1.importing Required package

```
import pandas as pd
import seaborn as sns
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
```

2.Loading the Data

```
df = pd.read_csv("/content/Churn_Modelling.csv")
df
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure
0	1	15634602	Hargrave	619	France	Female	42	2
1	2	15647311	Hill	608	Spain	Female	41	1
2	3	15619304	Onio	502	France	Female	42	8
3	4	15701354	Boni	699	France	Female	39	1
4	5	15737888	Mitchell	850	Spain	Female	43	2
...	...	...	...	...	...	...	...	...
9995	9996	15606229	Obijiaku	771	France	Male	39	5
9996	9997	15569892	Johnstone	516	France	Male	35	10
9997	9998	15584532	Liu	709	France	Female	36	7
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3
9999	10000	15628319	Walker	792	France	Female	28	4

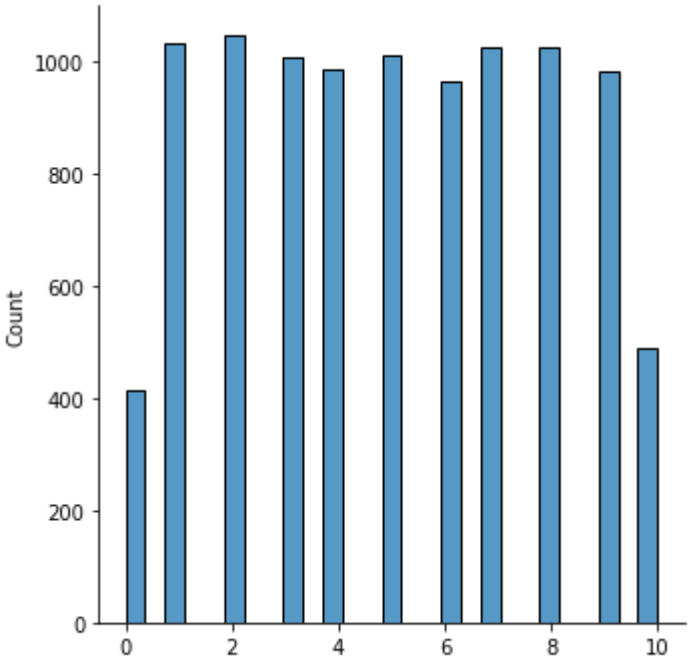
10000 rows × 14 columns

3.visualizations

3.1 Univariate Analysis

```
sns.displot(df.Tenure)
```

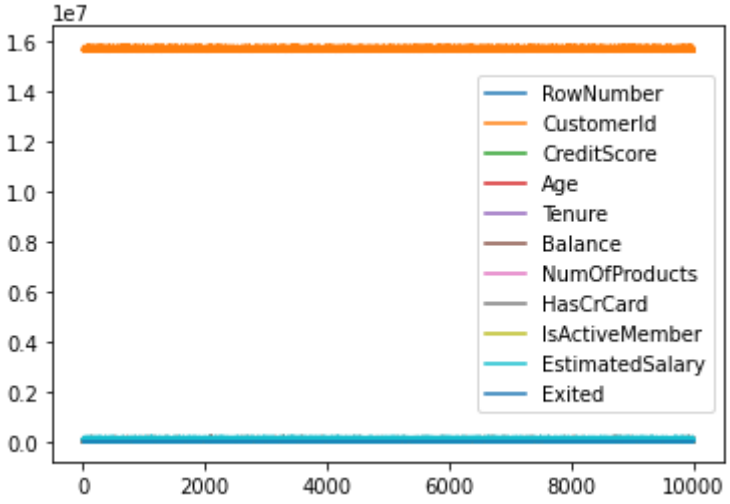
```
<seaborn.axisgrid.FacetGrid at 0x7f37c0bdabd0>
```



3.2 Bi-variate Analysis

```
df.plot.line()
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f37bc8bcd10>
```



3.3Multi-variate Analysis

```
sns.lmplot("Age","NumOfProducts",df,hue="NumOfProducts", fit_reg=False);
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pas
  FutureWarning
```

4.Perform descriptive statistics on the dataset

```
df.describe()
```

	RowNumber	CustomerId	CreditScore	Age	Tenure	Bala
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090

5. Handle the Missing values

```
data = pd.read_csv("/content/Churn_Modelling.csv")
pd.isnull (data["Gender"])
```

```
0       False
1       False
2       False
3       False
4       False
        ...
9995    False
9996    False
9997    False
9998    False
```

```
9999    False
Name: Gender, Length: 10000, dtype: bool
```

6.Find the outliers and replace the outliers

```
df["Tenure"] = np.where(df["Tenure"] >10, np.median,df["Tenure"])
df["Tenure"]
```

```
0        2
1        1
2        8
3        1
4        2
        ..
9995     5
9996    10
9997     7
9998     3
9999     4
Name: Tenure, Length: 10000, dtype: object
```

7.check For Categorical columns and perform encoding

```
pd.get_dummies(df, columns=["Gender", "Age"], prefix=["Age", "Gender"]).head()
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Tenure	Balance	NumOfP
0	1	15634602	Hargrave	619	France	2	0.00	
1	2	15647311	Hill	608	Spain	1	83807.86	
2	3	15619304	Onio	502	France	8	159660.80	
3	4	15701354	Boni	699	France	1	0.00	
4	5	15737888	Mitchell	850	Spain	2	125510.82	

5 rows × 84 columns

8.Split the data into dependent and independent variables

8.1 split the data into independent variables

```
X = df.iloc[:, :-2].values
print(X)
```

```
[[1 15634602 'Hargrave' ... 1 1 1]
 [2 15647311 'Hill' ... 1 0 1]
 [3 15619304 'Onio' ... 3 1 0]
 ...
 [9998 15584532 'Liu' ... 1 0 1]
```

```
 [9999 15682355 'Sabbatini' ... 2 1 0]
 [10000 15628319 'Walker' ... 1 1 0]]
```

8.Split the data into Dependent variables

```
Y = df.iloc[:, -1].values
print(Y)
```

```
[1 0 1 ... 1 1 0]
```

9. Scale the independent variables

```
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
Scaler = MinMaxScaler()
df[["RowNumber"]] = Scaler.fit_transform(df[["RowNumber"]])
print(df)
```

```
      RowNumber  CustomerId    Surname  CreditScore Geography  Gender  Age  \
0        0.0000    15634602   Hargrave          619    France  Female   42
1        0.0001    15647311       Hill          608     Spain  Female   41
2        0.0002    15619304       Onio          502    France  Female   42
3        0.0003    15701354       Boni          699    France  Female   39
4        0.0004    15737888   Mitchell          850     Spain  Female   43
...         ...         ...        ...          ...       ...     ...  ...
9995     0.9996    15606229   Obijiaku          771    France    Male   39
9996     0.9997    15569892  Johnstone          516    France    Male   35
9997     0.9998    15584532        Liu          709    France  Female   36
9998     0.9999    15682355  Sabbatini          772   Germany    Male   42
9999     1.0000    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

[10000 rows x 14 columns]
```

10. Split the data into training and testing

```
from sklearn.model_selection import train_test_split
train_size=0.8
X = df.drop(columns = ['Tenure']).copy()
y = df['Tenure']
X_train, X_rem, y_train, y_rem = train_test_split(X,y, train_size=0.8)
test_size = 0.5
X_valid, X_test, y_valid, y_test = train_test_split(X_rem,y_rem, test_size=0.5)
print(X_train.shape), print(y_train.shape)
print(X_valid.shape), print(y_valid.shape)
print(X_test.shape), print(y_test.shape)
```

```
(8000, 13)
(8000,)
(1000, 13)
(1000,)
(1000, 13)
(1000,)
(None, None)
```

_

✓ 0s completed at 1:42 PM