

# 1. Download the dataset: Dataset

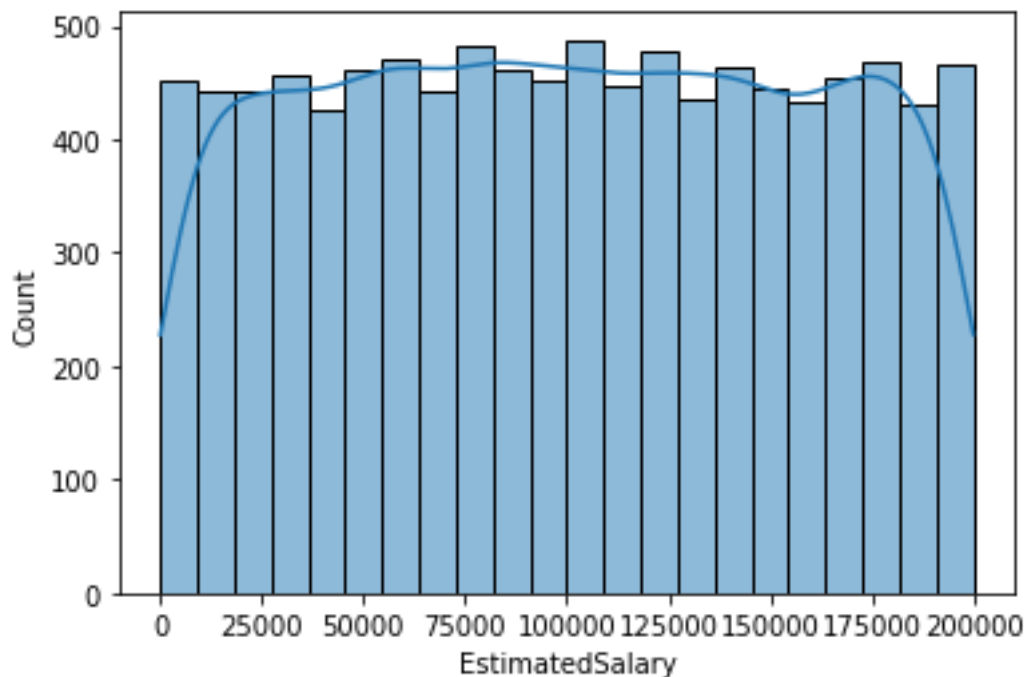
## 2. Load the dataset.

```
import numpy as np
import pandas as pd
df = pd.read_csv("/Churn_Modelling.csv")
```

## 3. Perform Below Visualizations.

### • Univariate Analysis

```
import seaborn as sns
sns.histplot(df.EstimatedSalary, kde=True)
```

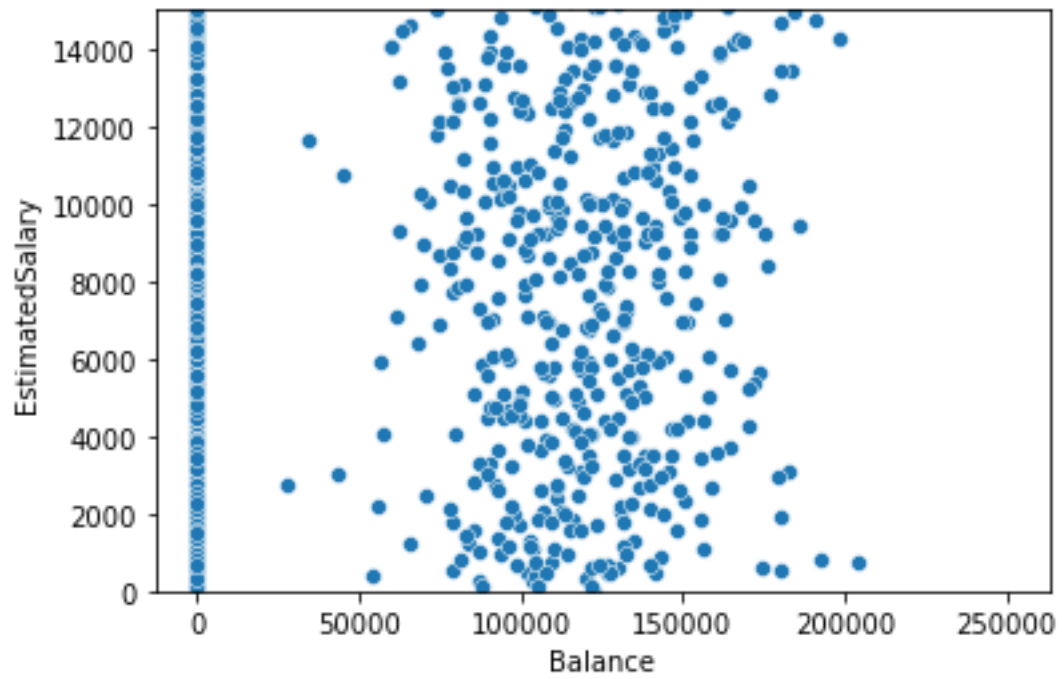


### • Bi - Variate Analysis

```
import seaborn as sns
import matplotlib.pyplot as plt
sns.scatterplot(df.Balance, df.EstimatedSalary)
plt.ylim(0, 15000)
```

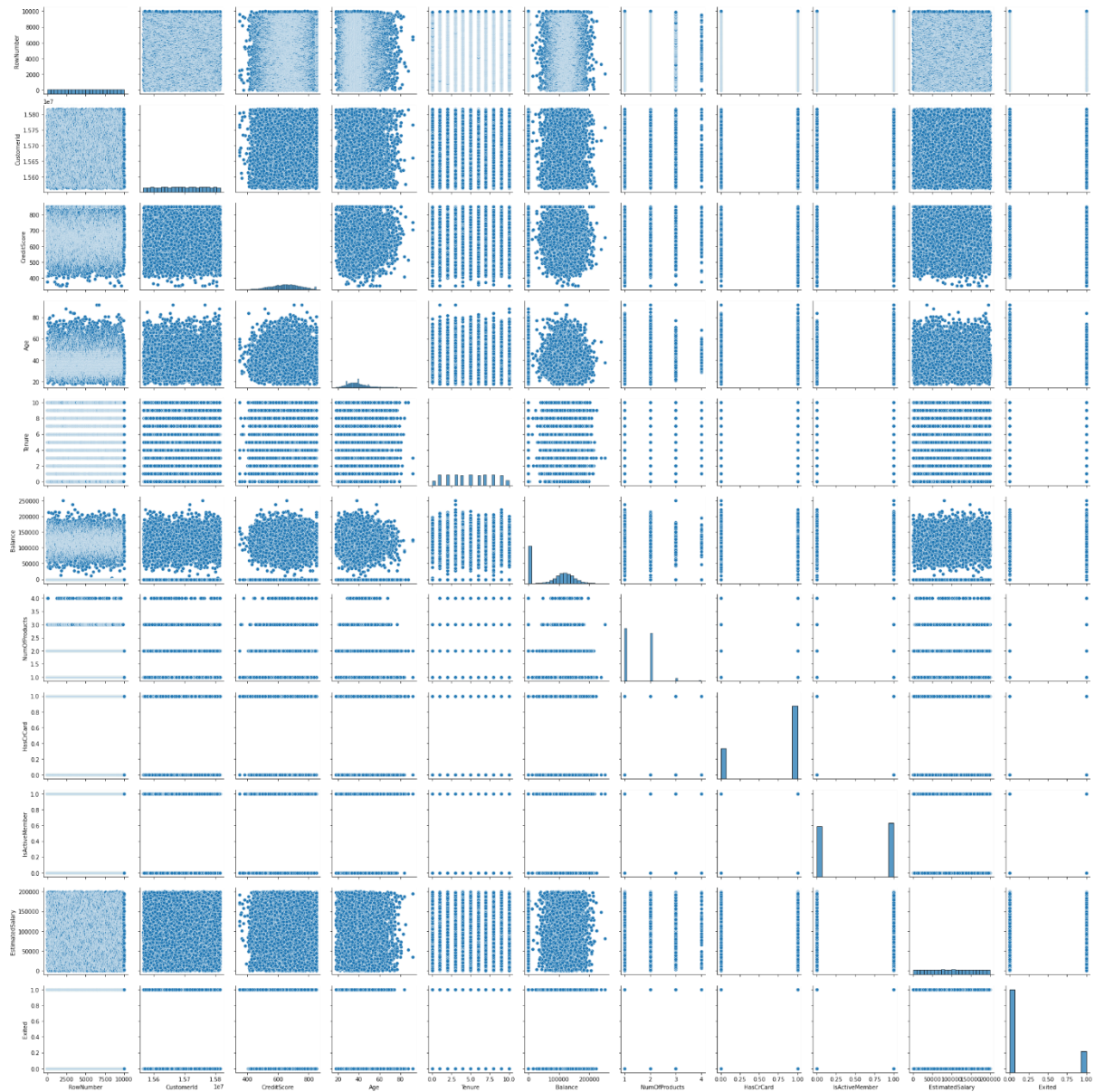
```
C:\Users\ELCOT\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
```

```
    warnings.warn(
(0.0, 15000.0)
```



- **Multi - Variate Analysis**

```
import seaborn as sns  
df=pd.read_csv("/Churn_Modelling.csv")  
sns.pairplot(df)
```



## 4. Perform descriptive statistics on the dataset.

```
df=pd.read_csv("/Churn_Modelling.csv")
df.describe(include='all')
```

	Row Number	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
count	1000	1.00	10	1000	10000	1000	1000	1000	1000	10000	10000.000000	10000.000000	10000.000000	10000.000000
	0.00	0000	00	0.00										
	000	e+04	0	0000										
unique	NaN	NaN	2932	NaN	3	2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
top	NaN	NaN	Smith	NaN	France	Male	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
frequency	NaN	NaN	32	NaN	5014	5457	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
mean	5000.50000	1.569094e+07	NaN	650.528800	NaN	NaN	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100	100090.239881	0.203700
std	2886.89568	7.193619e+04	NaN	96.653299	NaN	NaN	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797	57510.492818	0.402769
min	1.00000	1.556570e+07	NaN	350.000000	NaN	NaN	18.000000	0.000000	0.000000	1.000000	0.000000	0.000000	11.580000	0.000000
25%	2500.75000	1.562853e+07	NaN	584.000000	NaN	NaN	32.000000	3.000000	0.000000	1.000000	0.000000	0.000000	51002.110000	0.000000
50%	5000.50000	1.569074e+07	NaN	652.000000	NaN	NaN	37.000000	5.000000	97198.540000	1.000000	1.000000	1.000000	100193.915000	0.000000
75%	7500.25000	1.575323e+07	NaN	718.000000	NaN	NaN	44.000000	7.000000	127644.240000	2.000000	1.000000	1.000000	149388.247500	0.000000
max	10000.00000	1.581569e+07	NaN	850.000000	NaN	NaN	92.000000	10.000000	250898.090000	4.000000	1.000000	1.000000	199992.480000	1.000000

## 5. Handle the Missing values.

```
from ast import increment_lineno
import pandas as pd
import numpy as np
```

## 5. Handle the Missing values.

```
from ast import increment_lineno
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
sns.set(color_codes=True)
df=pd.read_csv("/Churn_Modelling.csv")
df.head()
```

	Row Num ber	Cust omer Id	Sur na me	Cred itSco re	Geo grap hy	Ge nd er	A g e	Te nu re	Bal anc e	NumO fProdu cts	Has CrC ard	IsActiv eMemb er	Estima tedSala ry	Ex ite d
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Michell	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0

## 6. Find the outliers and replace the outliers

```
import pandas as pd
```

```
import matplotlib
from matplotlib import pyplot as pyplot
%matplotlib inline
matplotlib.rcParams['figure.figsize']=(10,6)
df=pd.read_csv("/Churn_Modelling.csv")
df.sample(5)
```

Row Number	Customer Id	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited	
120	121	15682472	Culbreth	828	France	Male	34	8	129433.34	2	0	0	38131.77	0
2504	2505	15625942	McDonald	619	Spain	Female	45	0	0.00	2	0	0	113645.40	0
8432	8433	15582519	Seleznyov	479	France	Male	47	6	121797.09	1	0	1	5811.90	1
6931	6932	15808930	Mai	531	France	Female	37	1	0.00	1	1	0	4606.97	0
1453	1454	15714227	Kelly	672	France	Female	53	7	0.00	1	1	1	136910.18	0

## 7. Check for Categorical columns and perform encoding.

```
df=pd.read_csv("/Churn_Modelling.csv")
df.columns
import pandas as pd
import numpy as np
headers=['RowNumber','CustomerId','Surname','CreditScore','Geography',
'Gender','Age','Tenure','Balance','NumofProducts','HasCard',
'IsActiveMember','EstimatedSalary','Exited']
import seaborn as sns
df.head()
```

	Row Number	Customer Id	Sur name	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Michell	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0

## 8. Split the data into dependent and independent variables.

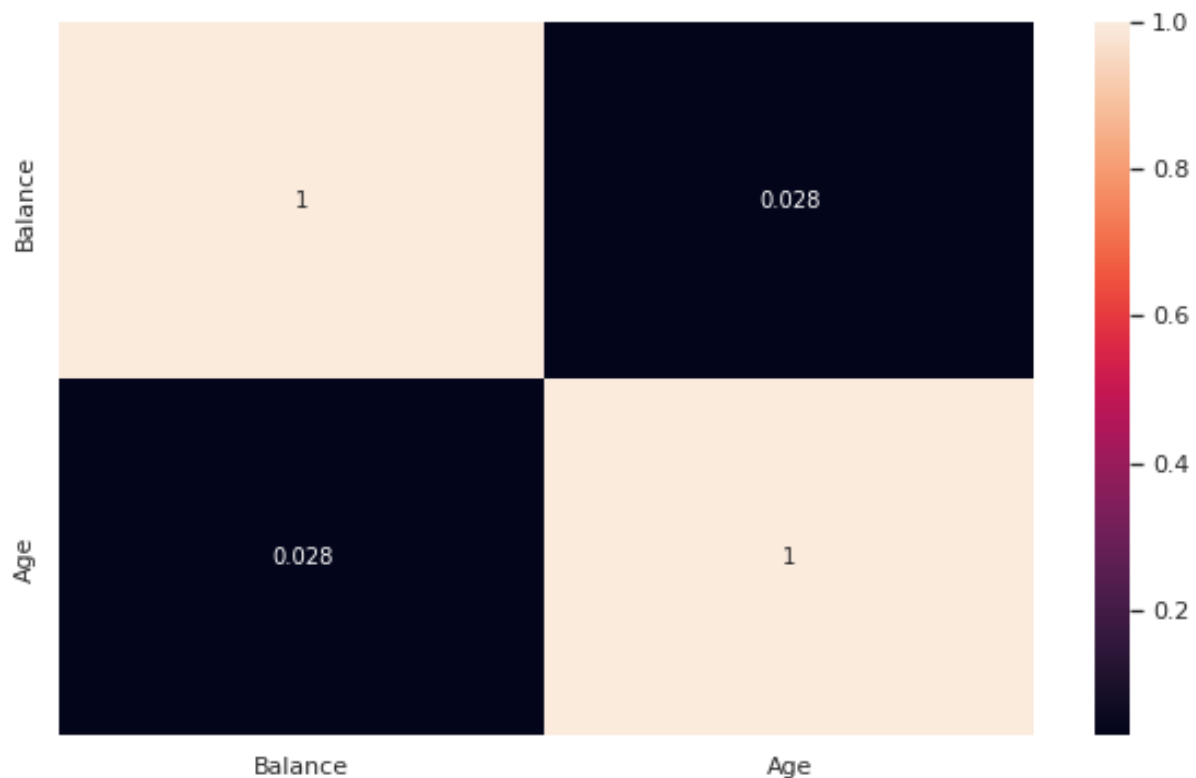
```
x=df.iloc[:, :-1].values
print(x)
y=df.iloc[:, -1]._values
print(y)

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

## 9. Scale the independent variables

```
import seaborn as sns
df=pd.read_csv("/Churn_Modelling.csv")
dff=df[['Balance', 'Age']]
sns.heatmap(dff.corr(), annot=True)
```

```
sns.set(rc={'figure.figsize': (40,40)})
```



## 10. Split the data into training and testing

```
from scipy.sparse.construct import random
x=df.iloc[:, 1:2].values
y=df.iloc[:,2].values
from sklearn.model_selection import train_test_split
x_train, x_test, y_train,
y_test=train_test_split(x,y,test_size=0.2,random_state=0)
print('Row count of x_train table'+ '-' +str(f"{len(x_train):,}"))
print('Row count of y_train table'+ '-' +str(f"{len(y_train):,}"))
print('Row count of x_test table'+ '-' +str(f"{len(x_test):,}"))
print('Row count of y_test table'+ '-' +str(f"{len(y_test):,}"))

Row count of x_train table-8,000
Row count of y_train table-8,000
Row count of x_test table-2,000
Row count of y_test table-2,000
```