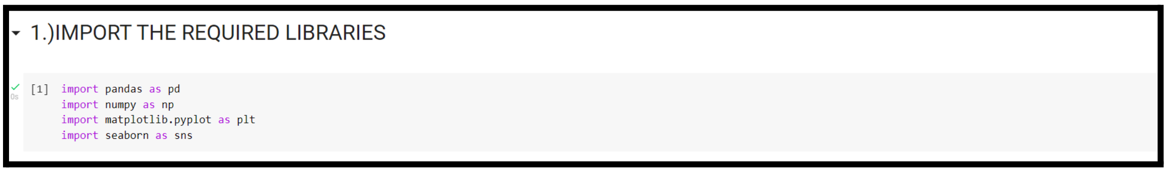
UNIVERSITY ADMIT ELIGIBILITY PREDICTOR

ASSIGNMENT - 4

Date	4th October 2022
Team ID	PNT2022TMID27839
Student Name	Chandan Kumar A K (311519104010)
Domain Name	Education
Project Name	University Admit Eligibility Predictor
Maximum Marks	2 Marks

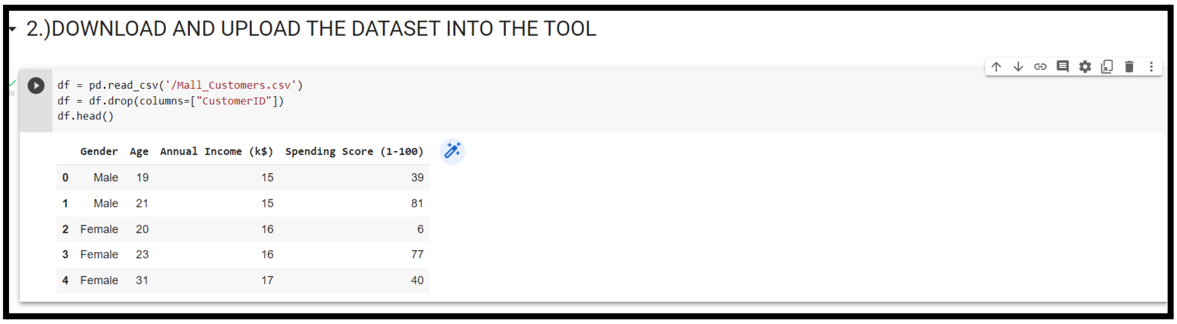
1.)IMPORT THE REQUIRED LIBRARIES



1.)IMPORT THE REQUIRED LIBRARIES

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

2.)DOWNLOAD AND UPLOAD THE DATASET

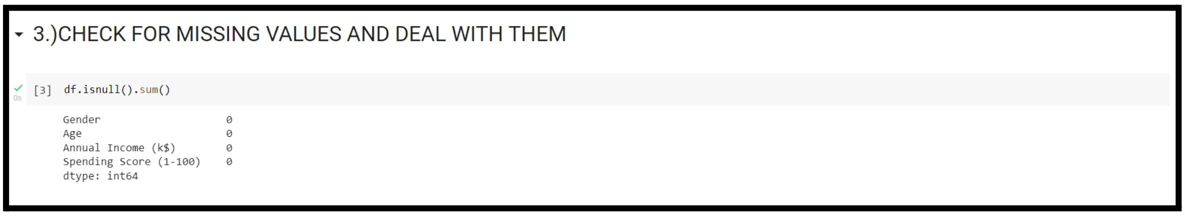


2.)DOWNLOAD AND UPLOAD THE DATASET INTO THE TOOL

```
df = pd.read_csv('/Mall_Customers.csv')
df = df.drop(columns=["CustomerID"])
df.head()
```

	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	Male	19	15	39
1	Male	21	15	81
2	Female	20	16	6
3	Female	23	16	77
4	Female	31	17	40

3.)HANDLE MISSING VALUES AND DEAL WITH THEM

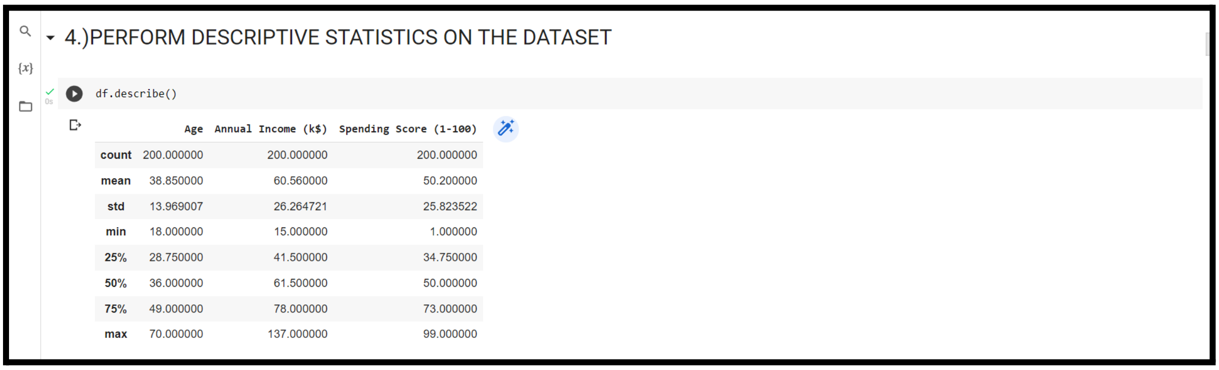


3.)CHECK FOR MISSING VALUES AND DEAL WITH THEM

```
[3] df.isnull().sum()
```

```
Gender                    0
Age                       0
Annual Income (k$)        0
Spending Score (1-100)    0
dtype: int64
```

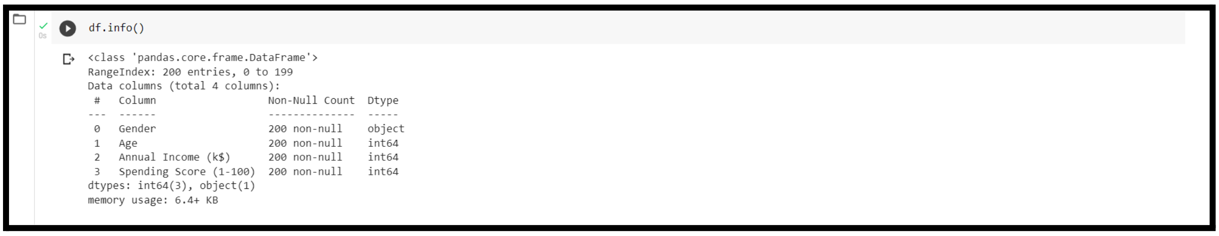
4.) PERFORM THE DESCRIPTIVE STATISTICS ON THE DATASET



4.)PERFORM DESCRIPTIVE STATISTICS ON THE DATASET

```
df.describe()
```

	Age	Annual Income (k$)	Spending Score (1-100)
count	200.000000	200.000000	200.000000
mean	38.850000	60.560000	50.200000
std	13.969007	26.264721	25.823522
min	18.000000	15.000000	1.000000
25%	28.750000	41.500000	34.750000
50%	36.000000	61.500000	50.000000
75%	49.000000	78.000000	73.000000
max	70.000000	137.000000	99.000000

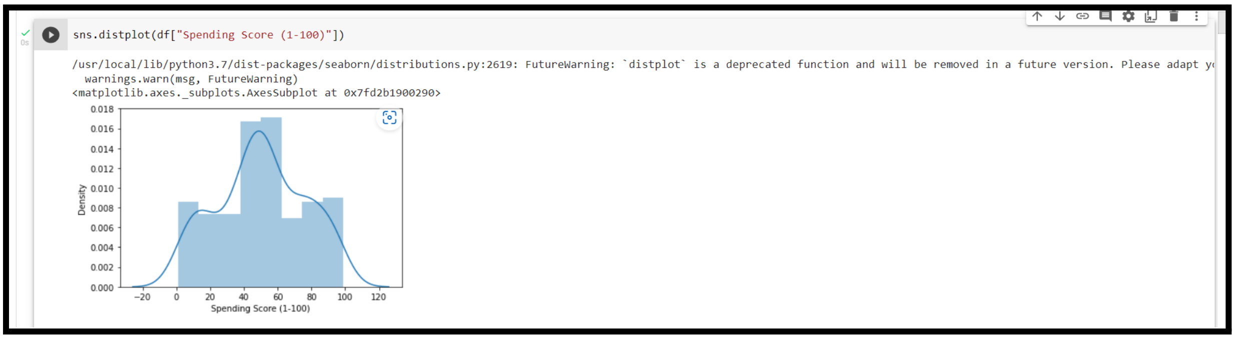


```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 4 columns):
 #   Column                  Non-Null Count  Dtype 
---  ------                  --------------  ----- 
 0   Gender                  200 non-null    object
 1   Age                     200 non-null    int64 
 2   Annual Income (k$)      200 non-null    int64 
 3   Spending Score (1-100)  200 non-null    int64 
dtypes: int64(3), object(1)
memory usage: 6.4+ KB
```

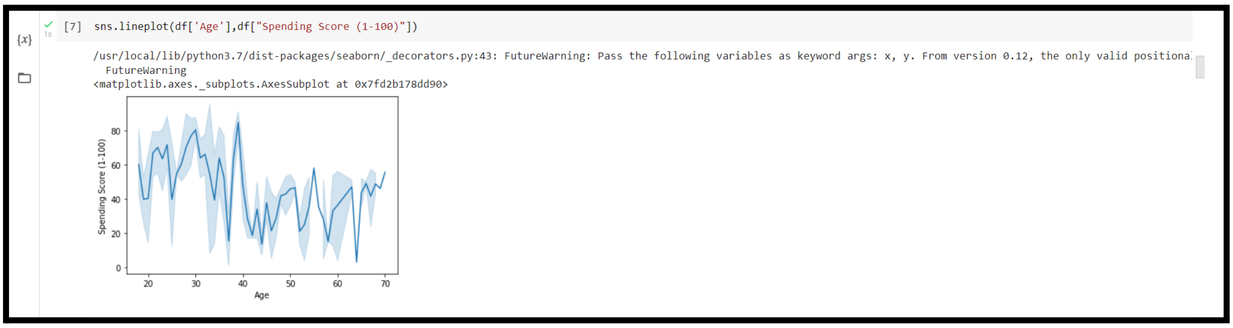
5.) PERFORM VARIOUS VISUALISATIONS

a.) UNIVARIANTE ANALYSIS



```
sns.distplot(df["Spending Score (1-100)"])
```

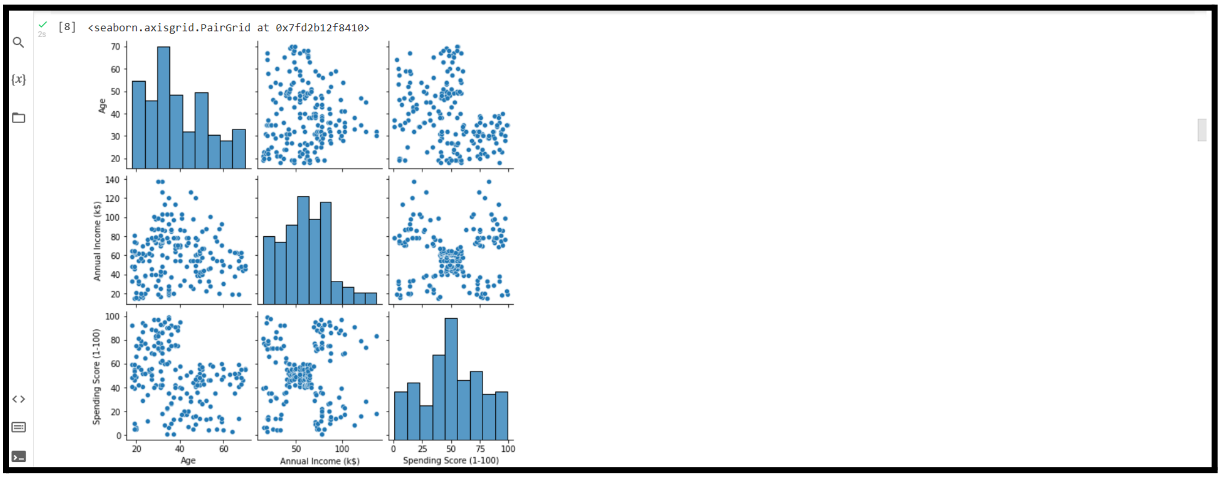
```
/usr/local/lib/python3.7/dist-packages/seaborn/distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future version. Please adapt yo
  warnings.warn(msg, FutureWarning)
<matplotlib.axes._subplots.AxesSubplot at 0x7fd2b1900290>
```



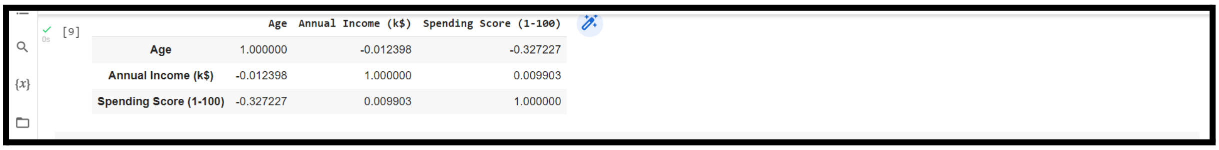
```
[7] sns.lineplot(df['Age'],df["Spending Score (1-100)"])
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positiona
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7fd2b178dd90>
```

b.) MULTI - VARIANTE ANALYSIS

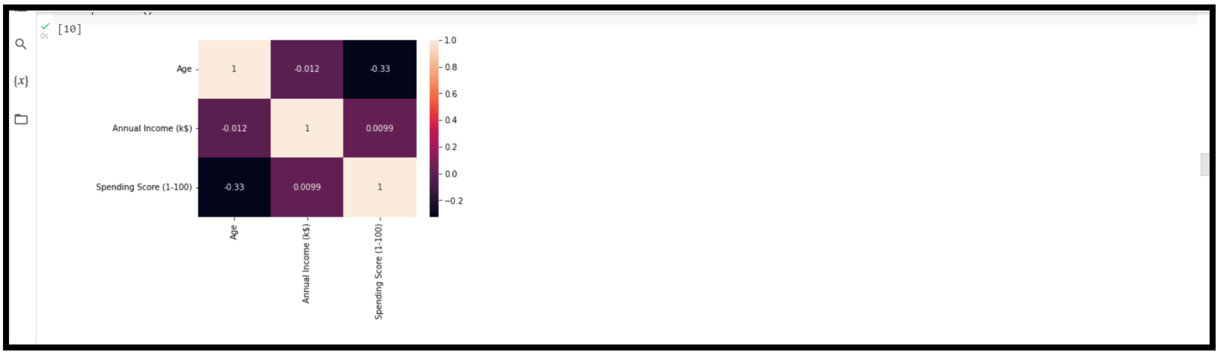


```
[8] <seaborn.axisgrid.PairGrid at 0x7fd2b12f8410>
```



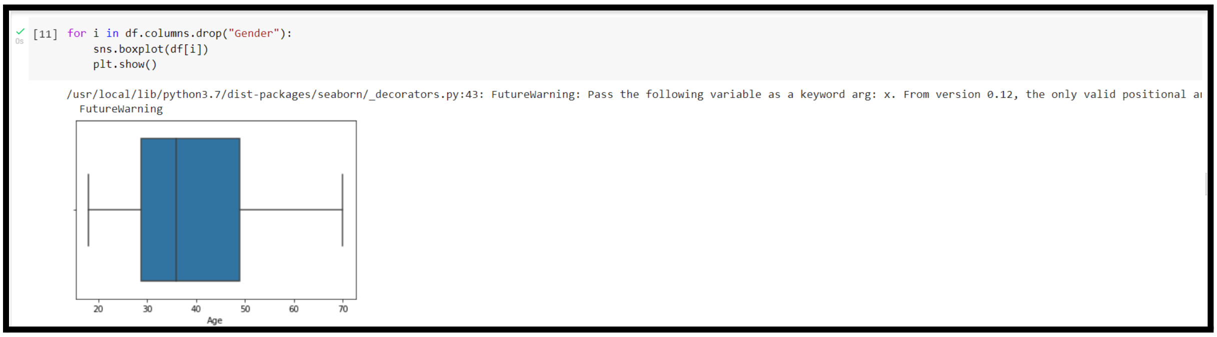
[9]

	Age	Annual Income (k$)	Spending Score (1-100)
Age	1.000000	-0.012398	-0.327227
Annual Income (k$)	-0.012398	1.000000	0.009903
Spending Score (1-100)	-0.327227	0.009903	1.000000



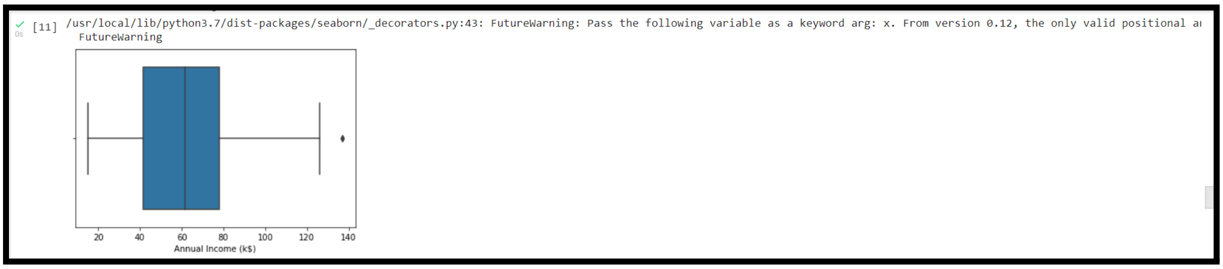
[10]

6.) FIND AND REPLACE THE OUTLIERS

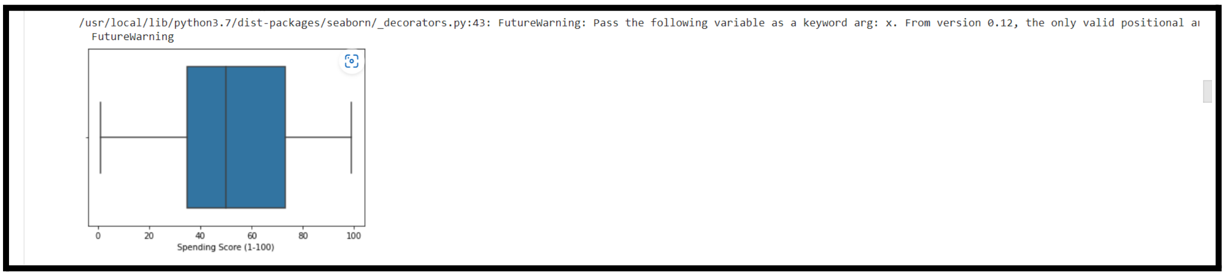


```
[11] for i in df.columns.drop("Gender"):
         sns.boxplot(df[i])
         plt.show()
```

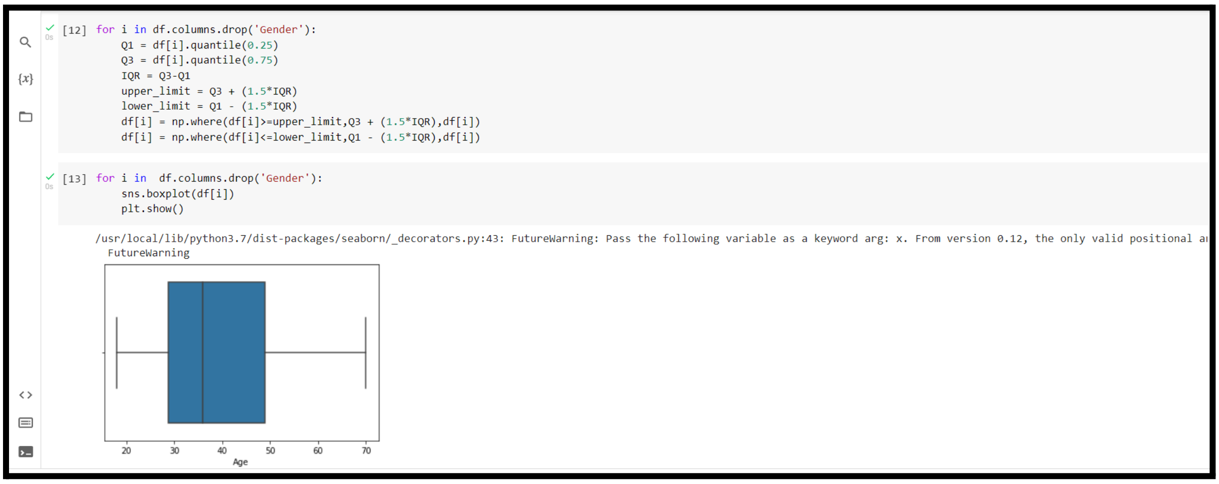
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional a
  FutureWarning
```



```
[11] /usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional ar
       FutureWarning
```



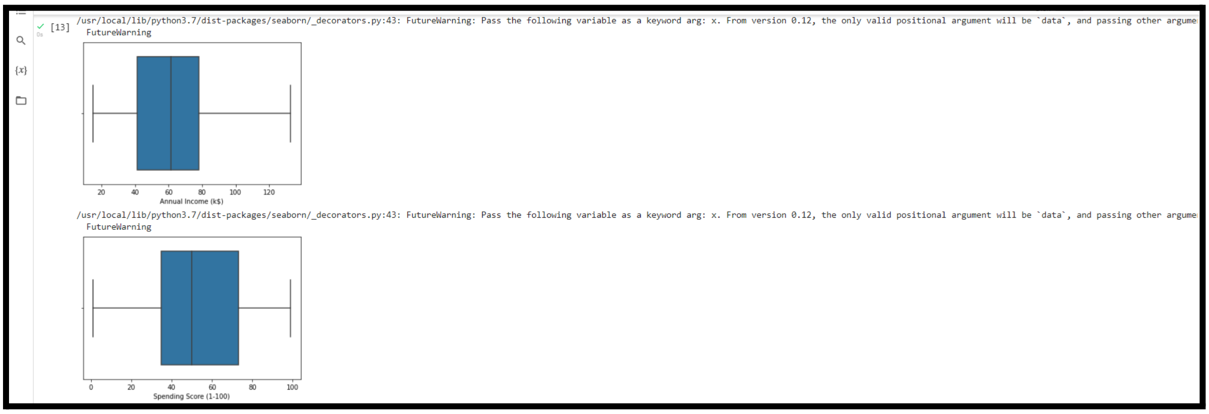
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional ar
  FutureWarning
```



```
[12] for i in df.columns.drop('Gender'):
         Q1 = df[i].quantile(0.25)
         Q3 = df[i].quantile(0.75)
         IQR = Q3-Q1
         upper_limit = Q3 + (1.5*IQR)
         lower_limit = Q1 - (1.5*IQR)
         df[i] = np.where(df[i]>=upper_limit,Q3 + (1.5*IQR),df[i])
         df[i] = np.where(df[i]<=lower_limit,Q1 - (1.5*IQR),df[i])
```

```
[13] for i in  df.columns.drop('Gender'):
         sns.boxplot(df[i])
         plt.show()
```

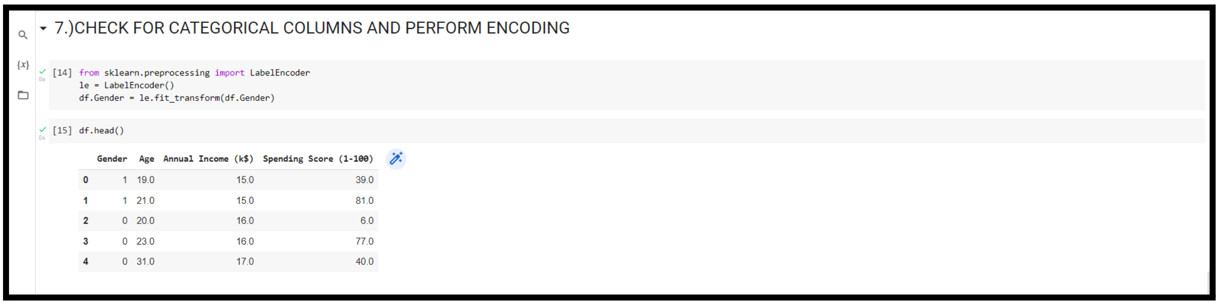
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional ar
  FutureWarning
```



```
[13] /usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other argume
       FutureWarning
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other argume
  FutureWarning
```

7.) CHECK FOR CATEGORICAL COLUMNS AND ENCODE THEM



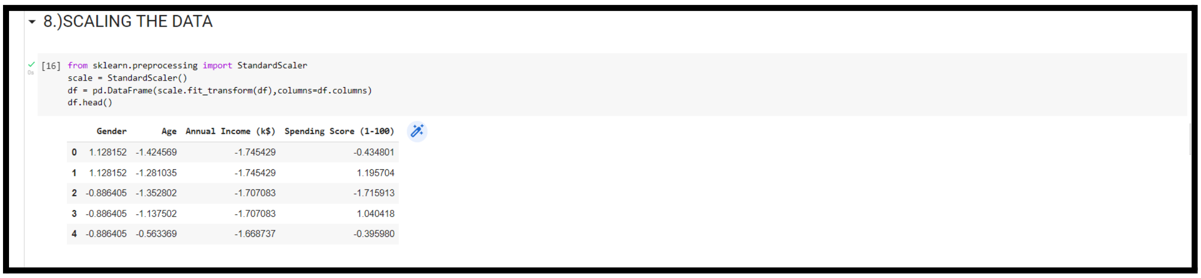
7.)CHECK FOR CATEGORICAL COLUMNS AND PERFORM ENCODING

```
[14] from sklearn.preprocessing import LabelEncoder
     le = LabelEncoder()
     df.Gender = le.fit_transform(df.Gender)
```

```
[15] df.head()
```

	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	19.0	15.0	39.0
1	1	21.0	15.0	81.0
2	0	20.0	16.0	6.0
3	0	23.0	16.0	77.0
4	0	31.0	17.0	40.0

8.) SCALING THE DATA

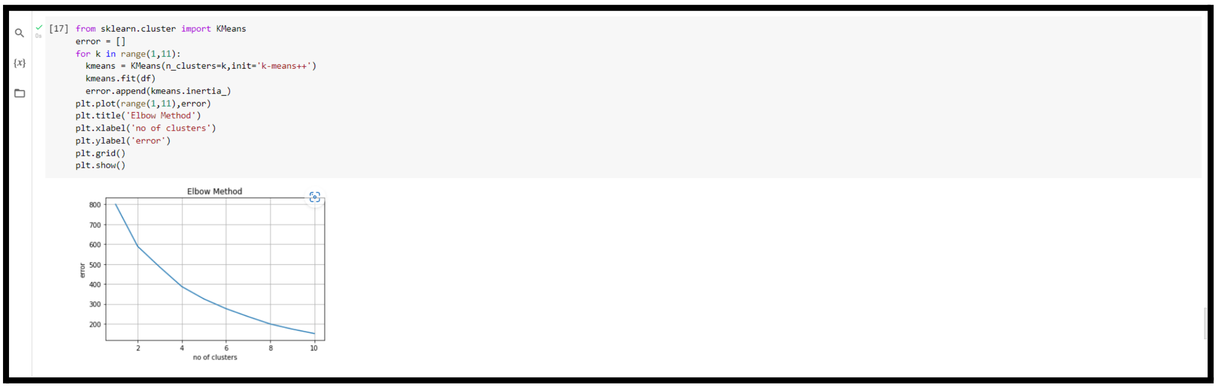


8.)SCALING THE DATA

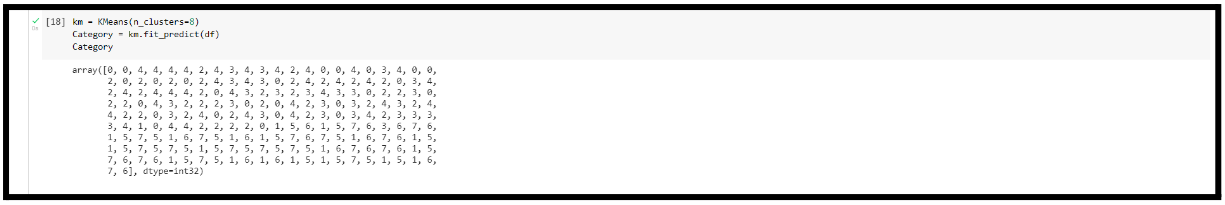
```
[16] from sklearn.preprocessing import StandardScaler
     scale = StandardScaler()
     df = pd.DataFrame(scale.fit_transform(df),columns=df.columns)
     df.head()
```

	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1.128152	-1.424569	-1.745429	-0.434801
1	1.128152	-1.281035	-1.745429	1.195704
2	-0.886405	-1.352802	-1.707083	-1.715913
3	-0.886405	-1.137502	-1.707083	1.040418
4	-0.886405	-0.563369	-1.668737	-0.395980

9.) PERFORMING ANY OF THE CLUSTERING ALGORITHMS



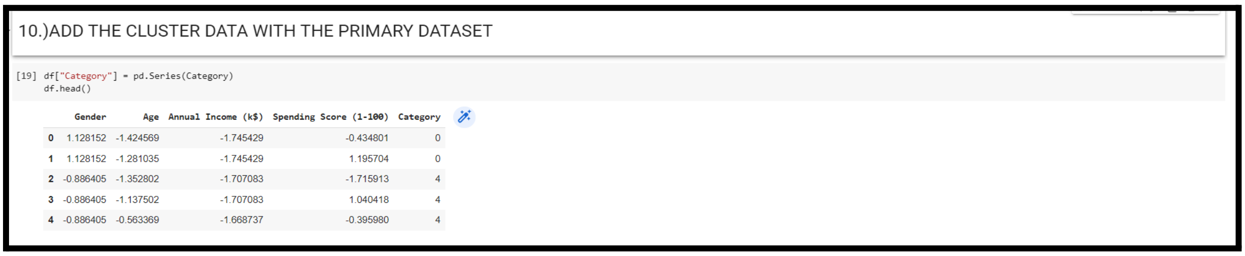
```
[17] from sklearn.cluster import KMeans
     error = []
     for k in range(1,11):
       kmeans = KMeans(n_clusters=k,init='k-means++')
       kmeans.fit(df)
       error.append(kmeans.inertia_)
     plt.plot(range(1,11),error)
     plt.title('Elbow Method')
     plt.xlabel('no of clusters')
     plt.ylabel('error')
     plt.grid()
     plt.show()
```



```
[18] km = KMeans(n_clusters=8)
     Category = km.fit_predict(df)
     Category

     array([0, 0, 4, 4, 4, 4, 2, 4, 3, 4, 3, 4, 2, 4, 0, 0, 4, 0, 3, 4, 0, 0,
            2, 0, 2, 0, 2, 0, 2, 4, 3, 4, 3, 0, 2, 4, 2, 4, 2, 4, 2, 0, 3, 4,
            2, 4, 2, 4, 4, 4, 2, 0, 4, 3, 2, 3, 2, 3, 4, 3, 3, 0, 2, 2, 3, 0,
            2, 2, 0, 4, 3, 2, 2, 2, 3, 0, 2, 0, 4, 2, 3, 0, 3, 2, 4, 3, 2, 4,
            4, 2, 2, 0, 3, 2, 4, 0, 2, 4, 3, 0, 4, 2, 3, 0, 3, 4, 2, 3, 3, 3,
            3, 4, 1, 0, 4, 4, 2, 2, 2, 2, 0, 1, 5, 6, 1, 5, 7, 6, 3, 6, 7, 6,
            1, 5, 7, 5, 1, 6, 7, 5, 1, 6, 1, 5, 7, 6, 7, 5, 1, 6, 7, 6, 1, 5,
            1, 5, 7, 5, 7, 5, 1, 5, 7, 5, 7, 5, 7, 5, 1, 6, 7, 6, 7, 6, 1, 5,
            7, 6, 7, 6, 1, 5, 7, 5, 1, 6, 1, 6, 1, 5, 1, 5, 7, 5, 1, 5, 1, 6,
            7, 6], dtype=int32)
```

10.) ADD THE CLUSTER DATA WITH THE PRIMARY DATASET

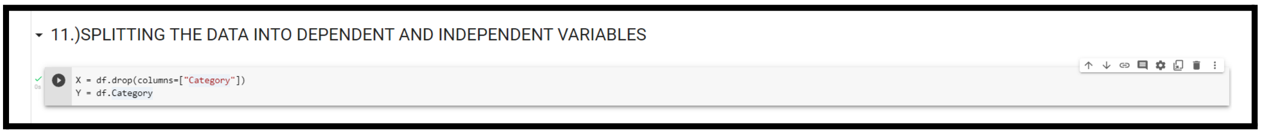


10.)ADD THE CLUSTER DATA WITH THE PRIMARY DATASET

```
[19] df["Category"] = pd.Series(Category)
     df.head()
```

```
      Gender       Age  Annual Income (k$)  Spending Score (1-100)  Category
0   1.128152 -1.424569           -1.745429               -0.434801         0
1   1.128152 -1.281035           -1.745429                1.195704         0
2  -0.886405 -1.352802           -1.707083               -1.715913         4
3  -0.886405 -1.137502           -1.707083                1.040418         4
4  -0.886405 -0.563369           -1.668737               -0.395980         4
```

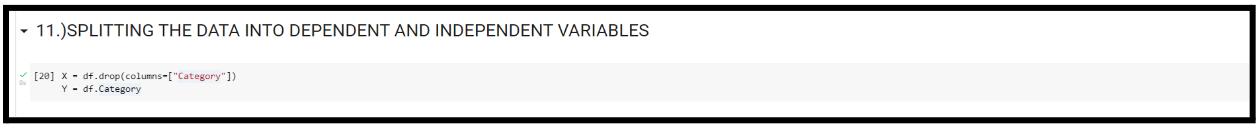
11.)SPLITTING THE DATA INTO DEPENDENT AND INDEPENDENT VARIABLES



11.)SPLITTING THE DATA INTO DEPENDENT AND INDEPENDENT VARIABLES

```
X = df.drop(columns=["Category"])
Y = df.Category
```

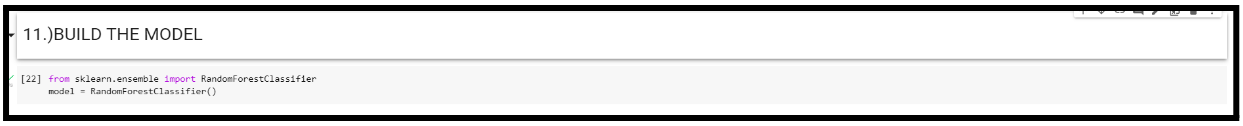
12.)SPLIT THE DATA INTO TRAINING AND TESTING DATA



11.)SPLITTING THE DATA INTO DEPENDENT AND INDEPENDENT VARIABLES

```
[20] X = df.drop(columns=["Category"])
     Y = df.Category
```

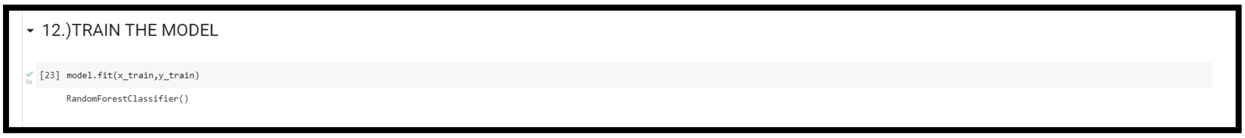
13.) BUILD THE MODEL



11.)BUILD THE MODEL

```
[22] from sklearn.ensemble import RandomForestClassifier
     model = RandomForestClassifier()
```

14.) TRAIN THE MODEL

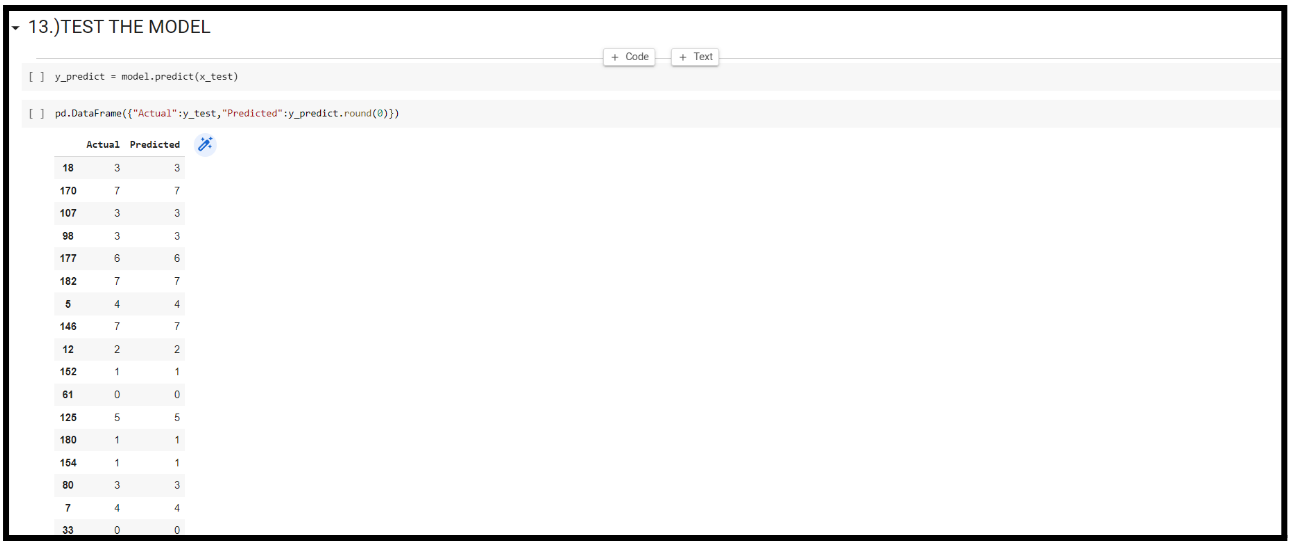


12.)TRAIN THE MODEL

```
[23] model.fit(x_train,y_train)

     RandomForestClassifier()
```

15.) TEST THE MODEL

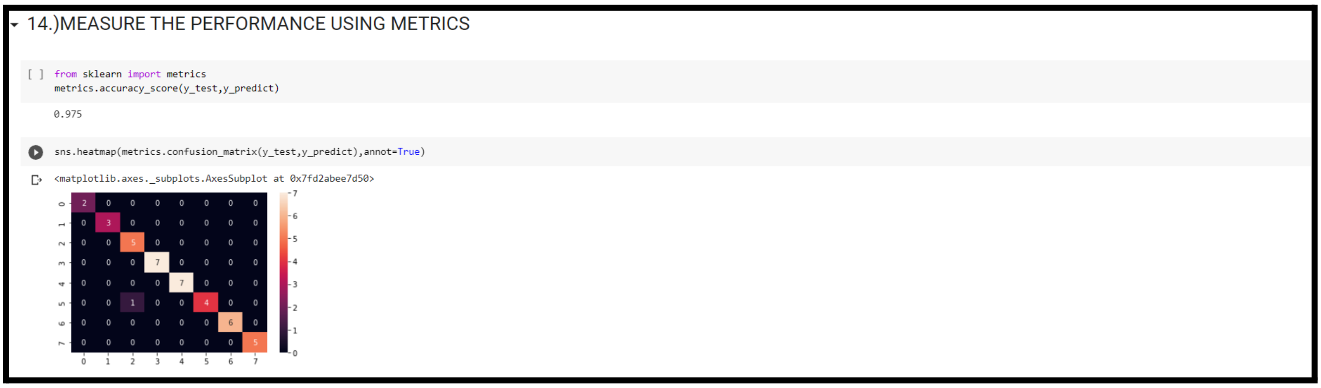


```
[ ] y_predict = model.predict(x_test)
```

```
[ ] pd.DataFrame({"Actual":y_test,"Predicted":y_predict.round(0)})
```

	Actual	Predicted
18	3	3
170	7	7
107	3	3
98	3	3
177	6	6
182	7	7
5	4	4
146	7	7
12	2	2
152	1	1
61	0	0
125	5	5
180	1	1
154	1	1
80	3	3
7	4	4
33	0	0

16.) MEASURE THE PERFORMANCE USING METRICS



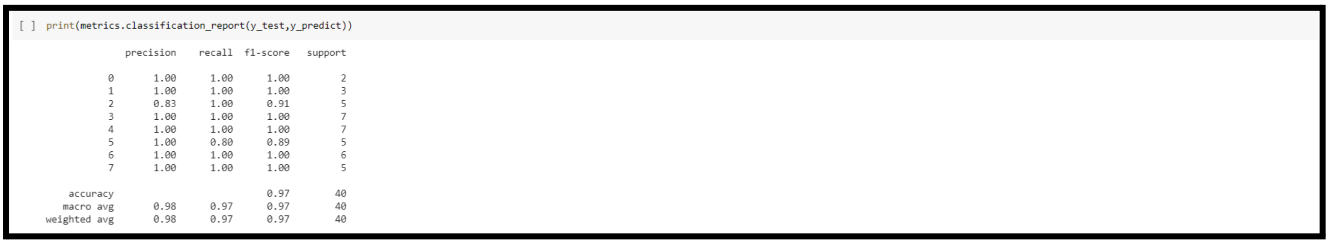
```
[ ] from sklearn import metrics
    metrics.accuracy_score(y_test,y_predict)

    0.975
```

```
sns.heatmap(metrics.confusion_matrix(y_test,y_predict),annot=True)

<matplotlib.axes._subplots.AxesSubplot at 0x7fd2abee7d50>
```

	0	1	2	3	4	5	6	7
0	2	0	0	0	0	0	0	0
1	0	3	0	0	0	0	0	0
2	0	0	5	0	0	0	0	0
3	0	0	0	7	0	0	0	0
4	0	0	0	0	7	0	0	0
5	0	0	1	0	0	4	0	0
6	0	0	0	0	0	0	6	0
7	0	0	0	0	0	0	0	5



```
[ ] print(metrics.classification_report(y_test,y_predict))

              precision    recall  f1-score   support

           0       1.00      1.00      1.00         2
           1       1.00      1.00      1.00         3
           2       0.83      1.00      0.91         5
           3       1.00      1.00      1.00         7
           4       1.00      1.00      1.00         7
           5       1.00      0.80      0.89         5
           6       1.00      1.00      1.00         6
           7       1.00      1.00      1.00         5

    accuracy                           0.97        40
   macro avg       0.98      0.97      0.97        40
weighted avg       0.98      0.97      0.97        40
```