Assignment -2

Python Programming

Assignment Date	19 September 2022
Student Name	R.Mohamed Imran
Student Roll Number	210519205031
Maximum Marks	2 Marks

```
#1Load the dataset
from google.colab import drive
```
[1] Python

```
drive.mount('/content/drive')
```
[2] Python

```
Mounted at /content/drive
```

```
from pandas.io.formats.style import plt
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib import rcParams
```
[3] Python

```
df=pd.read_csv('/content/drive/MyDrive/IBM/dataset')
```

```
from google.colab import drive
drive.mount('/content/drive')
```
[5] Python

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

```
df.head()
```
[6] Python

```
#6 check for categorical column and perform encoding
dummy=pd.get_dummies(df['Gender'])
dummy.head()
```
[7] Python

```
df2=pd.concat((df,dummy),axis=1)
df2.head()
```
[8] Python

```
[9]  df2.drop(['Gender'],axis=1)
```
Python

```
[10] df2=df2.drop(['Gender'],axis=1)
     df2.head()
```
Python

```
[11] df2=df2.drop(['Male'],axis=1)
     df2.head()
```
Python

```
[12] df2.rename(columns={"Female":"Gender"})
```
Python

```
[13] df.shape
```
Python

```
(10000, 14)
```

```
[14] df.info()
```
Python

```
<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
```

```
[15] #4 Handling Missing Values
     df.isnull().any()
```
Python

```
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
```

```
[16]
df.isnull().sum()
```
Python

```
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
```

```
[17]
df.isnull().sum().sum()
```
Python

```
0
```

```
[18]
#7 split the data into independent and dependent variable
y=df2['Tenure']
y
```
Python

```
0        2
1        1
2        8
3        1
4        2
       ..
       ..
9995     5
9996    10
9997     7
9998     3
9999     4
Name: Tenure, Length: 10000, dtype: int64
```

```
[19]
X=df.drop(columns=['Balance'],axis=1)
X.head()
```
Python

```
[20]
X=df.iloc[:,7:10]
X
```
Python

```
print(X.shape)
```

```
(10000, 3)
```

```
Y=df.iloc[:,7]
Y
```

[22] Python

```
0       2
1       1
2       8
3       1
4       2
       ..
9995    5
9996   10
9997    7
9998    3
9999    4
Name: Tenure, Length: 10000, dtype: int64
```

```
print(y.shape)
```

```
(10000,)
```

```
#8 Scale the independent variable
from sklearn.preprocessing import scale
x_scaled=pd.DataFrame(scale(X),columns=X.columns)
x_scaled.head()
```

[24] Python

```
#9 Train test split
from sklearn.model_selection import train_test_split
```

[25] Python

```
# Split data (train & test data)
X_train, X_test, y_train, y_test = train_test_split(X,y)
```

[26] Python

```
#display shape
print(X_train.shape)
print(X_test.shape)
print(y_train.shape)
print(y_test.shape)
```

[27] Python

```
(7500, 3)
(2500, 3)
(7500,)
(2500,)
```

```
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size=0.30,random_state=0)
print(X_train.shape)
print(X_test.shape)
print(y_train.shape)
print(y_test.shape)
```

[28] Python

```
(7000, 3)
(3000, 3)
(7000,)
(3000,)
```

```
print(np.mean(X_train))
print(np.mean(X_test))
```

[29] Python

```
Tenure              4.989429
Balance         75204.853421
NumOfProducts       1.534286
dtype: float64
Tenure              5.067333
Balance         79474.972977
NumOfProducts       1.520667
dtype: float64
```

```
#3 Descriptive stastical analysis
df.describe()
```

[30] Python

```
df.NumOfProducts.value_counts()
```

[31] Python

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

```
df.corr()
```

[32] Python

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

[33] Python

```
38.9218
```

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

[34] Python

```
Male      5457
Female    4543
Name: Gender, dtype: int64
```

```
#2 Visualization
```

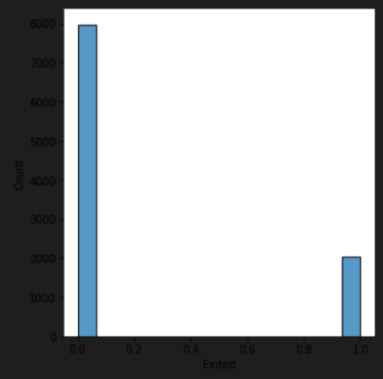
Python

```
#univariate analysis
sns.displot(df.Exited)
```

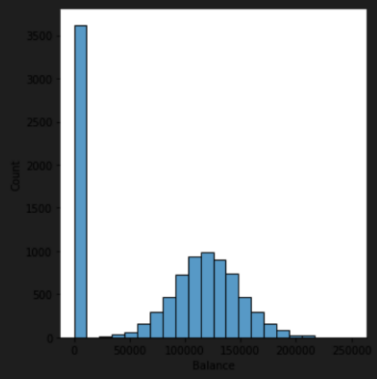
[61] Python

```
<seaborn.axisgrid.FacetGrid at 0x7f8a972818d0>
```

```
<seaborn.axisgrid.FacetGrid at 0x7f8a972818d0>
```



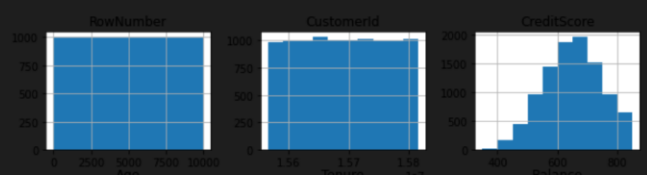

```
sns.displot(df.Balance)
```

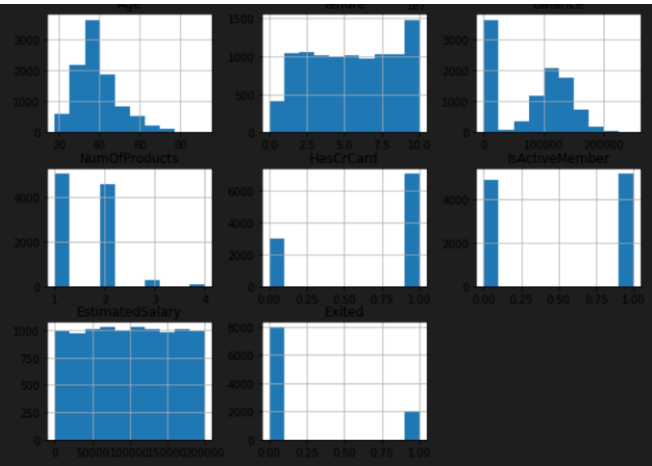



```
df.hist(figsize=(10,10))
```

[37] Python

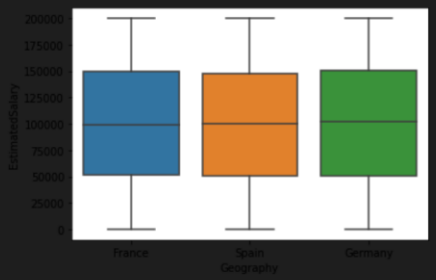
```
array([[<matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9ca3a150>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c9ee790>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c9a4d90>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c96a3d0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c924cd0>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c8e9550>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c8a1d10>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c869290>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c8692d0>],
       [<matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c81c550>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c7fdb50>,
        <matplotlib.axes._subplots.AxesSubplot object at 0x7f8a9c74b690>]],
      dtype=object)
```





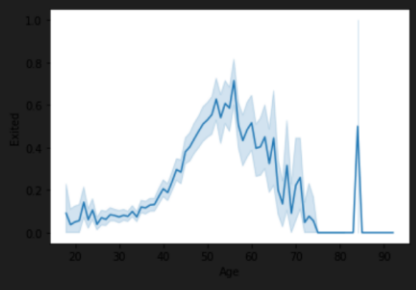

```
#Boxplot
sns.boxplot(x='Geography',y='EstimatedSalary',data=df)
plt.show()
```

[62] Python



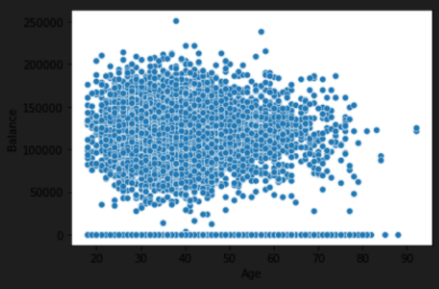

```
# Bivariate Analysis on continuous variable
sns.lineplot(df.Age,df.Exited)
```

```
/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 positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error
or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9c438650>
```




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

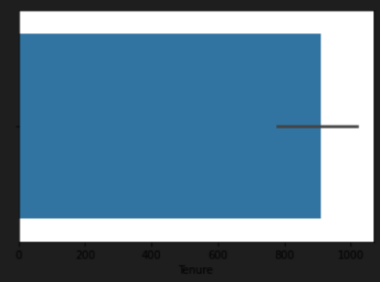
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variables as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9c308b10>
```




```
# Bivariate Analysis on categorical variable
sns.barplot(df.Tenure.value_counts())
```

[41] Python

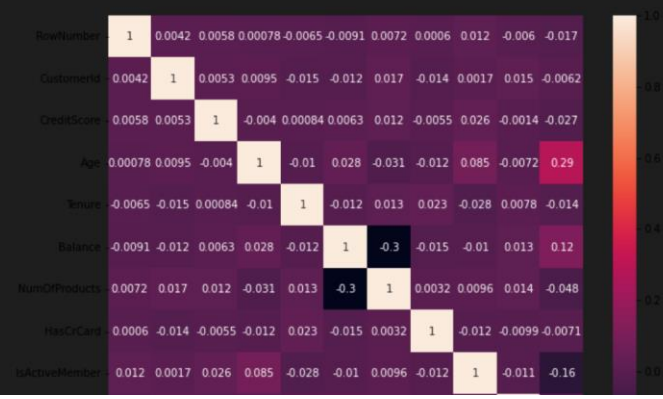
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9c313150>
```




```
fig=plt.figure(figsize=(10,8))
sns.heatmap(df.corr(),annot=True)
```

[42] Python

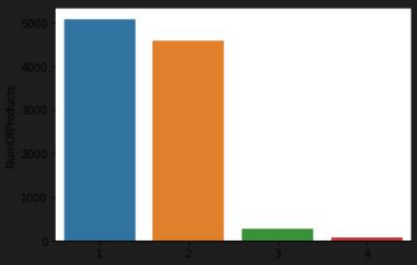
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9c313050>
```




```
sns.barplot(df.NumOfProducts.value_counts().index,df.NumOfProducts.value_counts())
```

[43] Python

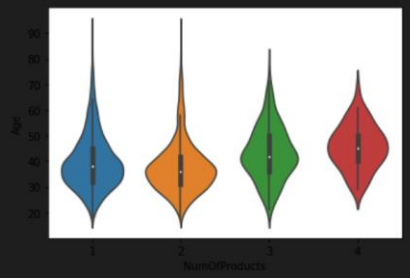
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variables as keyword args: x, y. From
version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error
or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9c04b6d0>
```




```
sns.violinplot(x='NumOfProducts',y='Age',data=df,size=8)
plt.show
```

[65] Python

```
<function matplotlib.pyplot.show(*args, **kw)>
```

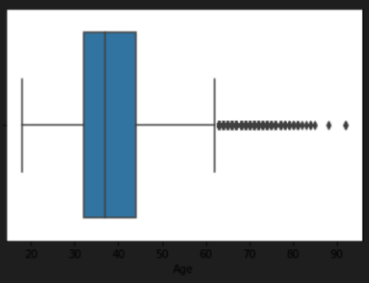



```
sns.boxplot(df.Age)
```

[45] Python

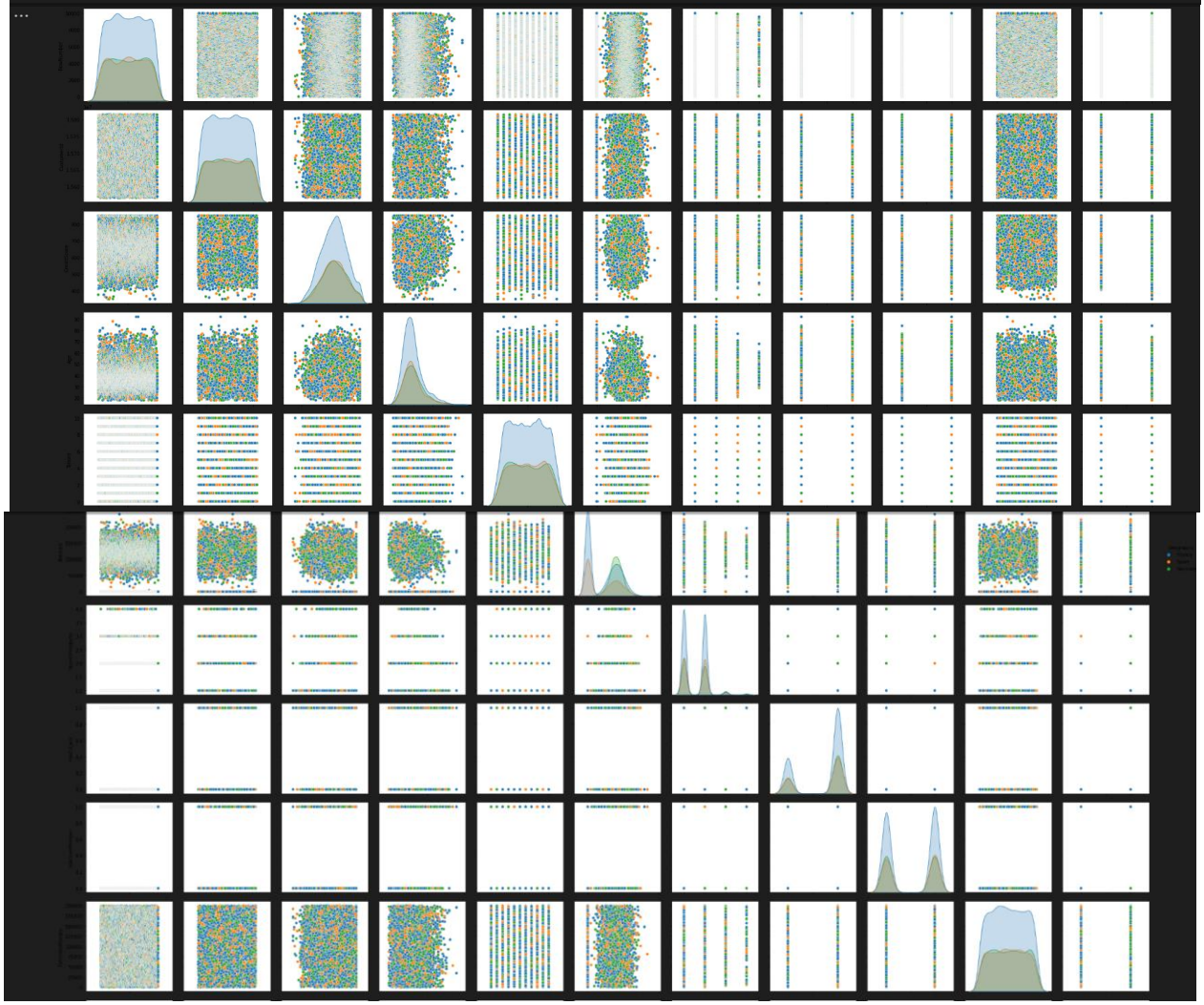
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or
misinterpretation.
  FutureWarning
```

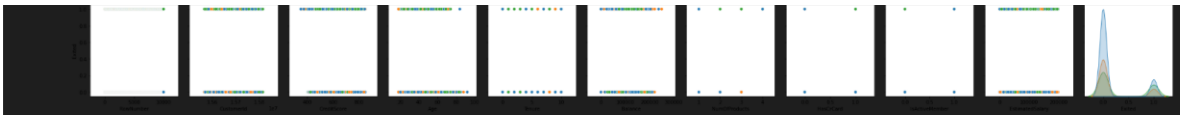
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a9a8329d0>
```




```
#Multivariate analysis
sns.pairplot(data=df,hue='Geography',height=3)
plt.show()
```

[66] Python





```
#5 Find the outlier and replace the outlier
#find the limits
upper_limit=df['Age'].mean()+3*df['Age'].std()
lower_limit=df['Age'].mean()-3*df['Age'].std()
print('upper_limit',upper_limit)
print('lower_limit',lower_limit)
```

[47] Python

```
upper_limit 70.38521935511383
lower_limit 7.458380644886169
```

```
df.loc[(df['Age']>upper_limit)|(df['Age']<lower_limit)]
```

[48] Python

```
#trimming - delete the outlier
new_df=df.loc[(df['Age']<upper_limit)&(df['Age']>lower_limit)]
print('Before removing outlier:',len(df))
print('After removing outlier:',len(new_df))
```

[49] Python

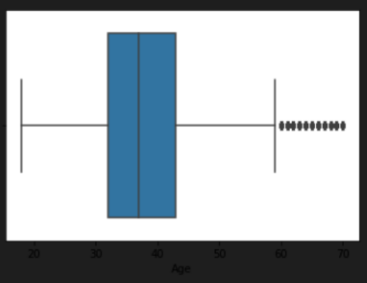
```
Before removing outlier: 10000
After removing outlier: 9867
```

```
sns.boxplot(new_df['Age'])
```

[50] Python

```
/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 arguments without an explicit keyword will result in an error or
misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a97f01790>
```

</>

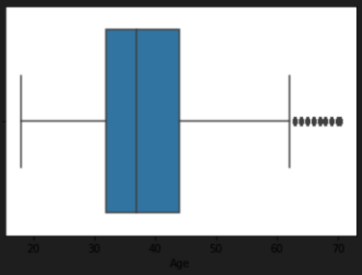



```
#copying-change the outlier value to upper or lower limits values
new_df=df.copy()
new_df.loc[(new_df['Age']>upper_limit),'Age']=upper_limit
new_df.loc[(new_df['Age']<lower_limit),'Age']=lower_limit
```

[51] Python

```
[52] sns.boxplot(new_df['Age'])
```
Python

```
/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 arguments without an explicit keyword will result in an error or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a98031ad0>
```




```
[53] len(new_df)
```
Python

```
10000
```

```
[54] #IQR method
     q1=df['Age'].quantile(0.25)
     q3=df['Age'].quantile(0.75)
     iqr=q3-q1
```
Python

```
[55] q1,q3,iqr
```
Python

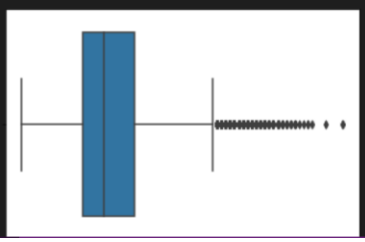
```
(32.0, 44.0, 12.0)
```

```
[56] upper_limit=q3+(1.5*iqr)
     lower_limit=q3-(1.5*iqr)
     lower_limit,upper_limit
```
Python

```
(26.0, 62.0)
```

```
[57] sns.boxplot(df['Age'])
```
Python

```
/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 arguments without an explicit keyword will result in an error or misinterpretation.
  FutureWarning

<matplotlib.axes._subplots.AxesSubplot at 0x7f8a98077ed0>
```



```python
#copying-change the outlier value to upper or lower limits values
new_df=df.copy()
new_df.loc[(new_df['Age']>upper_limit),'Age']=upper_limit
new_df.loc[(new_df['Age']<lower_limit),'Age']=lower_limit
```

[58] Python

```python
sns.boxplot(new_df['Age'])
```

[59] Python

```
/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 arguments without an explicit keyword will result in an error or misinterpretation.
  FutureWarning
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8a97e1a690>
```

</>