189 | -0.018653 | ... | -0.018653 | 0.0 | -0.013189 | 0.0 | -0.018653 | 1.004532 | -0.581768 |
| **3** | 1.427421 | 1.229470 | -0.555883 | -1.553107 | -0.004677 | -1.237505 | 0.803655 | -0.013189 | -0.013189 | -0.018653 | ... | -0.018653 | 0.0 | -0.013189 | 0.0 | -0.018653 | 1.004532 | -0.581768 |
| **4** | -0.532694 | 1.604978 | 0.988667 | -1.384035 | -1.383910 | 0.575863 | -0.902777 | -0.013189 | -0.013189 | -0.018653 | ... | -0.018653 | 0.0 | -0.013189 | 0.0 | -0.018653 | -0.995488 | -0.581768 |

5 rows × 2556 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 :  (5750, 2556)
y_train.shape :  (5750,)
x_test.shape :  (1917, 2556)
y_test.shape :  (1917,)
```