1.Download the dataset 2.Load the dataset

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
import warnings
```

```
data=pd.read_csv("Churn_Modelling.csv",encoding='ISO-8859-1')
data.head()
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Ba
0	1	15634602	Hargrave	619	France	Female	42	2	
1	2	15647311	Hill	608	Spain	Female	41	1	83
2	3	15619304	Onio	502	France	Female	42	8	159
3	4	15701354	Boni	699	France	Female	39	1	
4	5	15737888	Mitchell	850	Spain	Female	43	2	125

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	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

```
data.dtypes
```

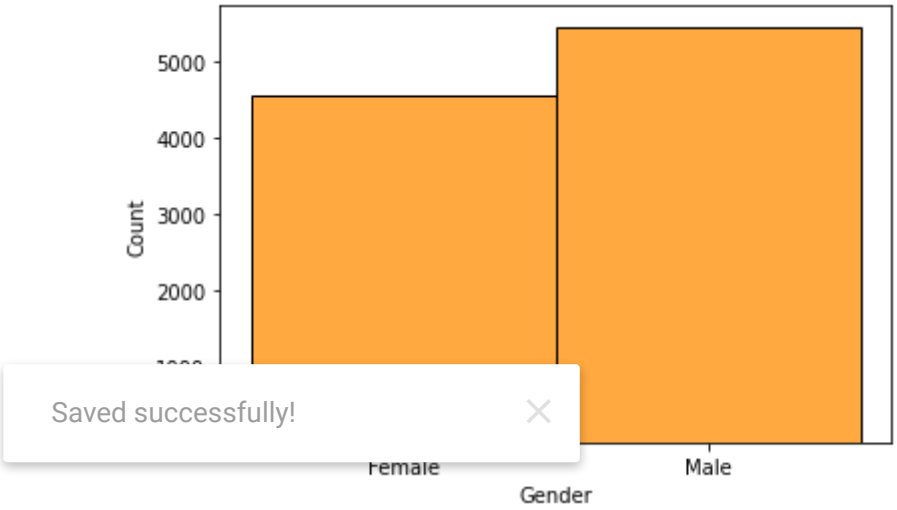
```
RowNumber           int64
CustomerId          int64
Surname            object
CreditScore         int64
Geography          object
Gender             object
Age                 int64
```

```
Tenure              int64
Balance           float64
NumOfProducts       int64
HasCrCard           int64
IsActiveMember      int64
EstimatedSalary   float64
Exited              int64
dtype: object
```

3.Perform Below Visualizations Univariate Analysis ,Bi - Variate Analysis,Multi - Variate Analysis **

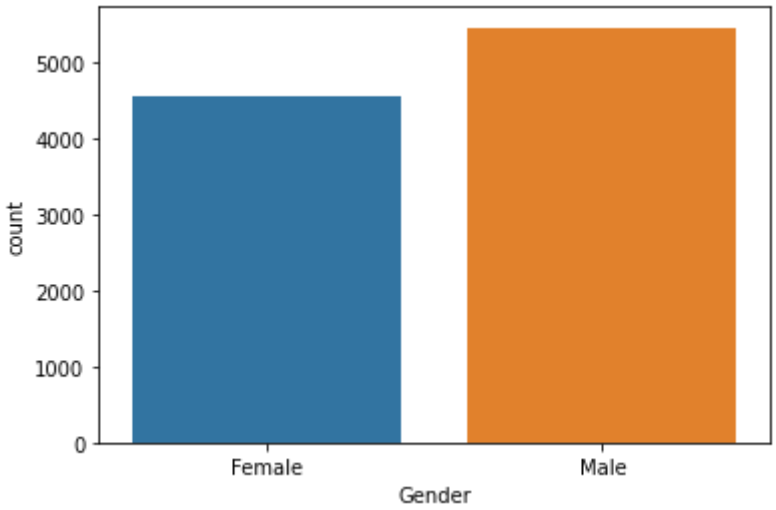
```
sns.histplot(data["Gender"],color='darkorange')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3f675c9c50>
```



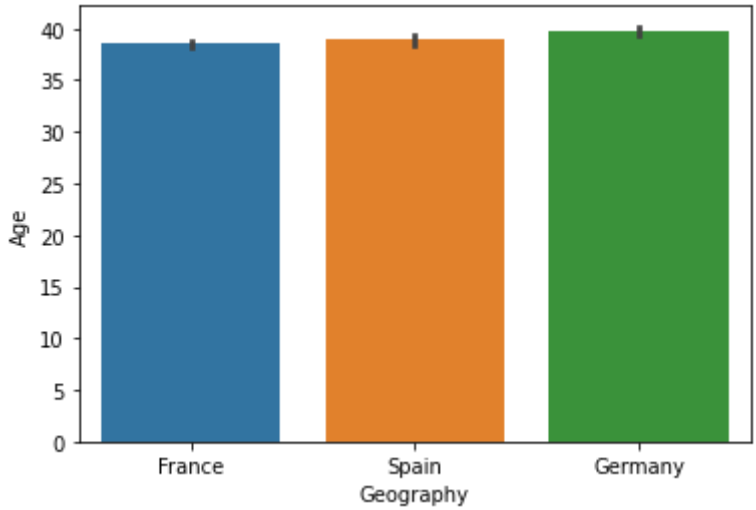

```
sns.countplot(data['Gender'])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pas
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7f3f6752bf50>
```



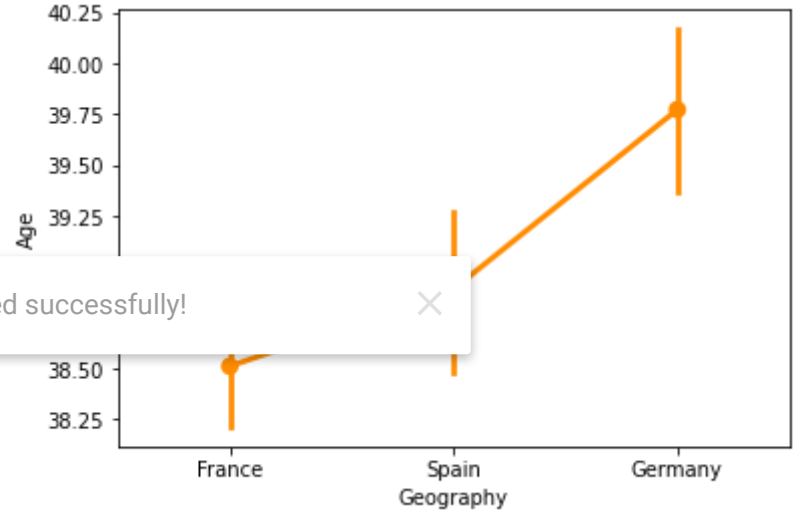

```
sns.barplot(x='Geography',y='Age',data=data)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3f66ff5310>
```




```
sns.pointplot(x='Geography',y='Age',data=data,color='darkorange')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3f66f68810>
```



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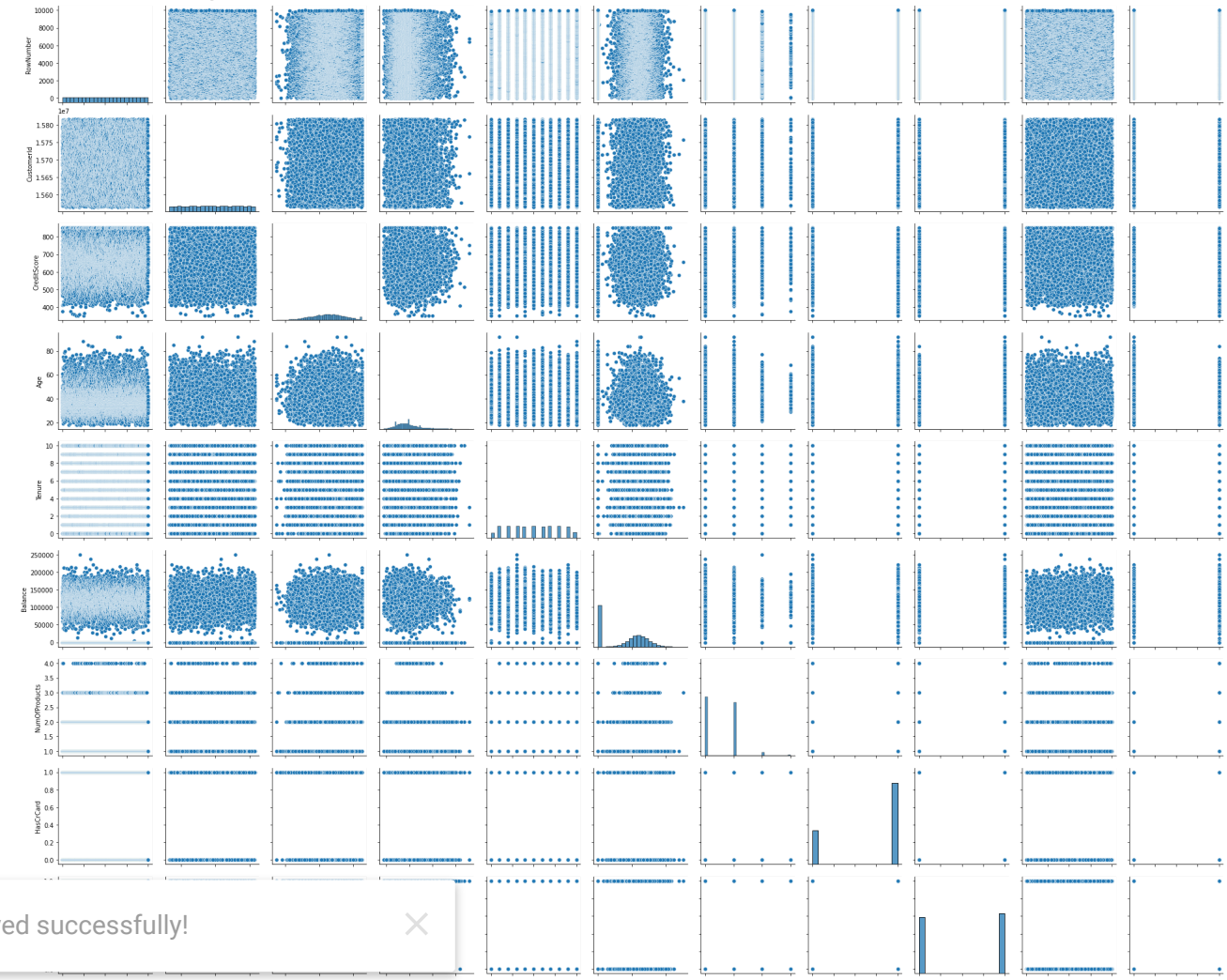
```
sns.pairplot(data)
```

```
<seaborn.axisgrid.PairGrid at 0x7f3f66ee65d0>
```



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4. Perform descriptive statistics on the dataset

```
data.describe().T
```

	count	mean	std	min	25%	
RowNumber	10000.0	5.000500e+03	2886.895680	1.00	2500.75	5.00050

5.Handle the Missing values.

CreditScore	10000.0	6.505288e+02	96.653299	350.00	584.00	6.52000

```
data.isnull().sum().sum()
```

```
0
```

Balance	10000.0	7.648589e+04	62397.405202	0.00	0.00	9.71985

There is no missing values in this dataset

HasCrCard	10000.0	7.055000e-01	0.455840	0.00	0.00	1.00000

```
missing_values=data.isnull().sum()
missing_values[missing_values>0]/len(data)*100
```

```
Series([], dtype: float64)
```

Exited	10000.0	2.037000e-01	0.402769	0.00	0.00	0.00000

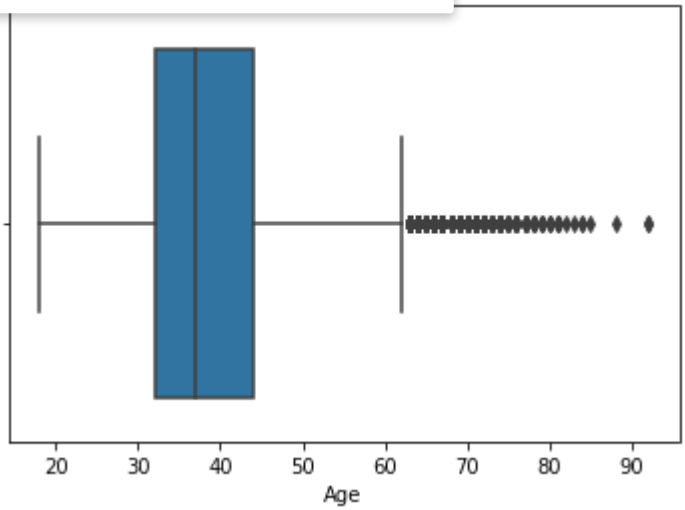
6.Find the outliers and replace the outliers

```
sns.boxplot(data['Age'],data=data)
```

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

Saved successfully!

```
sSubplot at 0x7f3f617ca550>
```



7.Check for Categorical columns and perform encoding.

```
print(data['Gender'].unique())
print(data['Age'].unique())
```

```
['Female' 'Male']
[42 41 39 43 44 50 29 27 31 24 34 25 35 45 58 32 38 46 36 33 40 51 61 49
 37 19 66 56 26 21 55 75 22 30 28 65 48 52 57 73 47 54 72 20 67 79 62 53
 80 59 68 23 60 70 63 64 18 82 69 74 71 76 77 88 85 84 78 81 92 83]
```

```
data['Gender'].value_counts()
data['Age'].value_counts()
```

```
37    478
38    477
35    474
36    456
34    447
     ...
92      2
82      1
88      1
85      1
83      1
Name: Age, Length: 70, dtype: int64
```

```
one_hot_encoded_data = pd.get_dummies(data, columns = ['Age', 'Gender'])
print(one_hot_encoded_data)
```

```
      RowNumber  CustomerId    Surname  CreditScore Geography  Tenure  \
0             1    15634602   Hargrave          619    France       2
1             2    15647311       Hill          608     Spain       1
2             3    15619304       Onio          502    France       8
3             4    15701354       Boni          699    France       1
4             5    15737888   Mitchell          850     Spain       2
                                    ...          ...       ...     ...
                                Obijiaku          771    France       5
                                ohnstone          516    France      10
9997       9998    15584532        Liu          709    France       7
9998       9999    15682355  Sabbatini          772   Germany       3
9999      10000    15628319     Walker          792    France       4

        Balance  NumOfProducts  HasCrCard  IsActiveMember  ...  Age_80  \
0          0.00              1          1               1  ...       0
1      83807.86              1          0               1  ...       0
2     159660.80              3          1               0  ...       0
3          0.00              2          0               0  ...       0
4     125510.82              1          1               1  ...       0
...         ...            ...        ...             ...  ...     ...
9995       0.00              2          1               0  ...       0
9996   57369.61              1          1               1  ...       0
9997       0.00              1          0               1  ...       0
9998   75075.31              2          1               0  ...       0
9999  130142.79              1          1               0  ...       0

      Age_81  Age_82  Age_83  Age_84  Age_85  Age_88  Age_92  Gender_Female  \
0          0       0       0       0       0       0       0              1
1          0       0       0       0       0       0       0              1
2          0       0       0       0       0       0       0              1
3          0       0       0       0       0       0       0              1
4          0       0       0       0       0       0       0              1
...      ...     ...     ...     ...     ...     ...     ...            ...
9995       0       0       0       0       0       0       0              0
9996       0       0       0       0       0       0       0              0
9997       0       0       0       0       0       0       0              1
9998       0       0       0       0       0       0       0              0
9999       0       0       0       0       0       0       0              1
```

Saved successfully!

```
      Gender_Male
0               0
1               0
2               0
3               0
4               0
...           ...
9995            1
9996            1
9997            0
9998            1
9999            0

[10000 rows x 84 columns]
```

8.Split the data into dependent and independent variables.

```
from sklearn.datasets import load_iris


from sklearn import preprocessing
data = load_iris()

X_data = data.data
target = data.target
```

Saved successfully!

```
print( 'Independent variable')
print(target)
```

```
Dependent variable
[[5.1 3.5 1.4 0.2]
 [4.9 3.  1.4 0.2]
 [4.7 3.2 1.3 0.2]
 [4.6 3.1 1.5 0.2]
 [5.  3.6 1.4 0.2]
 [5.4 3.9 1.7 0.4]
 [4.6 3.4 1.4 0.3]
 [5.  3.4 1.5 0.2]
 [4.4 2.9 1.4 0.2]
 [4.9 3.1 1.5 0.1]
 [5.4 3.7 1.5 0.2]
 [4.8 3.4 1.6 0.2]
 [4.8 3.  1.4 0.1]
 [4.3 3.  1.1 0.1]
 [5.8 4.  1.2 0.2]
 [5.7 4.4 1.5 0.4]
 [5.4 3.9 1.3 0.4]
 [5.1 3.5 1.4 0.3]
 [5.7 3.8 1.7 0.3]
 [5.1 3.8 1.5 0.3]
 [5.4 3.4 1.7 0.2]
 [5.1 3.7 1.5 0.4]
 [4.6 3.6 1.  0.2]
 [5.1 3.3 1.7 0.5]
 [4.8 3.4 1.9 0.2]
```

```
 [5.  3.  1.6 0.2]
 [5.  3.4 1.6 0.4]
 [5.2 3.5 1.5 0.2]
 [5.2 3.4 1.4 0.2]
 [4.7 3.2 1.6 0.2]
 [4.8 3.1 1.6 0.2]
 [5.4 3.4 1.5 0.4]
 [5.2 4.1 1.5 0.1]
 [5.5 4.2 1.4 0.2]
 [4.9 3.1 1.5 0.2]
 [5.  3.2 1.2 0.2]
 [5.5 3.5 1.3 0.2]
 [4.9 3.6 1.4 0.1]
 [4.4 3.  1.3 0.2]
 [5.1 3.4 1.5 0.2]
 [5.  3.5 1.3 0.3]
 [4.5 2.3 1.3 0.3]
 [4.4 3.2 1.3 0.2]
 [5.  3.5 1.6 0.6]
 [5.1 3.8 1.9 0.4]
 [4.8 3.  1.4 0.3]
 [5.1 3.8 1.6 0.2]
 [4.6 3.2 1.4 0.2]
 [5.3 3.7 1.5 0.2]
 [5.  3.3 1.4 0.2]
 [7.  3.2 4.7 1.4]
 [6.4 3.2 4.5 1.5]
 [6.9 3.1 4.9 1.5]
```



```
 [6.3 3.3 4.7 1.6]
```

9.Scale the independent variable

```
standard = preprocessing.scale(target)
print(standard)
```

```
[-1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487 -1.22474487
 -1.22474487 -1.22474487  0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          0.          0.
  0.          0.          0.          0.          1.22474487  1.22474487
  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
```

```
       1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
       1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
       1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
       1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487
       1.22474487  1.22474487  1.22474487  1.22474487  1.22474487  1.22474487]
```

10.Split the data into training and testing

```
import pandas as pd
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
df = pd.read_csv('Churn_Modelling.csv')
X = df.iloc[:, :-1]
y = df.iloc[:, -1]
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.05, random_state=0)
print(X_train, X_test, y_train, y_test)
```

```
      ...         ...         ...       ...          ...       ...     ...  ...
      8938       8939    15722409    Ritchie          693     Spain    Male   47
      9291       9292    15679804   Esquivel          636    France    Male   36
      491         492    15699005     Martin          710    France  Female   41
      2021       2022    15795519   Vasiliev          716   Germany  Female   18
      4299       4300    15711991  Chiawuotu          615    France    Male   30

            Tenure    Balance  NumOfProducts  HasCrCard  IsActiveMember  \
      9394       2  137145.12              1          1               1
      898        1  115046.74              1          1               0
      2398       8   95386.82              1          1               1
      5906       4  112079.58              1          0               0
      2343       5  163034.82              2          1               1
      ...      ...        ...            ...        ...             ...
      8938       8  107604.66              1          1               1
      9291       5  117559.05              2          1               1
      491        2  156067.05              1          1               1
      2021       3  128743.80              1          0               0
      4299       8       0.00              2          0               0

            EstimatedSalary
      9394        192852.67
      898         128702.10
      2398         75732.25
      5906         89368.59
      2343        135662.17
      ...               ...
      8938         80149.27
      9291        111573.30
      491           9983.88
      2021        197322.13
      4299          3183.15

      [500 rows x 13 columns] 799     0
      1069    1
      8410    0
      9436    0
      5099    1
             ..
      9225    0
```

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```
9225    0
4859    0
3264    0
9845    0
2732    1
Name: Exited, Length: 9500, dtype: int64 9394    0
898     1
2398    0
5906    0
2343    0
       ..
8938    0
9291    0
491     0
2021    0
4299    0
Name: Exited, Length: 500, dtype: int64
```

Saved successfully!

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