Assignment -2

Python Programming

Assignment Date	30 September 2022
Student Name	R.Suraj
Student Roll Number	621319106093
Maximum Marks	2 Marks

Question-1:

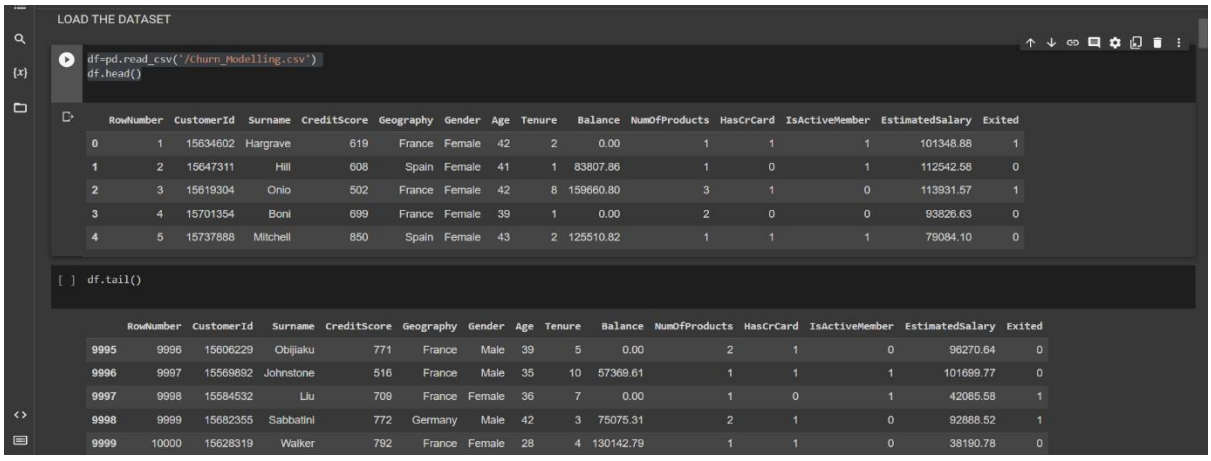
AFTER DOWNLOADING THE DATASET ,IMPORT NECESSARY LIBRARIES

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

LOAD THE DATASET

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

Solution:



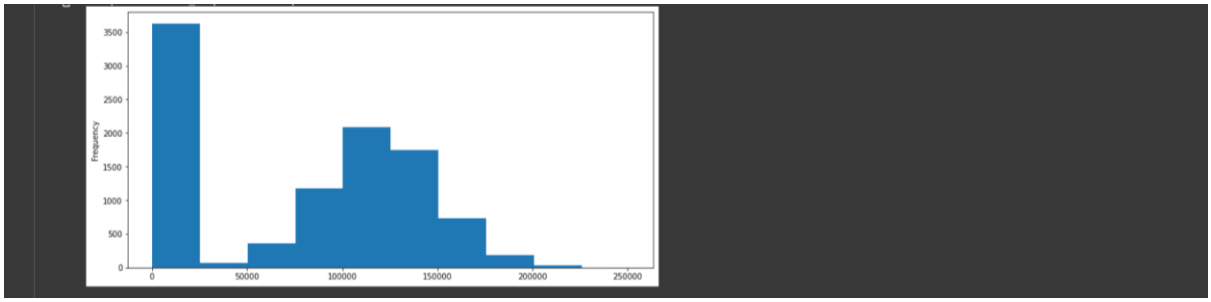
Question-2:

PERFORM VARIOUS VISUALIZATIONS

```
 # UNIVARIANT ANALYSIS

plt.figure()
df.Balance.plot(kind='hist' ,figsize=(12,6))
```

Solution:




```
#distribution plot
plt.figure()
sns.distplot(df.Tenure)
```

Solution:


```
plt.figure()
sns.countplot(df.Gender)
```

Solution:

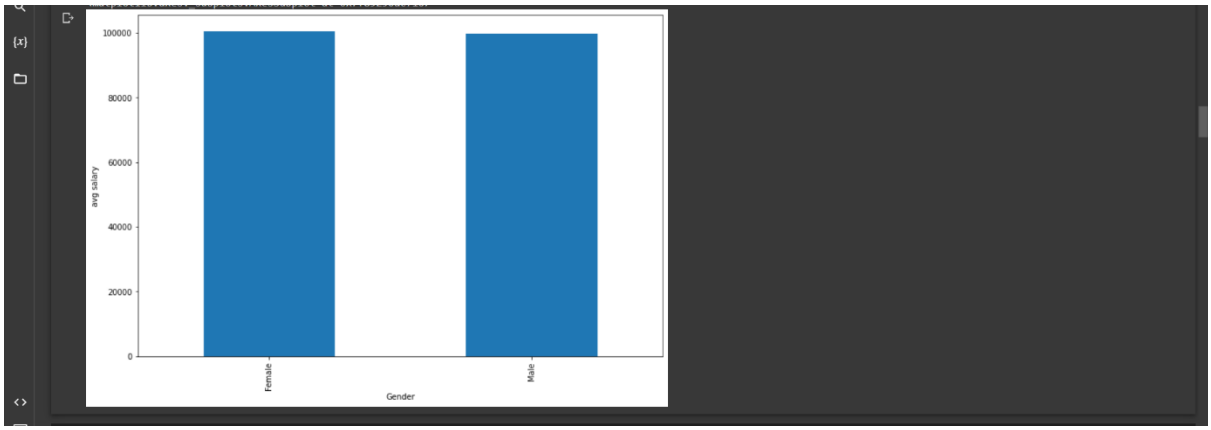

```
df.groupby(['Gender'])['EstimatedSalary'].mean().plot(kind='bar')
```

Solution:

Question-3:

```
#BIVARIANT ANALYSIS
df.groupby(['Gender'])['EstimatedSalary'].mean().plot(kind='bar',ylabel
='avg salary',figsize=(12,8))
```

Solution:



Question-4:

```
# 3.3 MULTI-VARIANT ANALYSIS
plt.scatter(x='CreditScore',y='EstimatedSalary',data=df,c='g',s=50)
plt.scatter(x='CreditScore',y='Balance',data=df,c='b',marker='*')
```

Solution:

Question-5:

```
# 4 DESCRIPTIVE STATISTICS ON THE DATASET
df.describe()
```

Solution:

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.00000	10000.000000	10000.000000	10000.000000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100	100090.239881	0.203700
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797	57510.492818	0.402769
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000000	1.000000	0.00000	0.000000	11.580000	0.000000
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	1.000000	0.00000	0.000000	51002.110000	0.000000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	1.000000	1.00000	1.000000	100193.915000	0.000000
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	2.000000	1.00000	1.000000	149388.247500	0.000000
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	4.000000	1.00000	1.000000	199992.480000	1.000000

Question-6:

```
# 5 HANDLING THE MISSING VALUES
df.isnull().sum()
```

Solution:

```
RowNumber          0
CustomerId         0
Surname            0
CreditScore        0
Geography          0
Gender             0
Age                0
Tenure             0
Balance            0
NumOfProducts      0
HasCrCard          0
IsActiveMember     0
EstimatedSalary    0
Exited             0
dtype: int64
```

```
df.plot()
```

Solution:

Solution:

```
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
```

```
df['NumOfProducts'].value_counts()
```

Solution:

```
df['NumOfProducts'].value_counts()

1    5084
2    4590
3     266
4      60
Name: NumOfProducts, dtype: int64
```

```
df['Age'].unique()
```

Solution:

```
[ ] df['Age'].unique()

array([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])
```

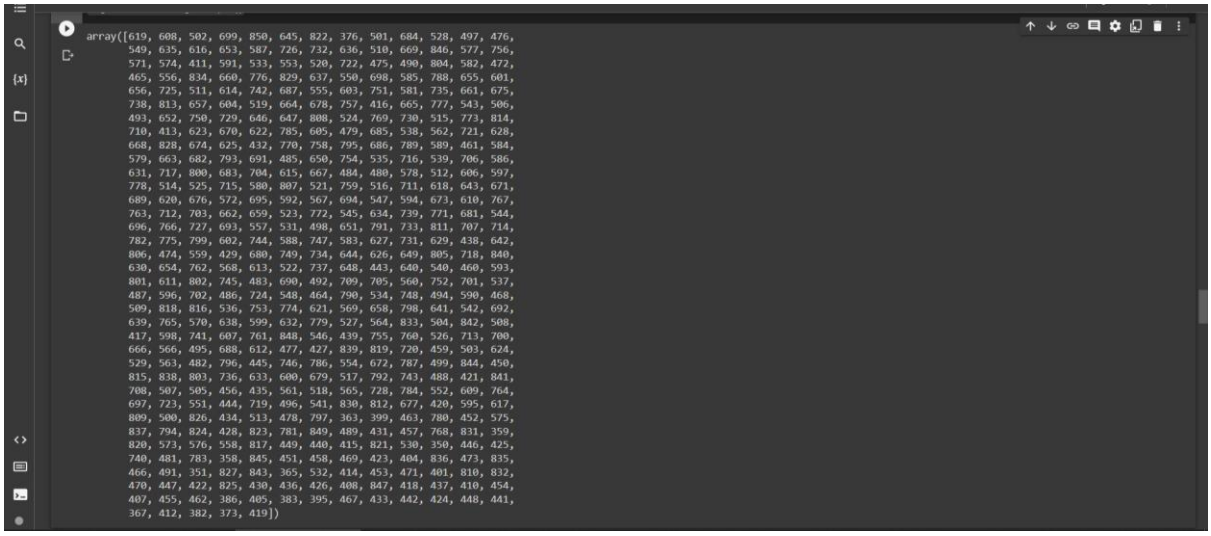
```
df['NumOfProducts'].unique()
```

Solution:

```
array([1, 3, 2, 4])
```

```
df['CreditScore'].unique()
```

Solution:



```
array([619, 608, 502, 699, 850, 645, 822, 376, 501, 684, 528, 497, 476,
       549, 635, 616, 653, 587, 726, 732, 636, 510, 669, 846, 577, 756,
       571, 574, 411, 591, 533, 553, 520, 722, 475, 490, 804, 582, 472,
       465, 556, 834, 660, 776, 829, 637, 550, 698, 585, 788, 655, 601,
       656, 725, 511, 614, 742, 687, 555, 603, 751, 581, 735, 661, 675,
       738, 813, 657, 604, 519, 664, 678, 757, 416, 665, 777, 543, 506,
       493, 652, 750, 729, 646, 647, 808, 524, 769, 730, 515, 773, 814,
       710, 413, 623, 670, 622, 785, 605, 479, 685, 538, 562, 721, 628,
       668, 828, 674, 625, 432, 770, 758, 795, 686, 789, 589, 461, 584,
       579, 663, 682, 793, 691, 485, 650, 754, 535, 716, 539, 706, 586,
       631, 717, 800, 683, 704, 615, 667, 484, 480, 578, 512, 606, 597,
       778, 514, 525, 715, 580, 807, 521, 759, 516, 711, 618, 643, 671,
       689, 620, 676, 572, 695, 592, 567, 694, 547, 594, 673, 610, 767,
       763, 712, 703, 662, 659, 523, 772, 545, 634, 739, 771, 681, 544,
       696, 766, 727, 693, 557, 531, 498, 651, 791, 733, 811, 707, 714,
       782, 775, 799, 602, 744, 588, 747, 583, 627, 731, 629, 438, 642,
       806, 474, 559, 429, 680, 749, 734, 644, 626, 649, 805, 718, 840,
       630, 654, 762, 568, 613, 522, 737, 648, 443, 640, 540, 460, 593,
       801, 611, 802, 745, 483, 690, 492, 709, 705, 560, 752, 701, 537,
       487, 596, 702, 486, 724, 548, 464, 790, 534, 748, 494, 590, 468,
       509, 818, 816, 536, 753, 774, 621, 569, 658, 798, 641, 542, 692,
       639, 765, 570, 638, 599, 632, 779, 527, 564, 833, 504, 842, 508,
       417, 598, 741, 607, 761, 848, 546, 439, 755, 760, 526, 713, 700,
       666, 566, 495, 688, 612, 477, 427, 839, 819, 720, 459, 503, 624,
       529, 563, 482, 796, 445, 746, 786, 554, 672, 787, 499, 844, 450,
       815, 838, 803, 736, 633, 600, 679, 517, 792, 743, 488, 421, 841,
       708, 507, 505, 456, 435, 561, 518, 565, 728, 784, 552, 609, 764,
       697, 723, 551, 444, 719, 496, 541, 830, 812, 677, 420, 595, 617,
       809, 500, 826, 434, 513, 478, 797, 363, 399, 463, 780, 452, 575,
       837, 794, 824, 428, 823, 781, 849, 489, 431, 457, 768, 831, 359,
       820, 573, 576, 558, 817, 449, 440, 415, 821, 530, 350, 446, 425,
       740, 481, 783, 358, 845, 451, 458, 469, 423, 404, 836, 473, 835,
       466, 491, 351, 827, 843, 365, 532, 414, 453, 471, 401, 810, 832,
       470, 447, 422, 825, 430, 436, 426, 408, 847, 418, 437, 410, 454,
       407, 455, 462, 386, 405, 383, 395, 467, 433, 442, 424, 448, 441,
       367, 412, 382, 373, 419])
```

```
df['Balance'].unique()
```

Solution:

```
array([ 0.  , 83807.86, 159660.8 , ..., 57369.61, 75075.31, 130142.79])
```

```
df['Balance'].value_counts()
```

Solution:


```
df['EstimatedSalary'].value_counts()
```

Solution:

Question-7:

Solution:

```
# 6 OUTLIERS
df['EstimatedSalary'].unique()
```

```
array([101348.88, 112542.58, 113931.57, ..., 42085.58, 92888.52,
38190.78])
```

Question-8:

Solution:

```
# 7 CHECK FOR CATEGORICAL VALUES AND PERFORM ENCODING
df.info()
```

Solution:

```
# 7 CHECK FOR CATEGORICAL VALUES AND PERFORM ENCODING
df.info()
```

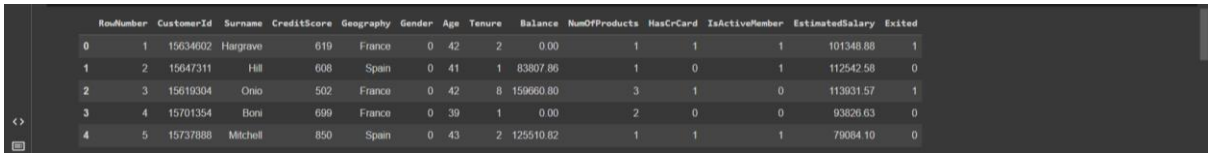
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 14 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   RowNumber        10000 non-null  int64
 1   CustomerId       10000 non-null  int64
 2   Surname          10000 non-null  object
 3   CreditScore      10000 non-null  int64
 4   Geography        10000 non-null  object
 5   Gender           10000 non-null  object
 6   Age              10000 non-null  int64
 7   Tenure           10000 non-null  int64
 8   Balance          10000 non-null  float64
 9   NumOfProducts    10000 non-null  int64
 10  HasCrCard        10000 non-null  int64
 11  IsActiveMember   10000 non-null  int64
 12  EstimatedSalary  10000 non-null  float64
 13  Exited           10000 non-null  int64
dtypes: float64(2), int64(9), object(3)
memory usage: 1.1+ MB
```

```
from sklearn.preprocessing import LabelEncoder, StandardScaler

label_encoder = LabelEncoder()

df['Gender'] = label_encoder.fit_transform(df['Gender'])
df.head()
```

Solution:

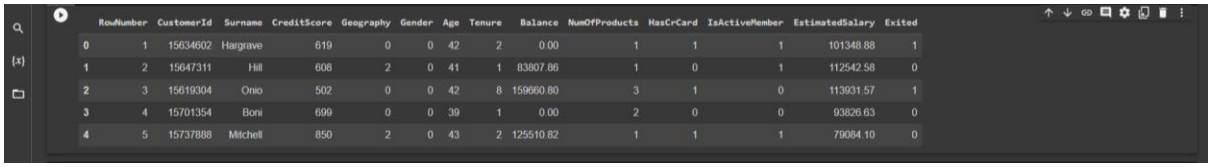


	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	Hargrave	619	France	0	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	Spain	0	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	France	0	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	France	0	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Mitchell	850	Spain	0	43	2	125510.82	1	1	1	79084.10	0

```
label_encoder = LabelEncoder()

df['Geography'] = label_encoder.fit_transform(df['Geography'])
df.head()
```

Solution:



	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	Hargrave	619	0	0	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	2	0	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	0	0	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	0	0	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Mitchell	850	2	0	43	2	125510.82	1	1	1	79084.10	0

```
df['Geography'].unique()
```

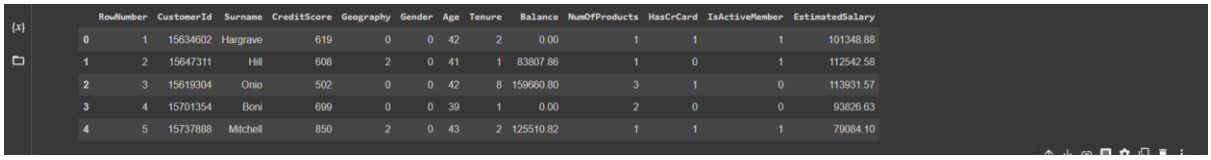
Solution:

```
array([0, 2, 1])
```

Question-9:

```
x=df.iloc[:,:-1]
y=df.iloc[:,-1]
# 8 SPLITTING DATA INTO INDEPENDENT AND DEPENDENT VARIABLES
x.head()
```

Solution:



	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary
0	1	15634602	Hargrave	619	0	0	42	2	0.00	1	1	1	101348.88
1	2	15647311	Hill	608	2	0	41	1	83807.86	1	0	1	112542.58
2	3	15619304	Onio	502	0	0	42	8	159660.80	3	1	0	113931.57
3	4	15701354	Boni	699	0	0	39	1	0.00	2	0	0	93826.63
4	5	15737888	Mitchell	850	2	0	43	2	125510.82	1	1	1	79084.10

```
y.head()
```

Solution:

```
0 1 1 0 2 1 3 0 4 0 Name: Exited, dtype: int64
```

```
df.info()
```

```
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 14 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   RowNumber        10000 non-null  int64
 1   CustomerId       10000 non-null  int64
 2   Surname          10000 non-null  object
 3   CreditScore      10000 non-null  int64
 4   Geography        10000 non-null  int64
 5   Gender           10000 non-null  int64
 6   Age              10000 non-null  int64
 7   Tenure           10000 non-null  int64
 8   Balance          10000 non-null  float64
 9   NumOfProducts    10000 non-null  int64
 10  HasCrCard        10000 non-null  int64
 11  IsActiveMember   10000 non-null  int64
 12  EstimatedSalary  10000 non-null  float64
 13  Exited           10000 non-null  int64
dtypes: float64(2), int64(11), object(1)
memory usage: 1.1+ MB
```

Question-10:

```
df.drop('Surname', axis=1, inplace=True)
x=df.iloc[:,6:10]
y=df.iloc[:,6:10]
#9 SPLITTING THE DATA INTO TRAIN AND TEST
from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(x, y, test_size=0.3
, random_state=0)
X_train.head()
```

Solution:

	Tenure	Balance	NumOfProducts	HasCrCard
7681	2	146193.60	2	1
9031	7	0.00	2	1
3691	5	160979.68	1	0
202	5	0.00	1	0
5625	7	143262.04	1	1

Question-11:

```
#10 SCALING INDEPENDENT VARIABLES
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train= sc.fit_transform(X_train)
print(X_train)
```

Solution:

```
#10 SCALING INDEPENDENT VARIABLES
from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
X_train= sc.fit_transform(X_train)
print(X_train)
```