






Assignment Date	19september
Student Name	M.Vivek
Student Roll Number	962719106039
Maximum Mark	2 mark

Question –1

### 1. Download the dataset:

Churn_Modelling.csv														Open with ▾		  		 	
	A	B	C	D	E	F	G	H	I	J	K	L	M						
	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCreditCard	IsActiveMember	EstimatedSalary						
1	1	15634402	Hargrave	819	France	Female	42	2	0	1	1	1	120148.45						
2	2	15663711	Hill	609	France	Female	41	1	83307.86	1	0	1	112942.43						
3	3	15619304	Orio	502	France	Female	42	8	159660.8	3	1	0	113315.11						
4	4	15701354	Boni	699	France	Female	39	1	0	2	0	0	93826.6						
5	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1	79084.						
6	6	15574012	Chu	645	Spain	Male	44	8	113755.78	2	1	0	149756.7						
7	7	15592511	Barilett	822	France	Male	50	7	0	2	1	1	10062.						
8	8	15656148	Ottolina	376	Germany	Female	29	4	115046.74	4	1	0	119346.8						
9	9	15782365	He	501	France	Male	44	4	142051.07	2	0	1	74340.1						
10	10	15592389	HT	684	France	Male	27	2	134603.88	1	1	1	71725.75						
11	11	15797821	Brance	528	France	Male	31	6	102916.72	2	0	0	90181.6						
12	12	15737173	Andreas	497	Spain	Male	24	0	0	2	1	0	76390.9						
13	13	15632264	Key	436	France	Female	34	10	0	2	1	0	26290.9						
14	14	15691483	Chin	549	France	Female	25	5	0	2	0	0	190857.8						
15	15	15605882	Scott	635	Spain	Female	35	7	0	2	1	1	65951.6						
16	16	15643968	Goforth	616	Germany	Male	45	3	143129.41	2	0	1	64327.2						
17	17	15737452	Romeo	653	Germany	Male	58	1	126022.88	1	1	0	50977.6						
18	18	15788218	Henderson	549	Spain	Female	24	9	0	0	2	1	14406.4						
19	19	15661507	Muldown	587	Spain	Male	45	6	0	1	1	0	158684.8						
20	20	15568992	Hao	726	France	Male	40	0	0	2	1	1	54724.0						
21	21	15677607	McDonald	618	France	Male	41	7	119386.	2	1	1	170986.						
22	22	15597945	DeLucci	638	France	Female	32	8	0	2	1	0	138654.5						
23	23	15689305	Gerasimov	510	Spain	Female	22	4	0	1	1	0	118913.5						
24	24	15725737	Mosman	669	France	Male	39	0	0	2	0	1	8467.7						

### Question-2

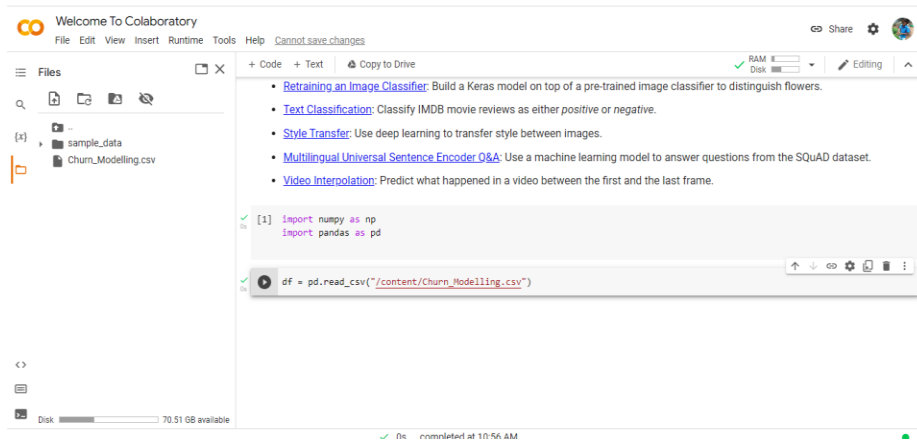
2. Load the dataset.

Solution:

```
import numpy as np
```

```
import pandas as pd
```

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



## Question\_3

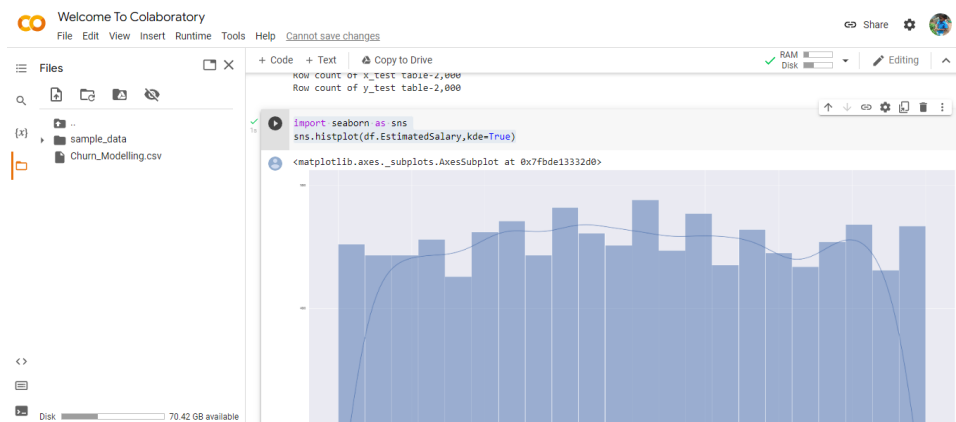
### 3. Perform Below Visualizations.

#### ● Univariate Analysis

Solution:

```
import seaborn as sns
```

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



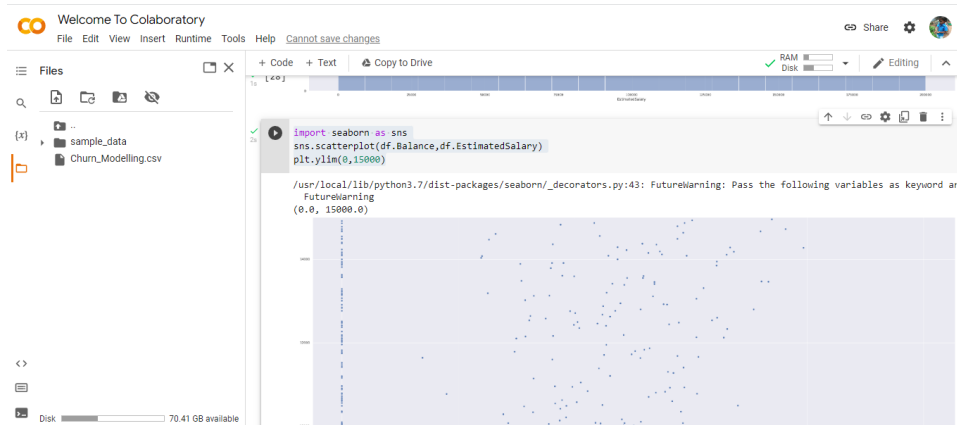
#### ● Bi - Variate Analysis

Solution:

```
import seaborn as sns
```

```
sns.scatterplot(df.Balance,df.EstimatedSalary)
```

```
plt.ylim(0,15000)
```



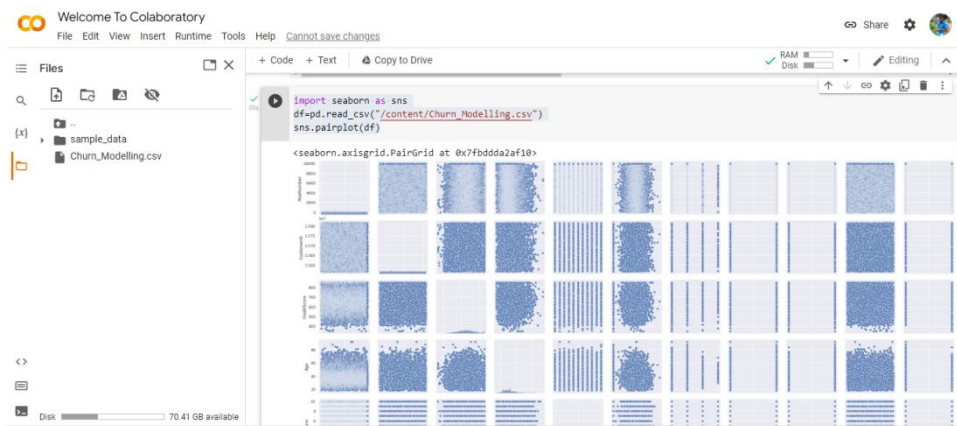
- Multi - Variate Analysis

Solution:

```
import seaborn as sns
```

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

```
sns.pairplot(df)
```



## Question\_4

4. Perform descriptive statistics on the data set

Solution:

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

```
df.describe(include='all')
```

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Editing

Files

sample\_data

Churn\_Modelling.csv

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

	RowNumber	CustomerId	Surname	Creditscore	Geography	Gender	Age	Tenure	Balance	NumOfChildren
count	10000.00000	1.000000e+04	10000	10000.000000	10000	10000	10000.000000	10000.000000	10000.000000	10000.000000
unique	NaN	NaN	2932	NaN	3	2	NaN	NaN	NaN	NaN
top	NaN	NaN	Smith	NaN	France	Male	NaN	NaN	NaN	NaN
freq	NaN	NaN	32	NaN	5014	5457	NaN	NaN	NaN	NaN
mean	5000.50000	1.569094e+07	NaN	650.528800	NaN	NaN	36.921800	5.012800	76485.889288	NaN
std	2886.89568	7.193619e+04	NaN	96.653299	NaN	NaN	10.487806	2.892174	62397.405202	NaN
min	1.00000	1.556570e+07	NaN	350.000000	NaN	NaN	18.000000	0.000000	0.000000	NaN
25%	2500.75000	1.562853e+07	NaN	584.000000	NaN	NaN	32.000000	3.000000	0.000000	NaN
50%	5000.50000	1.569074e+07	NaN	652.000000	NaN	NaN	37.000000	5.000000	97198.540000	NaN
75%	7500.25000	1.575323e+07	NaN	718.000000	NaN	NaN	44.000000	7.000000	127644.240000	NaN
max	10000.00000	1.581569e+07	NaN	850.000000	NaN	NaN	92.000000	10.000000	250898.090000	NaN

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## Question\_5

5. Handle the Missing values.

Solution:

```
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("/content/Churn_Modelling.csv")
```

```
df.head()
```

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sample\_data

Churn\_Modelling.csv

```

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("/content/Churn_Modelling.csv")
df.head()

```

RowNumber	CustomerId	Surname	Creditscore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActive
0	1	15634602	Hargrave	France	Female	42	2	0.00	1	1	
1	2	15647311	Hill	Spain	Female	41	1	83807.86	1	0	
2	3	15619304	Onio	France	Female	42	8	159660.80	3	1	
3	4	15701354	Boni	France	Female	39	1	0.00	2	0	
4	5	15737888	Mitchell	Spain	Female	43	2	125510.82	1	1	

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## Question\_6

6. Find the outliers and replace the outliers

Solution:

```
import pandas as pd
```

```
import matplotlib
```

```
from matplotlib import pyplot as pyplot
```

```
%matplotlib inline
```

```
matplotlib.rcParams['figure.figsize']=(10,6)
```

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

```
df.sample(5)
```

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```

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

```

RowNumber	CustomerId	Surname	Creditscore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActive
2471	2472	15995537	Trout	Germany	Male	49	9	171787.84	2	1	
7525	7526	15770406	Watson	Germany	Male	35	9	121355.19	1	0	
9560	9561	15658409	Mao	France	Male	41	5	128876.71	3	1	
259	260	15607178	Welch	Germany	Male	38	3	54901.01	1	1	
7495	7496	15889541	Sutherland	France	Female	27	2	0.00	2	0	

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## Question\_7

7. Check for Categorical columns and perform encoding.

Solution:

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

df.columns

import pandas as pd

import numpy as np

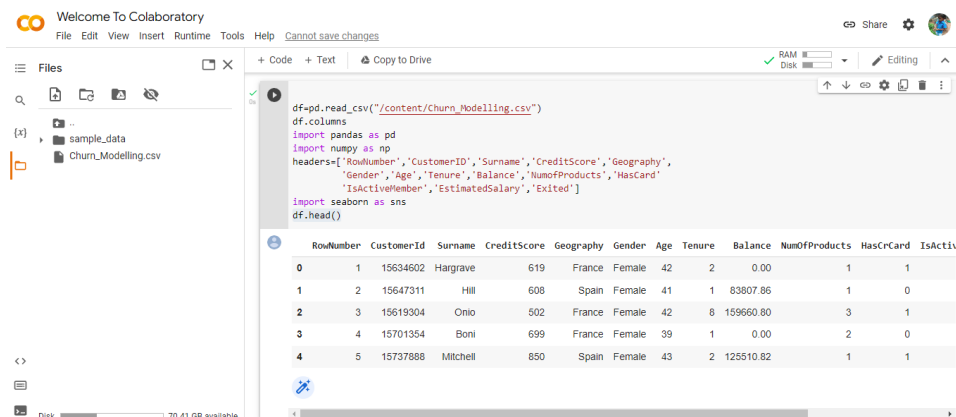
headers=['RowNumber','CustomerID','Surname','CreditScore','Geography',

         'Gender','Age','Tenure','Balance','NumofProducts','HasCard'

         'IsActiveMember','EstimatedSalary','Exited']

import seaborn as sns

df.head()
```



The screenshot shows the Google Colaboratory interface. On the left, the 'Files' pane shows a folder named 'sample\_data' containing a file named 'Churn\_Modelling.csv'. The main code editor contains the following Python code:

```
df=pd.read_csv("/content/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()
```

Below the code editor, the output of the code is displayed as a table with 12 columns: RowNumber, CustomerId, Surname, CreditScore, Geography, Gender, Age, Tenure, Balance, NumOfProducts, HasCrCard, and IsActiveMember. The first five rows of data are shown.

RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember
0	1	15634602	Hargrave	France	Female	42	2	0.00	1	1	1
1	2	15647311	Hill	Spain	Female	41	1	83807.86	1	0	0
2	3	15619304	Onio	France	Female	42	8	159650.80	3	1	1
3	4	15701354	Boni	France	Female	39	1	0.00	2	0	0
4	5	15737888	Mitchell	Spain	Female	43	2	125510.82	1	1	1

## Question\_8

8. Split the data into dependent and independent variables.

Solution:

```
x=df.iloc[:, :-1].values

print(x)

y=df.iloc[:, -1]._values

print(y)
```

```

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

[[1 15634502 '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]]

```

## Question\_9

9. Scale the independent variables

Solution:

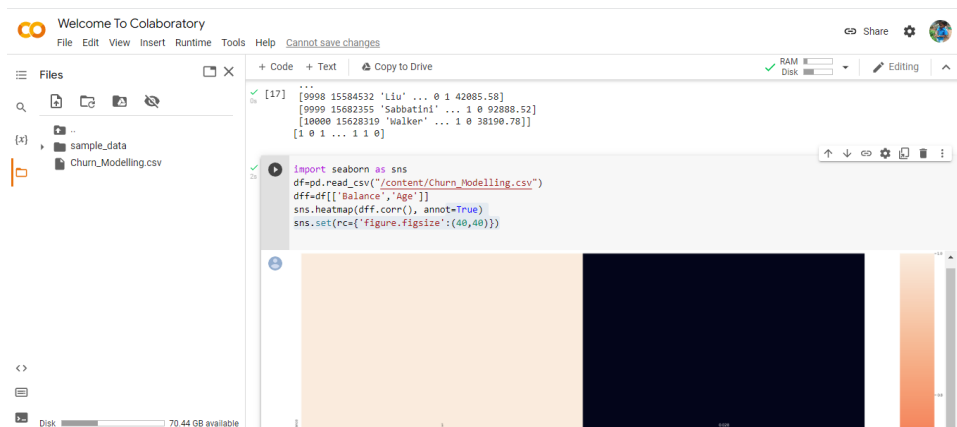
```
import seaborn as sns
```

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

```
dff=df[['Balance','Age']]
```

```
sns.heatmap(dff.corr(), annot=True)
```

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



## Question\_10

10. Split the data into training and testing

Solution:

```
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
```

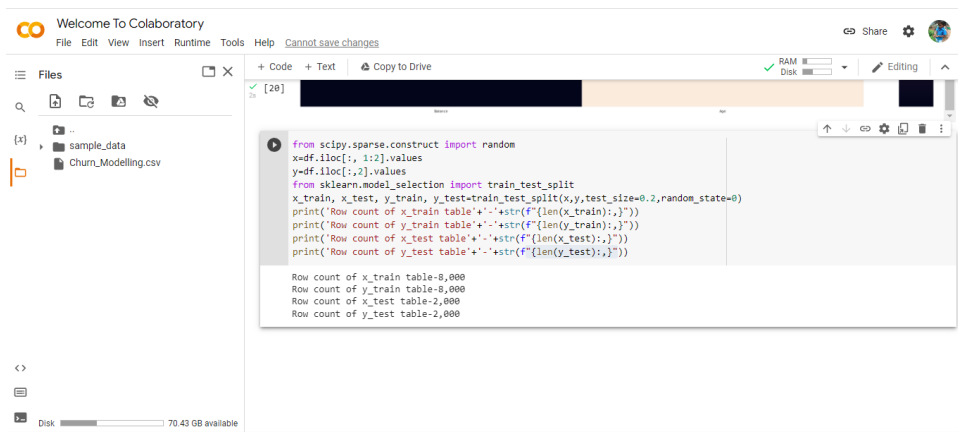
```
x_train, x_test, y_train, y_test=train_test_split(x,y,test_size=0.2,random_state=0)
```

```
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):,}"))
```



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Files

- sample\_data
- Churn\_Modelling.csv

```
[20] 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

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