

```
In [1]: 1 import pandas as pd
        2 df=pd.read_csv("Churn_Modelling.csv")
```

```
In [2]: 1 df
```

Out[2]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance
	0	1	15634602	Hargrave	619	France	Female	42	2
	1	2	15647311	Hill	608	Spain	Female	41	83807.86
	2	3	15619304	Onio	502	France	Female	42	159660.80
	3	4	15701354	Boni	699	France	Female	39	0.00
	4	5	15737888	Mitchell	850	Spain	Female	43	125510.82
...	...	...	...	...	...	...	...	...	...
9995	9996	15606229	Obijiaku	771	France	Male	39	5	0.00
9996	9997	15569892	Johnstone	516	France	Male	35	10	57369.61
9997	9998	15584532	Liu	709	France	Female	36	7	0.00
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	75075.31
9999	10000	15628319	Walker	792	France	Female	28	4	130142.79

0000 rows × 14 columns



```
In [5]: 1 x=df[['CreditScore','Age','Tenure','Balance','NumOfProducts','HasCrCard']]
        2 x
```

Out[5]:

	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	619	42	2	0.00	1	1	1	
1	608	41	1	83807.86	1	0	1	
2	502	42	8	159660.80	3	1	0	
3	699	39	1	0.00	2	0	0	
4	850	43	2	125510.82	1	1	1	
...	...	...	...	...	...	...	...	...
9995	771	39	5	0.00	2	1	0	
9996	516	35	10	57369.61	1	1	1	
9997	709	36	7	0.00	1	0	1	
9998	772	42	3	75075.31	2	1	0	
9999	792	28	4	130142.79	1	1	0	

10000 rows × 8 columns

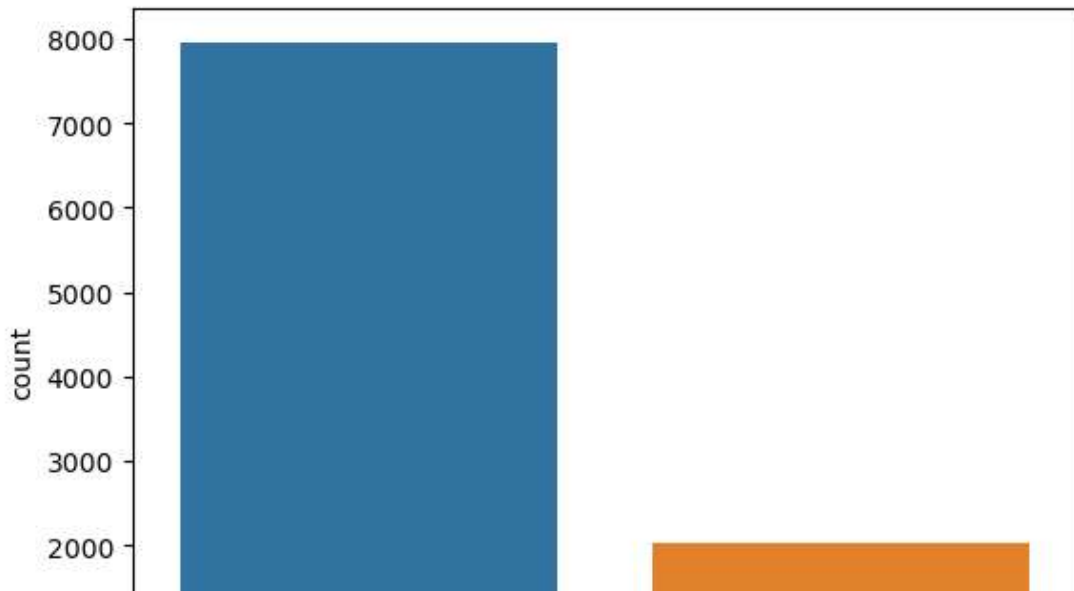


```
In [8]: 1 y=df['Exited']  
2 y.shape
```

Out[8]: (10000,)

```
In [10]: 1 import seaborn as sns  
2 sns.countplot(x=y)
```

Out[10]: <AxesSubplot:xlabel='Exited', ylabel='count'>



```
In [12]: 1 y.value_counts()
```

Out[12]: 0 7963  
1 2037  
Name: Exited, dtype: int64

```
In [41]: 1 !pip install imbalanced-learn
```

Collecting imbalanced-learn

Using cached imbalanced\_learn-0.11.0-py3-none-any.whl (235 kB)

Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\vishw\anaconda3\lib\site-packages (from imbalanced-learn) (2.2.0)

Requirement already satisfied: numpy>=1.17.3 in c:\users\vishw\anaconda3\lib\site-packages (from imbalanced-learn) (1.24.4)

Collecting joblib>=1.1.1

Using cached joblib-1.3.2-py3-none-any.whl (302 kB)

Requirement already satisfied: scikit-learn>=1.0.2 in c:\users\vishw\anaconda3\lib\site-packages (from imbalanced-learn) (1.0.2)

Requirement already satisfied: scipy>=1.5.0 in c:\users\vishw\anaconda3\lib\site-packages (from imbalanced-learn) (1.9.1)

Installing collected packages: joblib, imbalanced-learn

Attempting uninstall: joblib

Found existing installation: joblib 1.1.0

Uninstalling joblib-1.1.0:

Successfully uninstalled joblib-1.1.0

Successfully installed imbalanced-learn-0.11.0 joblib-1.3.2