1.DOWNLOAD THE DATASET

```
import pandas as pd
import numpy as np
```

1. LOAD THE DATASET

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

```
df.head()
```

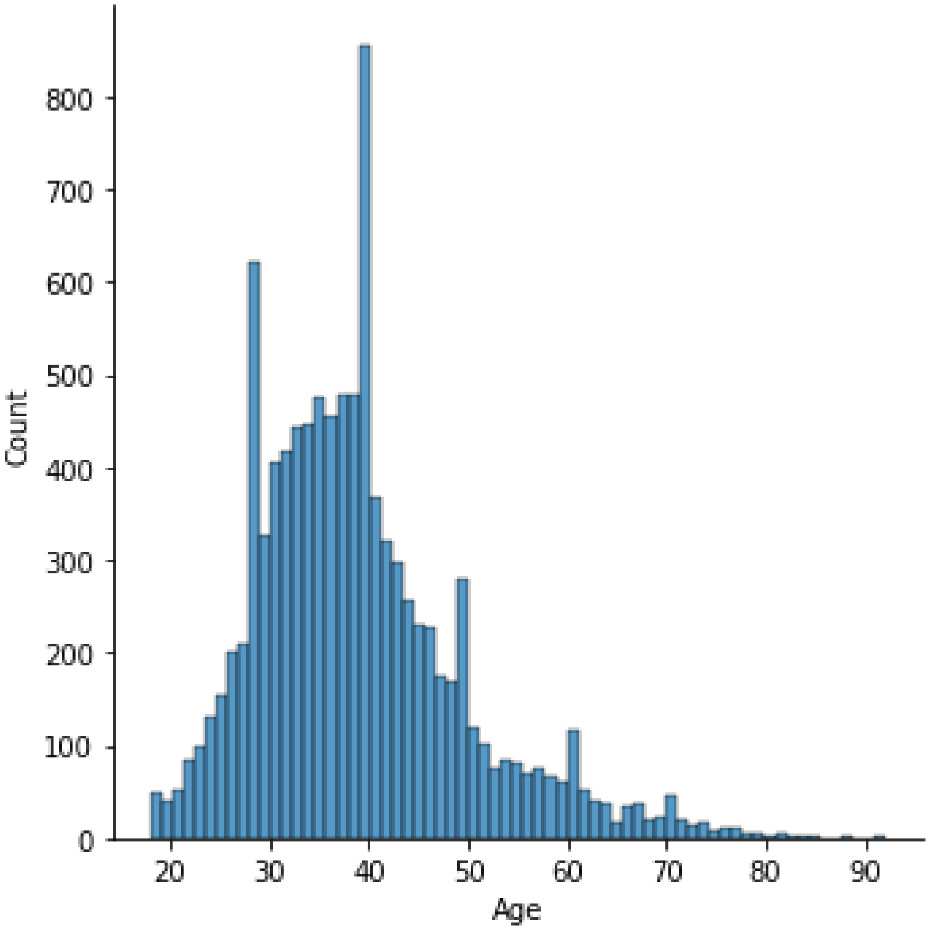
```
   RowNumber  CustomerId   Surname  CreditScore Geography  Gender  Age
\
0          1    15634602  Hargrave          619    France  Female   42

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


   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

   EstimatedSalary  Exited
0        101348.88       1
1        112542.58       0
2        113931.57       1
3         93826.63       0
4         79084.10       0
```

3.VISUALIZATION

```
import matplotlib.pyplot as plt
import seaborn as sns
```

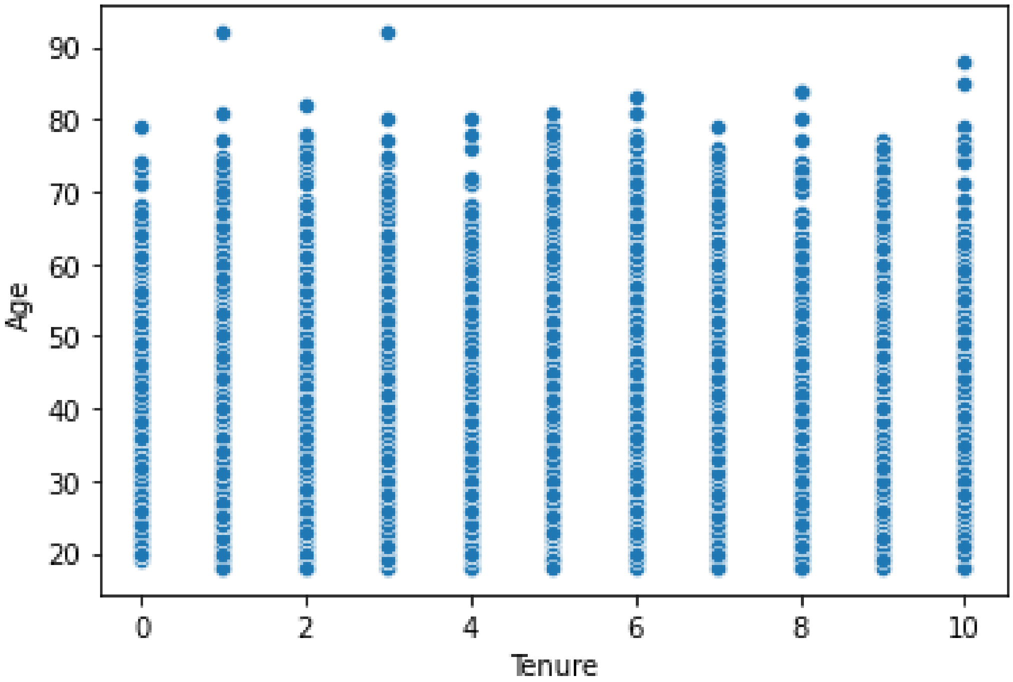
```
#Univariate Analysis
sns.displot(df['Age'])
```

```
<seaborn.axisgrid.FacetGrid at 0x7f2f89138e90>
```



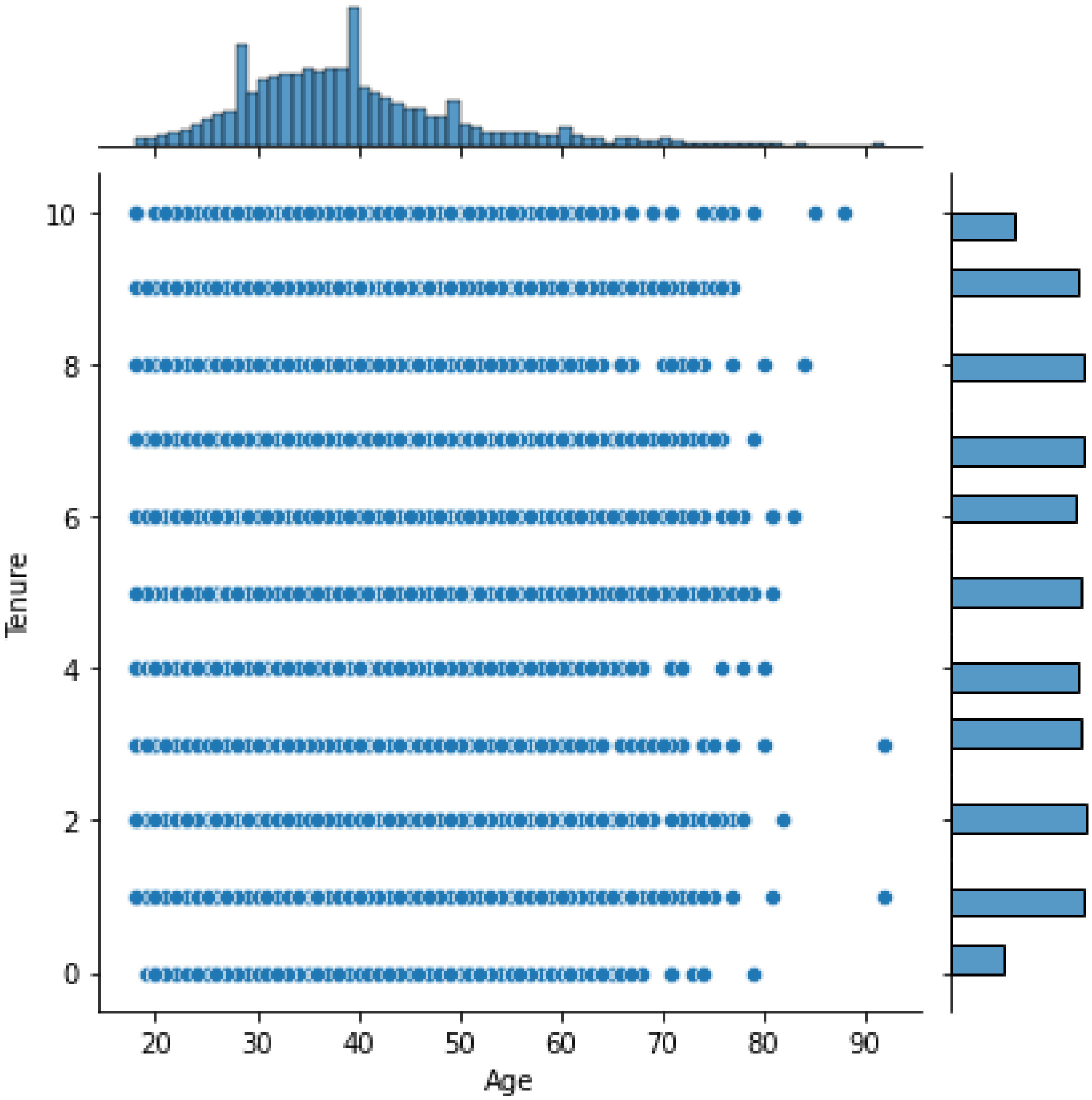
```
#Bivariate Analysis
sns.scatterplot(df['Tenure'],df['Age'])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43:
FutureWarning: Pass the following variables as keyword args: x, y.
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 0x7f2f8672f150>
```



```
#Multivariate Analysis
sns.jointplot(x='Age',y='Tenure',data=df)
```

```
<seaborn.axisgrid.JointGrid at 0x7f2f86273390>
```



1. Perform descriptive statistics on the dataset.

```
df.describe().T

                   count          mean           std          min  \
RowNumber        10000.0  5.000500e+03   2886.895680         1.00
CustomerId       10000.0  1.569094e+07  71936.186123  15565701.00
CreditScore      10000.0  6.505288e+02     96.653299       350.00
Age              10000.0  3.892180e+01     10.487806        18.00
Tenure           10000.0  5.012800e+00      2.892174         0.00
Balance          10000.0  7.648589e+04  62397.405202         0.00
NumOfProducts    10000.0  1.530200e+00      0.581654         1.00
HasCrCard        10000.0  7.055000e-01      0.455840         0.00
IsActiveMember   10000.0  5.151000e-01      0.499797         0.00
EstimatedSalary  10000.0  1.000902e+05  57510.492818        11.58
Exited           10000.0  2.037000e-01      0.402769         0.00
```

```
                        25%           50%           75%         max

RowNumber           2500.75  5.000500e+03  7.500250e+03    10000.00

CustomerId      15628528.25  1.569074e+07  1.575323e+07 15815690.00

CreditScore          584.00  6.520000e+02  7.180000e+02      850.00

Age                   32.00  3.700000e+01  4.400000e+01       92.00

Tenure                 3.00  5.000000e+00  7.000000e+00       10.00

Balance                0.00  9.719854e+04  1.276442e+05   250898.09

NumOfProducts          1.00  1.000000e+00  2.000000e+00        4.00

HasCrCard              0.00  1.000000e+00  1.000000e+00        1.00

IsActiveMember         0.00  1.000000e+00  1.000000e+00        1.00

EstimatedSalary    51002.11  1.001939e+05  1.493882e+05   199992.48

Exited                 0.00  0.000000e+00  0.000000e+00        1.00
```

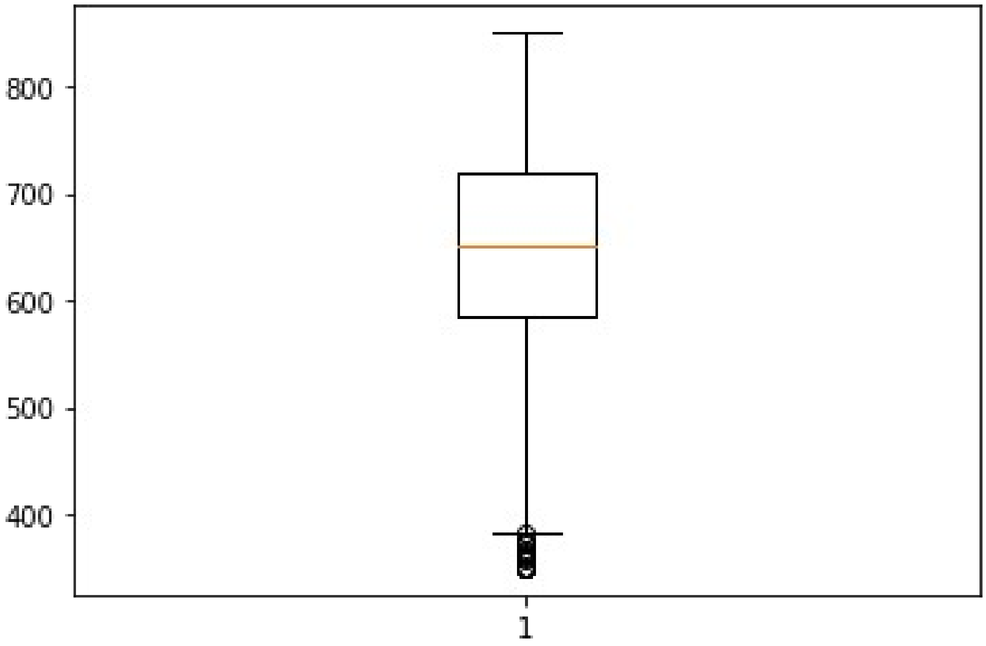
1. Handle the Missing values

```
df.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
```

1. Find the outliers and replace the outliers

```
plt.boxplot(df["CreditScore"])
plt.show()
```



1. Check for Categorical columns and perform encoding.

```
df.dtypes
```

```
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
```

```
obj_df = df.select_dtypes(include=['object']).copy()
obj_df.head()
```

```
    Surname Geography  Gender
0  Hargrave    France  Female
1      Hill     Spain  Female
2      Onio    France  Female
3      Boni    France  Female
4  Mitchell     Spain  Female
```

8.Split the data into dependent and independent variables.

```
x = df.iloc[:,0:13].values;
y = df.iloc[:,13:14].values;
```

```
x
```

```
array([[1, 15634602, 'Hargrave', ..., 1, 1, 101348.88],
       [2, 15647311, 'Hill', ..., 0, 1, 112542.58],
       [3, 15619304, 'Onio', ..., 1, 0, 113931.57],
       ...,
       [9998, 15584532, 'Liu', ..., 0, 1, 42085.58],
       [9999, 15682355, 'Sabbatini', ..., 1, 0, 92888.52],
       [10000, 15628319, 'Walker', ..., 1, 0, 38190.78]],
dtype=object)
```

```
y
```

```
array([[1],
       [0],
       [1],
       ...,
       [1],
       [1],
       [0]])
```

1. Scale the independent values

```
import pandas as pd
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()
scaler.fit_transform(y)
```

```
array([[ 1.97716468],
       [-0.50577476],
       [ 1.97716468],
       ...,
       [ 1.97716468],
       [ 1.97716468],
       [-0.50577476]])
```

1. Split the data into training and testing

```
from sklearn.model_selection import  train_test_split

xtrain, xtest, ytrain, ytest =
train_test_split(x,y,test_size=0.3,random_state=0)
```

```
from google.colab import drive
drive.mount('/content/drive')
```