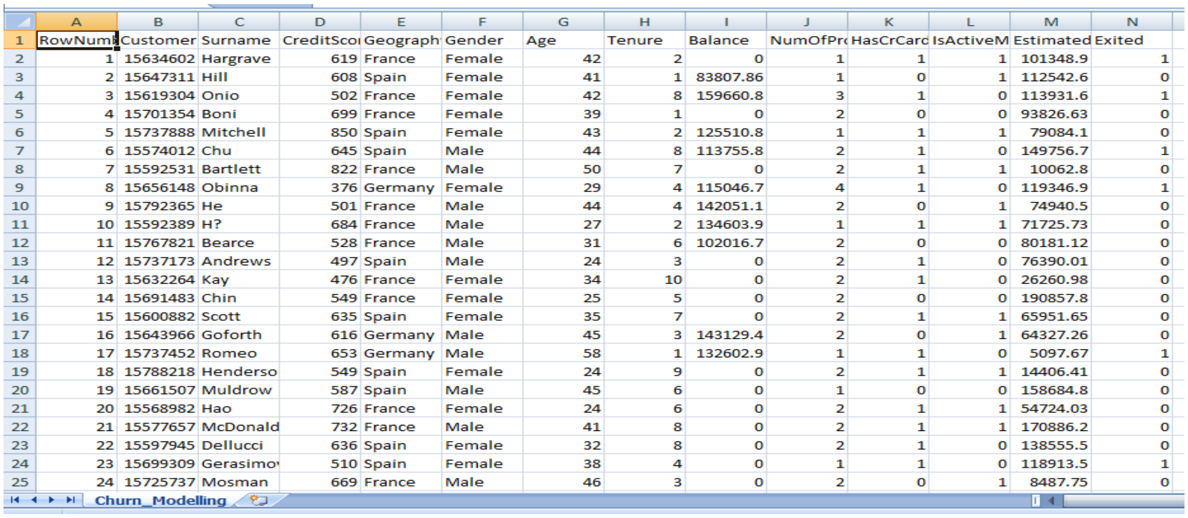
ASSIGNMENT 2

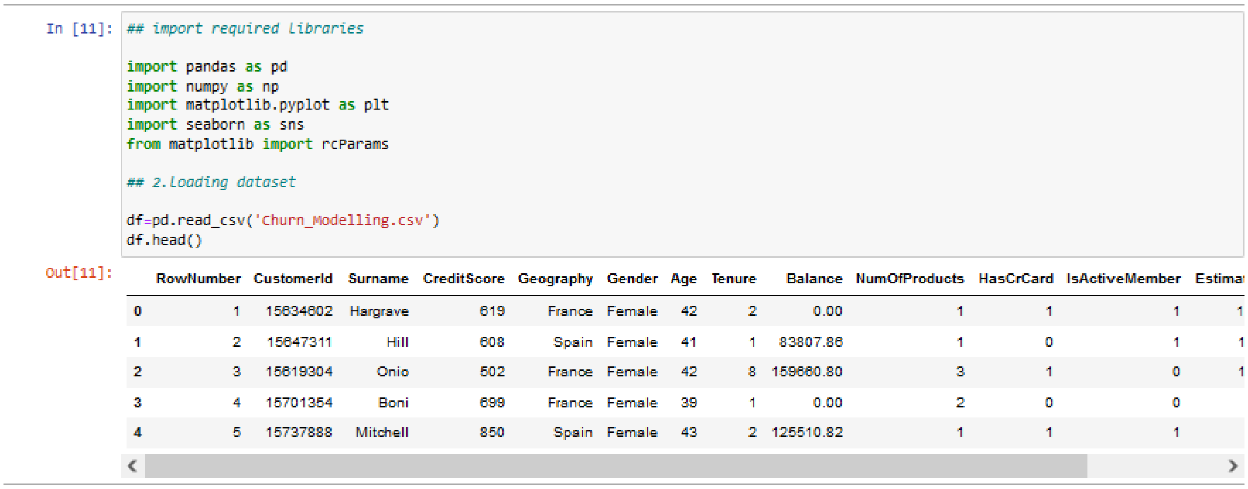
Date	19 September 2022
Team ID	PNT2022TMID38667
Project Name	Project – Early Detection of Chronic Kidney Disease using Machine Learning
Maximum Marks	2 Marks

1.Download the dataset



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	RowNumb	Customer	Surname	CreditScor	Geograph	Gender	Age	Tenure	Balance	NumOfPr	HasCrCard	IsActiveM	Estimated	Exited
2	1	15634602	Hargrave	619	France	Female	42	2	0	1	1	1	101348.9	1
3	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.6	0
4	3	15619304	Onio	502	France	Female	42	8	159660.8	3	1	0	113931.6	1
5	4	15701354	Boni	699	France	Female	39	1	0	2	0	0	93826.63	0
6	5	15737888	Mitchell	850	Spain	Female	43	2	125510.8	1	1	1	79084.1	0
7	6	15574012	Chu	645	Spain	Male	44	8	113755.8	2	1	0	149756.7	1
8	7	15592531	Bartlett	822	France	Male	50	7	0	2	1	1	10062.8	0
9	8	15656148	Obinna	376	Germany	Female	29	4	115046.7	4	1	0	119346.9	1
10	9	15792365	He	501	France	Male	44	4	142051.1	2	0	1	74940.5	0
11	10	15592389	H?	684	France	Male	27	2	134603.9	1	1	1	71725.73	0
12	11	15767821	Bearce	528	France	Male	31	6	102016.7	2	0	0	80181.12	0
13	12	15737173	Andrews	497	Spain	Male	24	3	0	2	1	0	76390.01	0
14	13	15632264	Kay	476	France	Female	34	10	0	2	1	0	26260.98	0
15	14	15691483	Chin	549	France	Female	25	5	0	2	0	0	190857.8	0
16	15	15600882	Scott	635	Spain	Female	35	7	0	2	1	1	65951.65	0
17	16	15643966	Goforth	616	Germany	Male	45	3	143129.4	2	0	1	64327.26	0
18	17	15737452	Romeo	653	Germany	Male	58	1	132602.9	1	1	0	5097.67	1
19	18	15788218	Henderso	549	Spain	Female	24	9	0	2	1	1	14406.41	0
20	19	15661507	Muldrow	587	Spain	Male	45	6	0	1	0	0	158684.8	0
21	20	15568982	Hao	726	France	Female	24	6	0	2	1	1	54724.03	0
22	21	15577657	McDonald	732	France	Male	41	8	0	2	1	1	170886.2	0
23	22	15597945	Dellucci	636	Spain	Female	32	8	0	2	1	0	138555.5	0
24	23	15699309	Gerasimo	510	Spain	Female	38	4	0	1	1	0	118913.5	1
25	24	15725737	Mosman	669	France	Male	46	3	0	2	0	1	8487.75	0

2. Load the dataset.



In [11]:

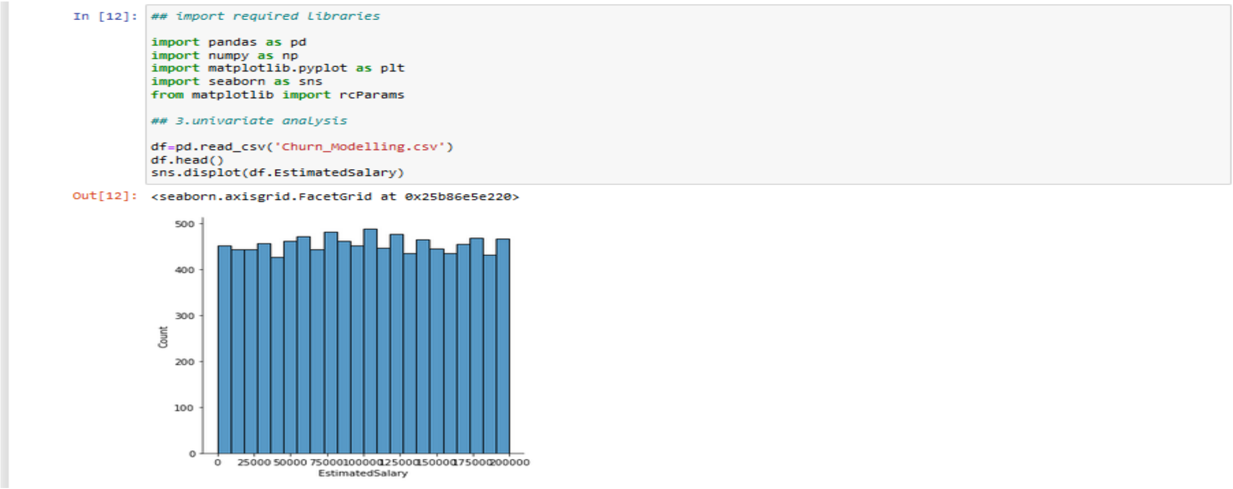
```
## import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams

## 2.loading dataset

df=pd.read_csv('Churn_Modelling.csv')
df.head()
```

Out[11]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	Estima
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	1
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	1
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	
4	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1	

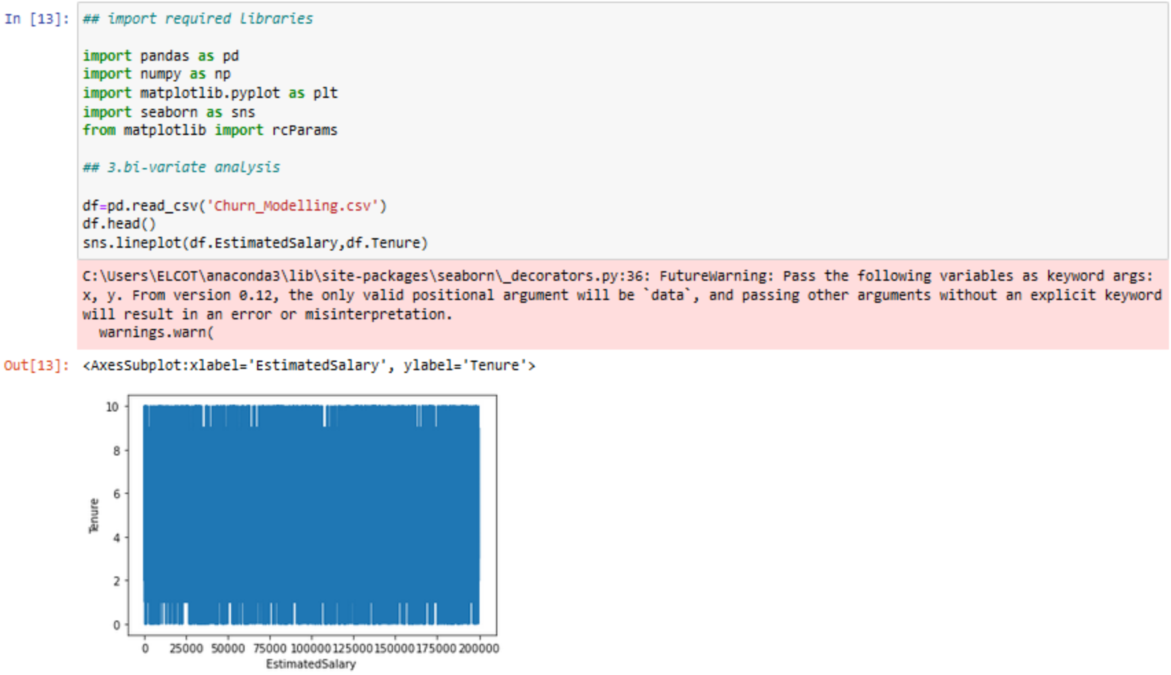
3. Perform Below Visualizations.

● Univariate Analysis



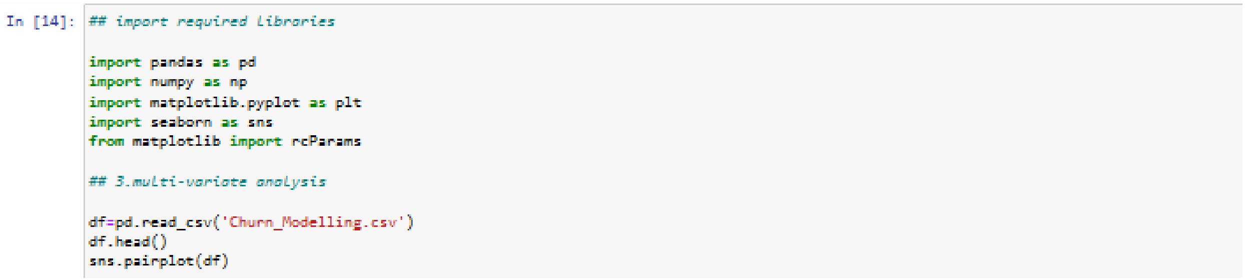
```
In [12]: ## import required Libraries

         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 3.univariate analysis

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         sns.displot(df.EstimatedSalary)

Out[12]: <seaborn.axisgrid.FacetGrid at 0x25b86e5e220>
```

● Bi - Variate Analysis

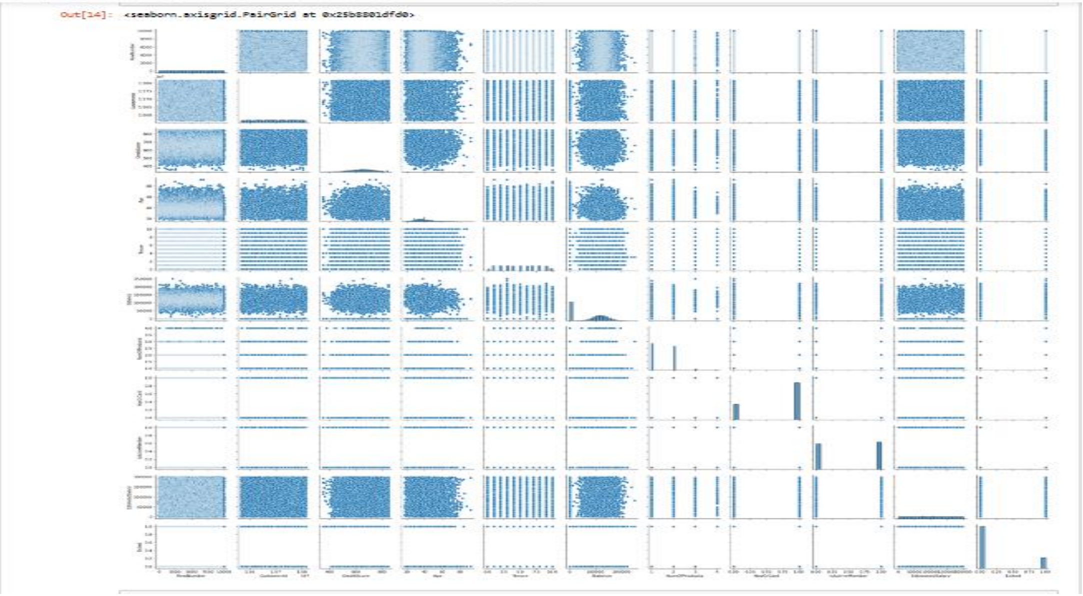


```
In [13]: ## import required Libraries

         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 3.bi-variate analysis

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         sns.lineplot(df.EstimatedSalary,df.Tenure)

         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(

Out[13]: <AxesSubplot:xlabel='EstimatedSalary', ylabel='Tenure'>
```

- Multi - Variate Analysis

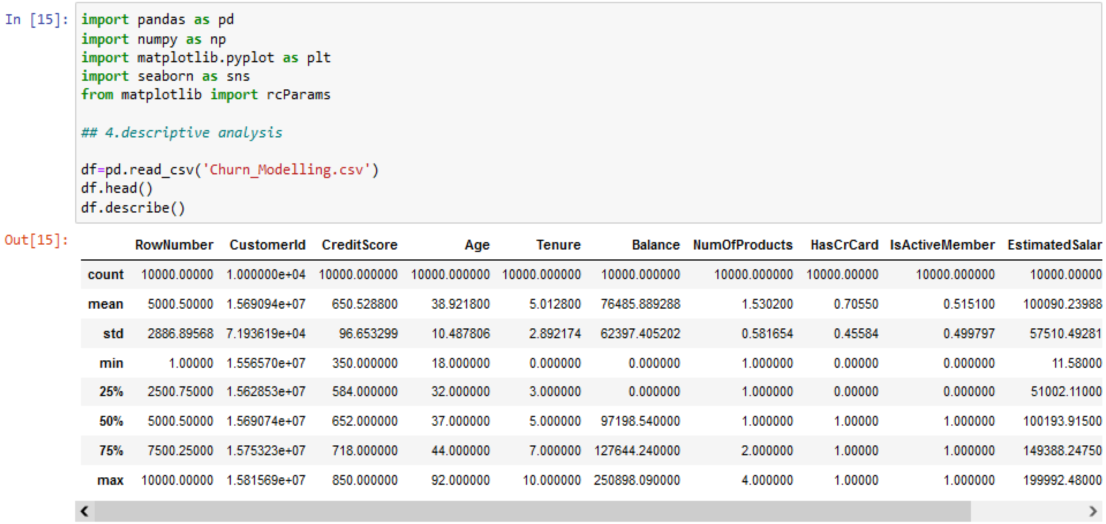


```
In [14]: ## import required libraries

         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 3.multi-variate analysis

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         sns.pairplot(df)
```



```
Out[14]: <seaborn.axisgrid.PairGrid at 0x25b8801dfd0>
```

4. Perform descriptive statistics on the dataset.

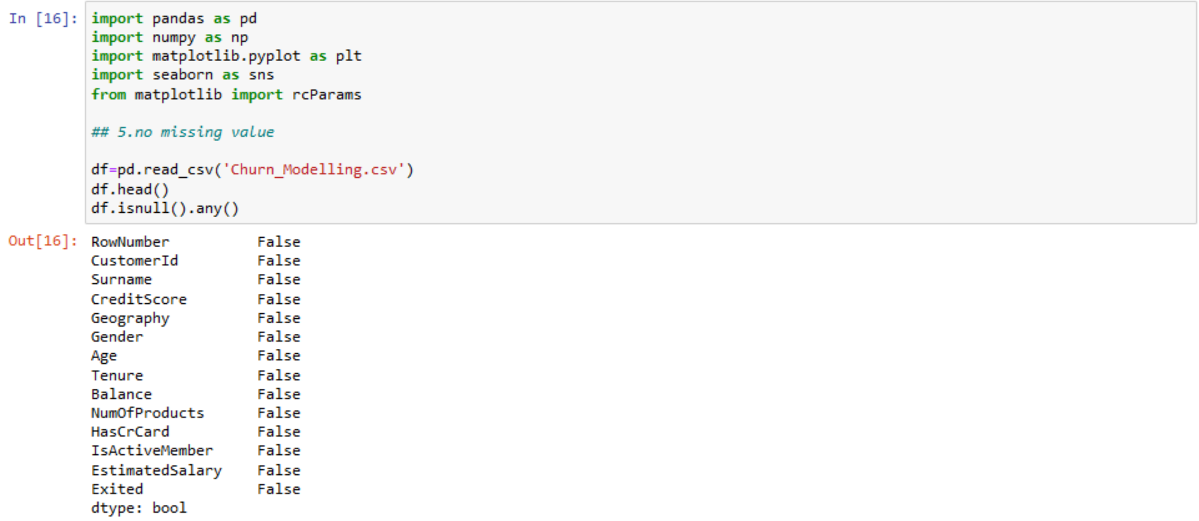


```
In [15]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 4.descriptive analysis

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         df.describe()
```

Out[15]:

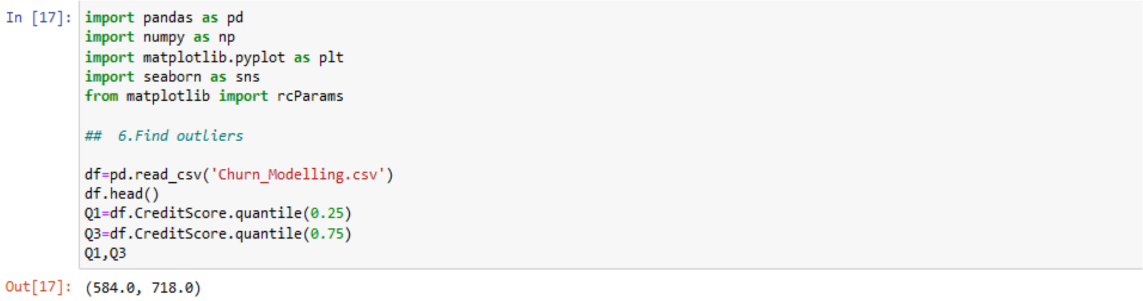
	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalar
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.00000	10000.000000	10000.00000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100	100090.23988
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797	57510.49281
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000000	1.000000	0.00000	0.000000	11.58000
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	1.000000	0.00000	0.000000	51002.11000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	1.000000	1.00000	1.000000	100193.91500
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	2.000000	1.00000	1.000000	149388.24750
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	4.000000	1.00000	1.000000	199992.48000

5. Handle the Missing values.

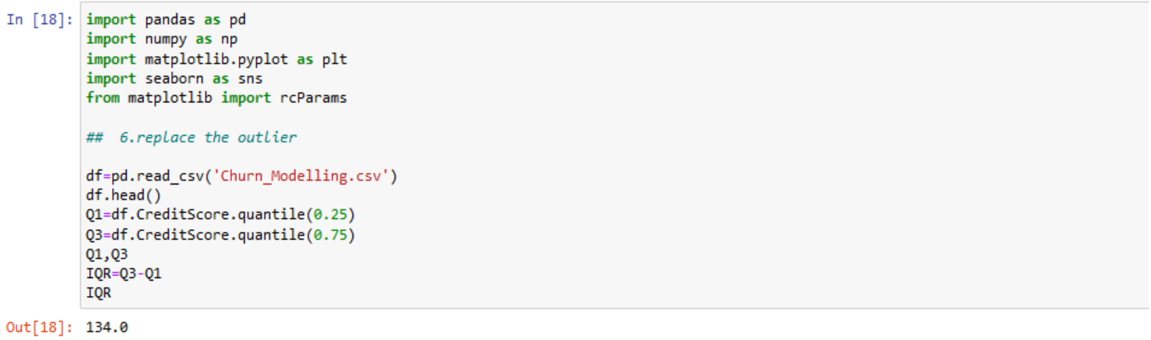


```
In [16]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 5.no missing value

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         df.isnull().any()

Out[16]: RowNumber          False
         CustomerId         False
         Surname            False
         CreditScore        False
         Geography          False
         Gender             False
         Age                False
         Tenure             False
         Balance            False
         NumOfProducts      False
         HasCrCard          False
         IsActiveMember     False
         EstimatedSalary    False
         Exited             False
         dtype: bool
```

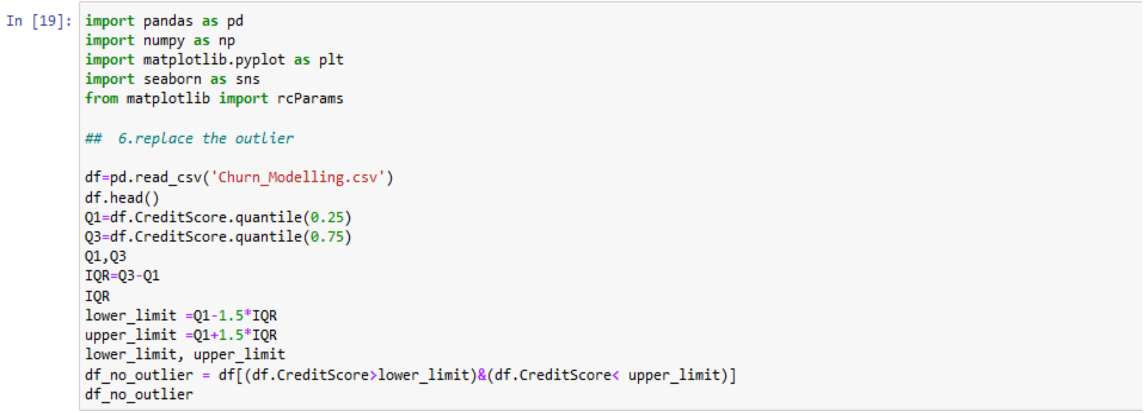
6. Find the outliers and replace the outliers



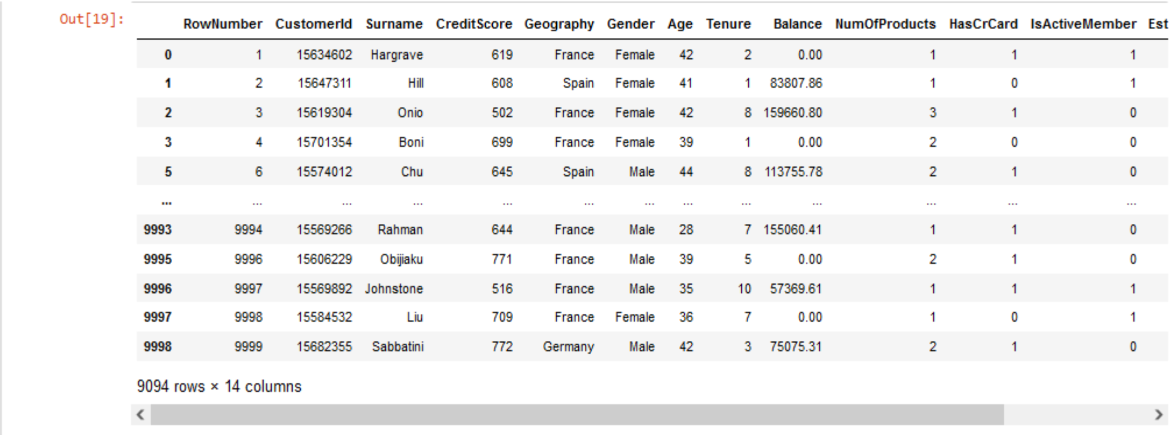
```
In [17]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ##  6.Find outliers

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         Q1=df.CreditScore.quantile(0.25)
         Q3=df.CreditScore.quantile(0.75)
         Q1,Q3

Out[17]: (584.0, 718.0)
```



```
In [18]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ##  6.replace the outlier

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         Q1=df.CreditScore.quantile(0.25)
         Q3=df.CreditScore.quantile(0.75)
         Q1,Q3
         IQR=Q3-Q1
         IQR

Out[18]: 134.0
```



```
In [19]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ##  6.replace the outlier

         df=pd.read_csv('Churn_Modelling.csv')
         df.head()
         Q1=df.CreditScore.quantile(0.25)
         Q3=df.CreditScore.quantile(0.75)
         Q1,Q3
         IQR=Q3-Q1
         IQR
         lower_limit =Q1-1.5*IQR
         upper_limit =Q1+1.5*IQR
         lower_limit, upper_limit
         df_no_outlier = df[(df.CreditScore>lower_limit)&(df.CreditScore< upper_limit)]
         df_no_outlier
```

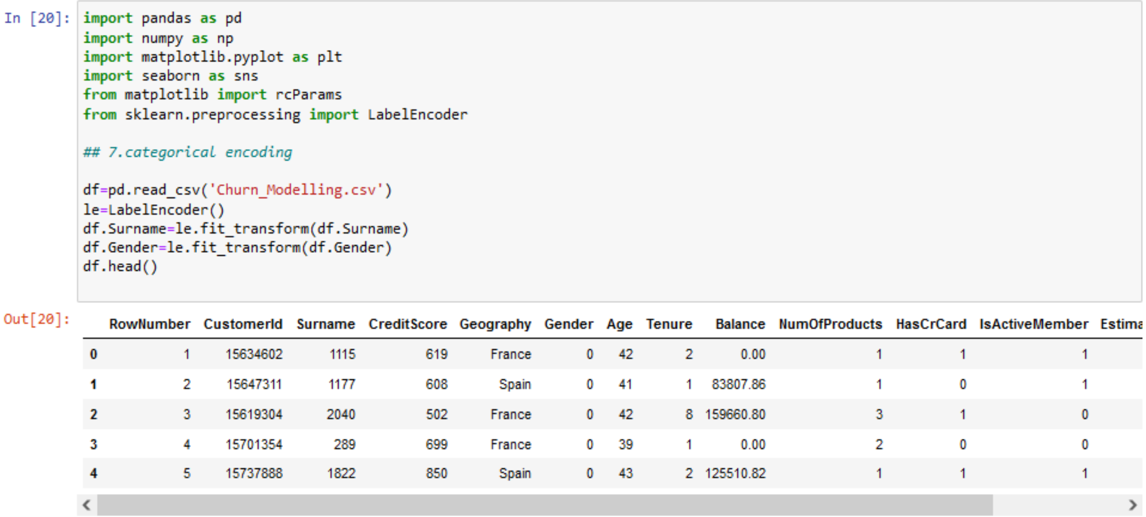


Out[19]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	Est
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	
5	6	15574012	Chu	645	Spain	Male	44	8	113755.78	2	1	0	
...	...	...	...	...	...	...	...	...	...	...	...	...	
9993	9994	15569266	Rahman	644	France	Male	28	7	155060.41	1	1	0	
9995	9996	15606229	Obijiaku	771	France	Male	39	5	0.00	2	1	0	
9996	9997	15569892	Johnstone	516	France	Male	35	10	57369.61	1	1	1	
9997	9998	15584532	Liu	709	France	Female	36	7	0.00	1	0	1	
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	75075.31	2	1	0	

9094 rows × 14 columns

7. Check for Categorical columns and perform encoding.



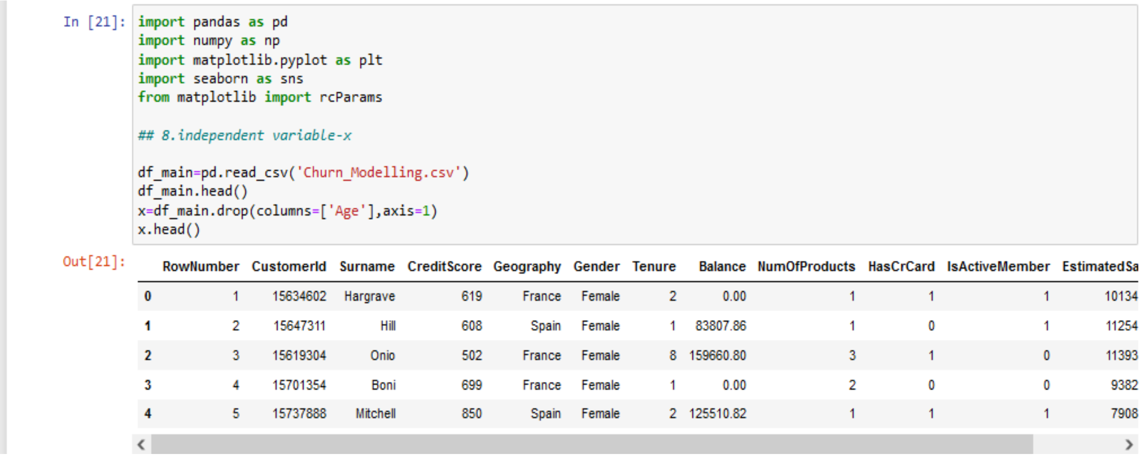
In [20]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams
from sklearn.preprocessing import LabelEncoder

## 7.categorical encoding

df=pd.read_csv('Churn_Modelling.csv')
le=LabelEncoder()
df.Surname=le.fit_transform(df.Surname)
df.Gender=le.fit_transform(df.Gender)
df.head()
```

Out[20]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	Estima
0	1	15634602	1115	619	France	0	42	2	0.00	1	1	1	
1	2	15647311	1177	608	Spain	0	41	1	83807.86	1	0	1	
2	3	15619304	2040	502	France	0	42	8	159660.80	3	1	0	
3	4	15701354	289	699	France	0	39	1	0.00	2	0	0	
4	5	15737888	1822	850	Spain	0	43	2	125510.82	1	1	1	

8. Split the data into dependent and independent variables.

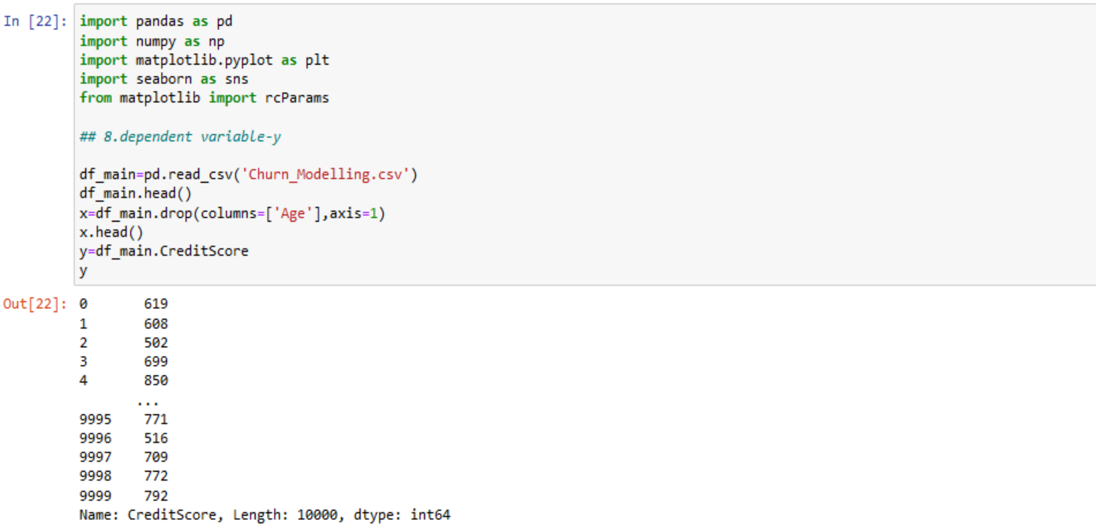


In [21]:

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

## 8.independent variable-x

df_main=pd.read_csv('Churn_Modelling.csv')
df_main.head()
x=df_main.drop(columns=['Age'],axis=1)
x.head()
```

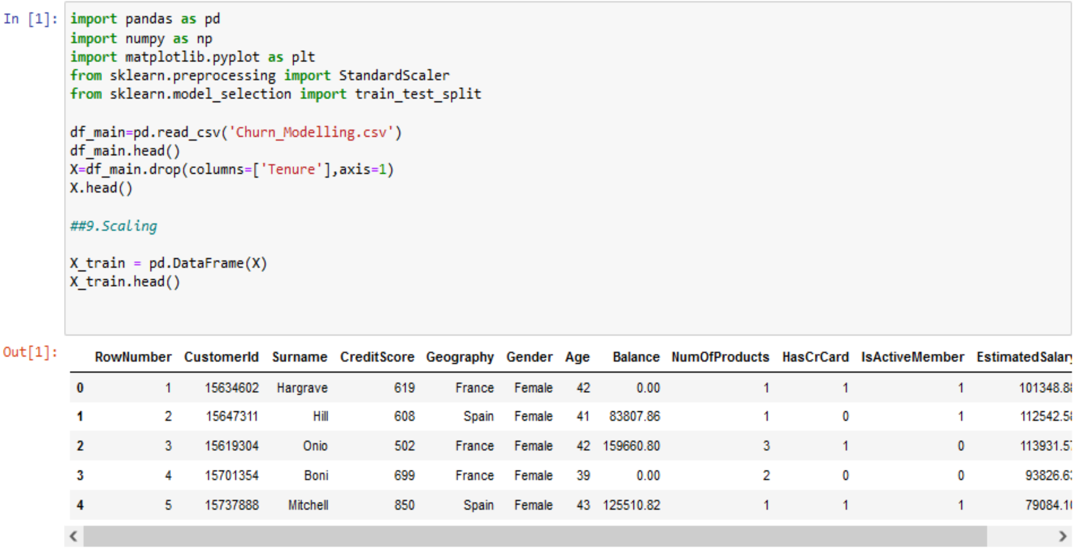
Out[21]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSa
0	1	15634602	Hargrave	619	France	Female	2	0.00	1	1	1	10134
1	2	15647311	Hill	608	Spain	Female	1	83807.86	1	0	1	11254
2	3	15619304	Onio	502	France	Female	8	159660.80	3	1	0	11393
3	4	15701354	Boni	699	France	Female	1	0.00	2	0	0	9382
4	5	15737888	Mitchell	850	Spain	Female	2	125510.82	1	1	1	7908



```
In [22]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         import seaborn as sns
         from matplotlib import rcParams

         ## 8.dependent variable-y

         df_main=pd.read_csv('Churn_Modelling.csv')
         df_main.head()
         x=df_main.drop(columns=['Age'],axis=1)
         x.head()
         y=df_main.CreditScore
         y

Out[22]: 0       619
         1       608
         2       502
         3       699
         4       850
                ...
         9995    771
         9996    516
         9997    709
         9998    772
         9999    792
         Name: CreditScore, Length: 10000, dtype: int64
```

9. Scale the independent variables

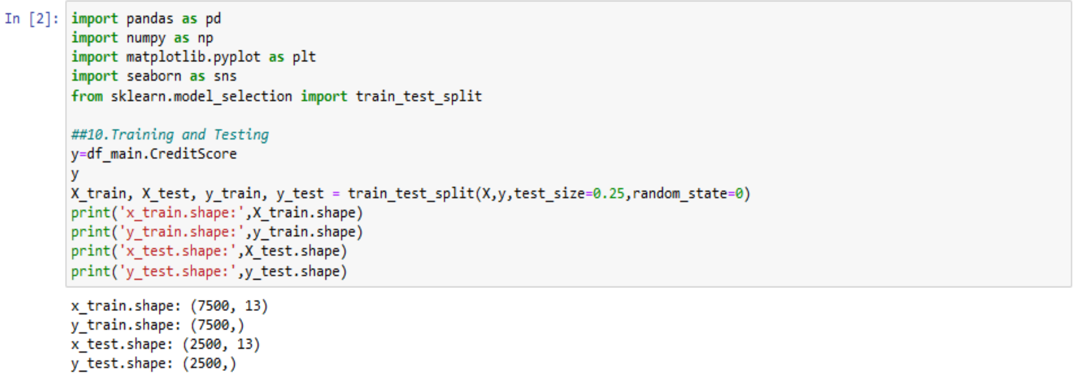


```
In [1]: import pandas as pd
        import numpy as np
        import matplotlib.pyplot as plt
        from sklearn.preprocessing import StandardScaler
        from sklearn.model_selection import train_test_split

        df_main=pd.read_csv('Churn_Modelling.csv')
        df_main.head()
        X=df_main.drop(columns=['Tenure'],axis=1)
        X.head()

        ##9.Scaling

        X_train = pd.DataFrame(X)
        X_train.head()
```

Out[1]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalar
0	1	15634602	Hargrave	619	France	Female	42	0.00	1	1	1	101348.8
1	2	15647311	Hill	608	Spain	Female	41	83807.86	1	0	1	112542.5
2	3	15619304	Onio	502	France	Female	42	159660.80	3	1	0	113931.5
3	4	15701354	Boni	699	France	Female	39	0.00	2	0	0	93826.6
4	5	15737888	Mitchell	850	Spain	Female	43	125510.82	1	1	1	79084.1

10. Split the data into training and testing



```
In [2]: import pandas as pd
        import numpy as np
        import matplotlib.pyplot as plt
        import seaborn as sns
        from sklearn.model_selection import train_test_split

        ##10.Training and Testing
        y=df_main.CreditScore
        y
        X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.25,random_state=0)
        print('x_train.shape:',X_train.shape)
        print('y_train.shape:',y_train.shape)
        print('x_test.shape:',X_test.shape)
        print('y_test.shape:',y_test.shape)

        x_train.shape: (7500, 13)
        y_train.shape: (7500,)
        x_test.shape: (2500, 13)
        y_test.shape: (2500,)
```