ASSIGNMENT - 2

Data Visualization and Pre - processing

| | |
|---|---|
| Assignment Date | 27 September 2022 |
| Student Name | Ansari.s |
| Student Roll Number | 420619104003 |
| Maximum marks | 2 Mark |

# 1.Download the dataset : Dataset

https://drive.google.com/file/d/160K6XcuYDyRBPGj-JsqThkyFoJhCvOWy/view?usp=sharing

# 2.Load the dataset.

```
In [2]: import numpy as np
        import pandas as pd
        import matplotlib.pyplot as plt
        import seaborn as sns

In [3]: df = pd.read_csv(r"E:\SB\Dataset\Churn_Modelling.csv")

In [4]: df
```

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 |

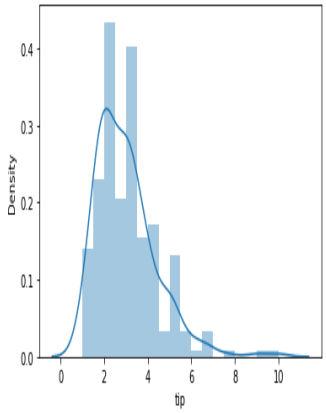
10000 rows × 14 columns

# 3. Perform Below Visualizations:

## * Univariate Analysis

```
sns.distplot(tips['tip'])
```

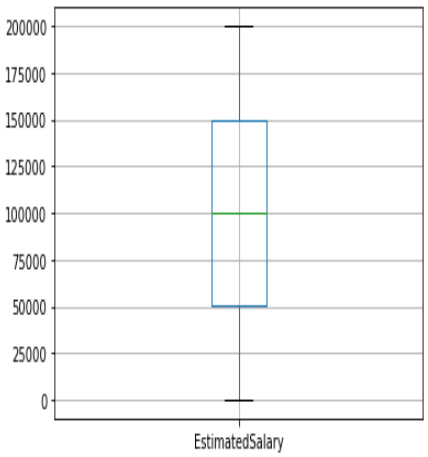
```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future version.
  warnings.warn(msg, FutureWarning)
<matplotlib.axes._subplots.AxesSubplot at 0x7f8cd4ef5310>
```




## * Bi - Variate Analysis

```
In [11]: df.boxplot(column="EstimatedSalary")
```

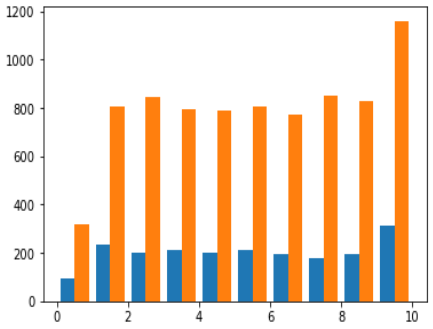
```
Out[11]: <AxesSubplot:>
```



# * Multi - Variate Analysis

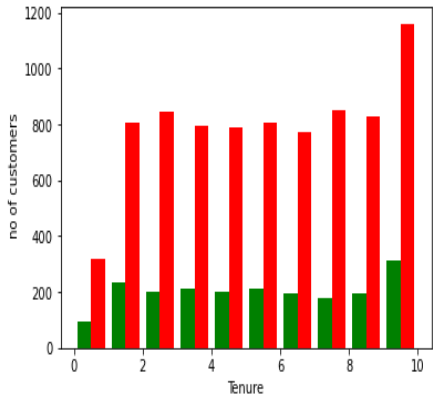
In [20]:
```
plt.hist([chrun_yes,chrun_no])
```

Out[20]:
```
(array([[  95.,  232.,  201.,  213.,  203.,  209.,  196.,  177.,  197.,
         314.],
        [ 318.,  803.,  847.,  796.,  786.,  803.,  771.,  851.,  828.,
        1160.]]),
 array([ 0.,  1.,  2.,  3.,  4.,  5.,  6.,  7.,  8.,  9., 10.]),
 <a list of 2 BarContainer objects>)
```




In [25]:
```
plt.hist([chrun_yes,chrun_no],color=["green","red"])
plt.xlabel("Tenure")
plt.ylabel(" no of customers")
```

Out[25]:
```
Text(0, 0.5, ' no of customers')
```



# 4. Perform descriptive statistics on the dataset

```
In [11]: df.describe()
```

Out[11]:

| | RowNumber | CustomerId | CreditScore | Age | Tenure | Balance | NumOfProducts | HasCrCard | IsActiveMember | EstimatedSalary | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| count | 10000.00000 | 1.000000e+04 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.000000 | 10000.00000 | 10000.000000 | 10000.000000 | 1( |
| mean | 5000.50000 | 1.569094e+07 | 650.528800 | 38.921800 | 5.012800 | 76485.889288 | 1.530200 | 0.70550 | 0.515100 | 100090.239881 | |
| std | 2886.89568 | 7.193619e+04 | 96.653299 | 10.487806 | 2.892174 | 62397.405202 | 0.581654 | 0.45584 | 0.499797 | 57510.492818 | |
| min | 1.00000 | 1.556570e+07 | 350.000000 | 18.000000 | 0.000000 | 0.000000 | 1.000000 | 0.00000 | 0.000000 | 11.580000 | |
| 25% | 2500.75000 | 1.562853e+07 | 584.000000 | 32.000000 | 3.000000 | 0.000000 | 1.000000 | 0.00000 | 0.000000 | 51002.110000 | |
| 50% | 5000.50000 | 1.569074e+07 | 652.000000 | 37.000000 | 5.000000 | 97198.540000 | 1.000000 | 1.00000 | 1.000000 | 100193.915000 | |
| 75% | 7500.25000 | 1.575323e+07 | 718.000000 | 44.000000 | 7.000000 | 127644.240000 | 2.000000 | 1.00000 | 1.000000 | 149388.247500 | |
| max | 10000.00000 | 1.581569e+07 | 850.000000 | 92.000000 | 10.000000 | 250898.090000 | 4.000000 | 1.00000 | 1.000000 | 199992.480000 | |

```
In [13]: df["RowNumber"].mean()
Out[13]: 5000.5

In [14]: df["EstimatedSalary"].median()
Out[14]: 100193.915

In [15]: df["Exited"].mode()
Out[15]: 0    0
         Name: Exited, dtype: int64
```

# 5. Handle the Missing values.

```
In [13]: df.isnull().any()
```

```
Out[13]: 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
```

```
In [14]: df.isnull().sum()
```

```
Out[14]: 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

```
In [16]: df.skew()
```

```
C:\Users\Rajii\AppData\Local\Temp\ipykernel_3520\1665899112.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.
  df.skew()
```

```
Out[16]: 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
```

# 7. Check for Categorical columns and perform encoding.

```
In [22]: df.dtypes
```

```
Out[22]: RowNumber            int64
         CustomerId           int64
         Surname             object
         CreditScore          int64
         Geography           object
         Gender              object
         Age                  int64
         Tenure               int64
         Balance            float64
         NumOfProducts        int64
         HasCrCard            int64
         IsActiveMember       int64
         EstimatedSalary    float64
         Exited               int64
         dtype: object
```

```
In [23]: df["Geography"].unique()
```

```
Out[23]: array(['France', 'Spain', 'Germany'], dtype=object)
```

```
In [24]: df["Gender"].unique()
```

```
Out[24]: array(['Female', 'Male'], dtype=object)
```

```
In [20]: from sklearn.compose import ColumnTransformer
```

```
In [21]: from sklearn.preprocessing import OneHotEncoder
```

```
In [22]: ct =  ColumnTransformer([("oh",OneHotEncoder(),[1,2])],remainder ="passthrough")
```

```
In [24]: x = ct.fit_transform(x)
```

```
In [25]: x.shape
```

```
Out[25]: (10000, 15)
```

# 8. Split the data into dependent and independent variables

```
In [17]: # dependent and indenpendent variables
```

```
In [18]: x = df.iloc[:,3:13].values
         y = df.iloc[:,13:14].values
```

```
In [19]: x.shape
```

```
Out[19]: (10000, 10)
```

```
In [20]: y.shape
```

```
Out[20]: (10000, 1)
```

## 9. Scale the independent variables

```
In [16]: y = df.iloc[:,13:14].values

In [19]: y.shape

Out[19]: (10000, 1)
```

## 10. Split the data into training and testing

```
In [27]: from sklearn.model_selection import train_test_split

In [28]: x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.2,random_state=0)

In [29]: x_test.shape

Out[29]: (2000, 15)

In [30]: x_train.shape

Out[30]: (8000, 15)
```