

ASSIGNMENT - 2

Data Visualization and Pre - processing

Assignment Date	27 September 2022
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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	EstimatedSalary
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	Obijaku	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

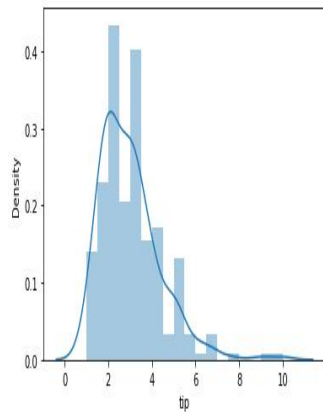
10000 rows x 14 columns

3. Perform Below Visualizations:

* Univariate Analysis

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

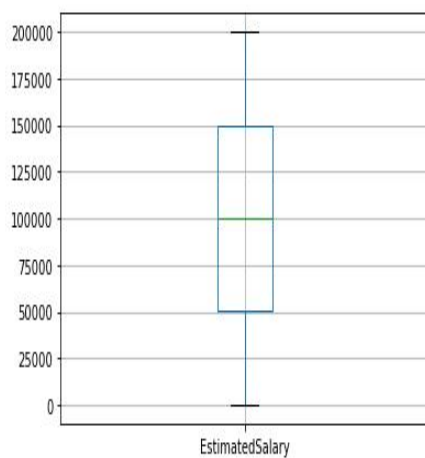
```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: 'distplot' is a deprecated function and will be removed in a future version.  
warnings.warn(msg, FutureWarning)  
<matplotlib.axes._subplots.AxesSubplot at 0x7f8cd4ef5310>
```



* Bi - Variate Analysis

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

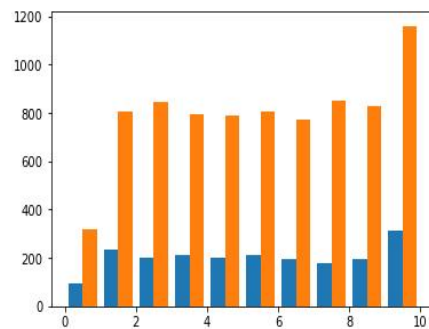
```
Out[11]: <AxesSubplot:>
```



* Multi - Variate Analysis

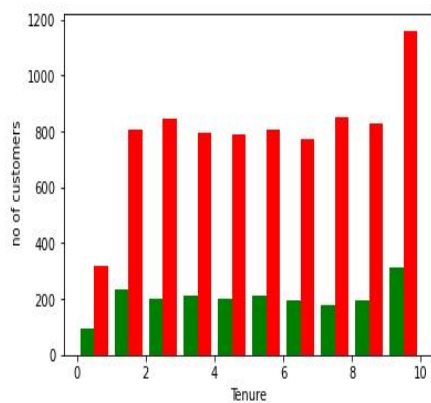
```
In [20]: plt.hist([chrun_yes,chrun_no])
```

```
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	10000.000000	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
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 independent 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)
```