ASSIGNMENT – 3

Python Programming

Assignment Date	06-10-2022
Student Name	Mr. Karuppaiya
Student Roll Number	923819104020
Maximum Marks	2 Mark

Question-1 :

1 . Importing Required Package

Solution :

```
import pandas as pd
import seaborn as sns
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
```

Question-2 :

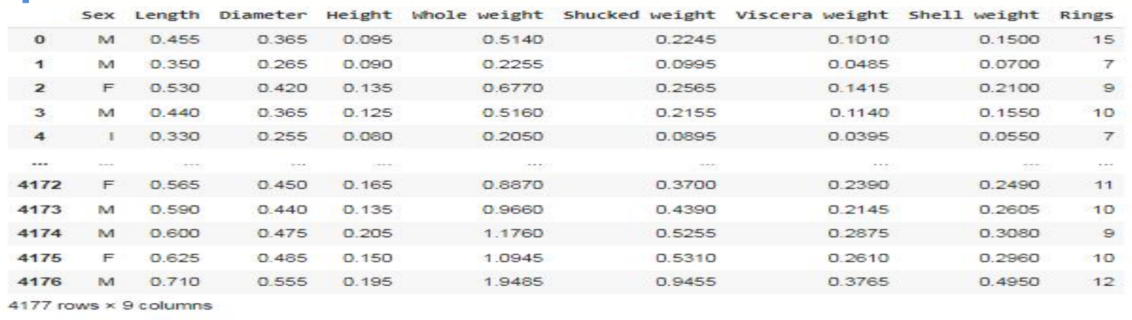
2. Loading the Dataset

Solution :

```
df = pd.read_csv("abalone.csv")

df
```

Output:



```
      Sex  Length  Diameter  Height  Whole weight  Shucked weight  Viscera weight  Shell weight  Rings
0       M   0.455     0.365   0.095        0.5140          0.2245          0.1010        0.1500     15
1       M   0.350     0.265   0.090        0.2255          0.0995          0.0485        0.0700      7
2       F   0.530     0.420   0.135        0.6770          0.2565          0.1415        0.2100      9
3       M   0.440     0.365   0.125        0.5160          0.2155          0.1140        0.1550     10
4       I   0.330     0.255   0.080        0.2050          0.0895          0.0395        0.0550      7
...   ...     ...       ...     ...           ...             ...             ...           ...    ...
4172    F   0.565     0.450   0.165        0.8870          0.3700          0.2390        0.2490     11
4173    M   0.590     0.440   0.135        0.9660          0.4390          0.2145        0.2605     10
4174    M   0.600     0.475   0.205        1.1760          0.5255          0.2875        0.3080      9
4175    F   0.625     0.485   0.150        1.0945          0.5310          0.2610        0.2960     10
4176    M   0.710     0.555   0.195        1.9485          0.9455          0.3765        0.4950     12
4177 rows × 9 columns
```

3. Visualizations

Question-3 :

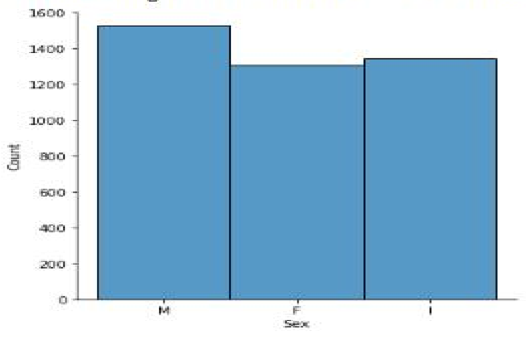
3.1 Univariate Analysis

Solution:

```
sns.displot(df.Sex)
```

Output:

```
<seaborn.axisgrid.FacetGrid at 0x7f6c84b67550>
```



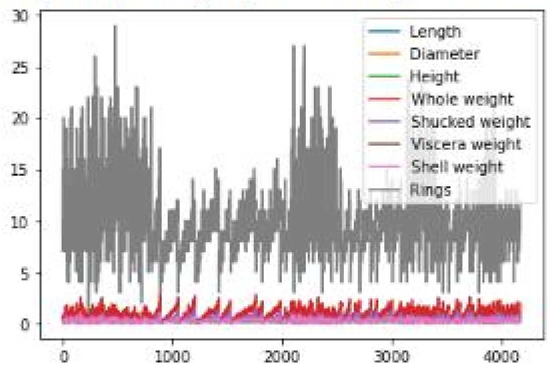
3.2 Bi-Variate Analysis

Solution:

```
df.plot.line()
```

Output:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f6c81d866d0>
```

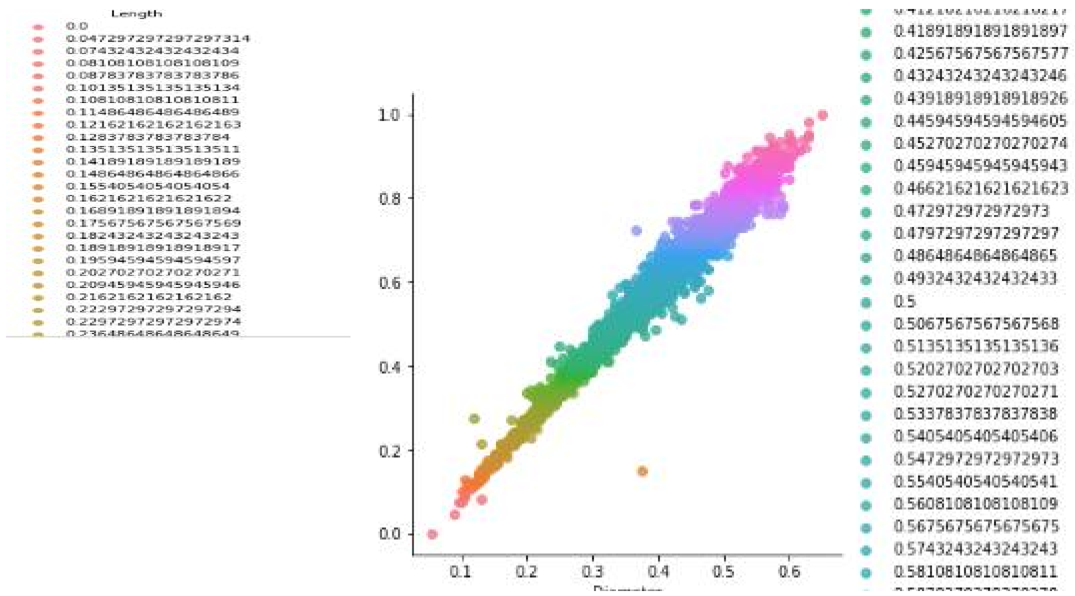


3.3 Multi - Variate Analysis

Solution:

```
sns.lmplot("Diameter","Length",df,hue="Length", fit_reg=False);
```

Output:



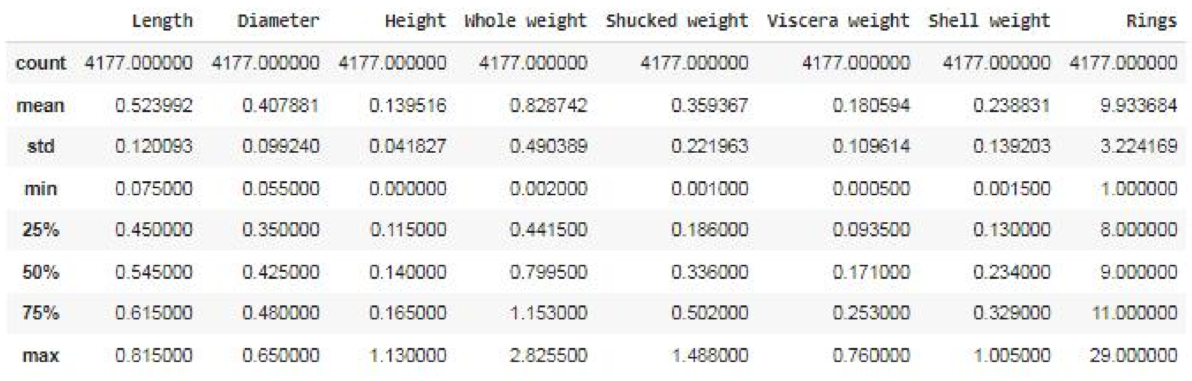
4. Perform descriptive statistics on the dataset.

Question-4 :

Solution:

```
df.describe()
```

Output:



	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0.238831	9.933684
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203	3.224169
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500	1.000000
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	8.000000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	9.000000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	11.000000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	29.000000

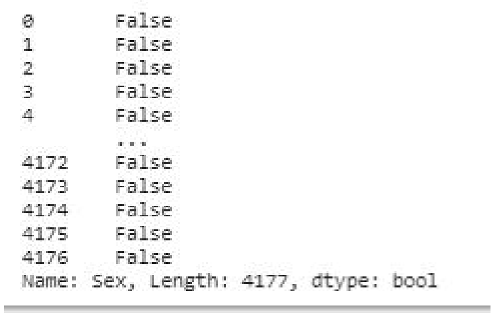
5. Handle the Missing values.

Question-5 :

Solution:

```
data = pd.read_csv("abalone.csv")
pd.isnull(data["Sex"])
```

Output:



```
0       False
1       False
2       False
3       False
4       False
        ...
4172    False
4173    False
4174    False
4175    False
4176    False
Name: Sex, Length: 4177, dtype: bool
```

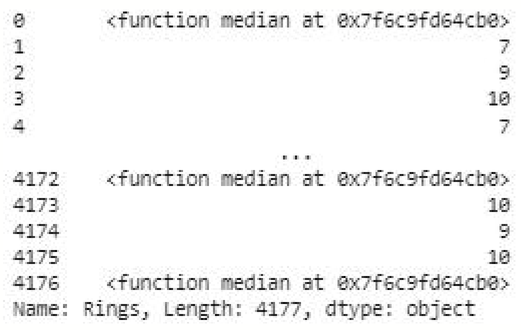
Question-6:

6. Find the outliers and replace the outliers.

Solution:

```
df["Rings"] = np.where(df["Rings"] >10, np.median,df["Rings"])
df["Rings"]
```

Output:



```
0       <function median at 0x7f6c9fd64cb0>
1                                         7
2                                         9
3                                        10
4                                         7
                       ...
4172    <function median at 0x7f6c9fd64cb0>
4173                                     10
4174                                      9
4175                                     10
4176    <function median at 0x7f6c9fd64cb0>
Name: Rings, Length: 4177, dtype: object
```

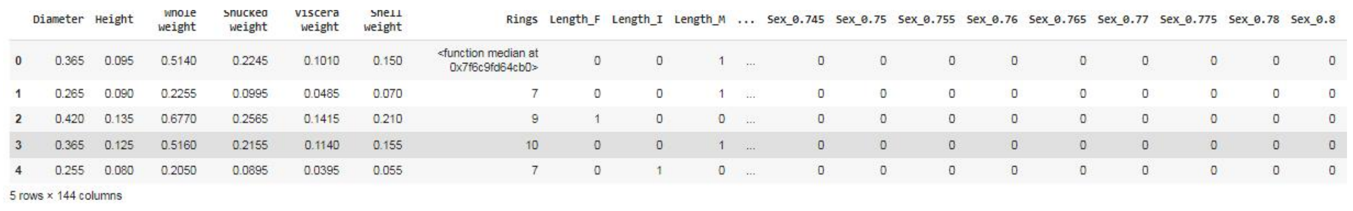
Question-7 :

7. Check for Categorical columns and perform encoding.

Solution:

```
pd.get_dummies(df, columns=["Sex", "Length"], prefix=["Length", "Sex"])
.head()
```

Output:



	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings	Length_F	Length_I	Length_M	...	Sex_0.745	Sex_0.75	Sex_0.755	Sex_0.76	Sex_0.765	Sex_0.77	Sex_0.775	Sex_0.78	Sex_0.8
0	0.365	0.095	0.5140	0.2245	0.1010	0.150	<function median at 0x7f6c9fd64cb0>	0	0	1	...	0	0	0	0	0	0	0	0	0
1	0.265	0.090	0.2255	0.0995	0.0485	0.070	7	0	0	1	...	0	0	0	0	0	0	0	0	0
2	0.420	0.135	0.6770	0.2565	0.1415	0.210	9	1	0	0	...	0	0	0	0	0	0	0	0	0
3	0.365	0.125	0.5160	0.2155	0.1140	0.155	10	0	0	1	...	0	0	0	0	0	0	0	0	0
4	0.255	0.080	0.2050	0.0895	0.0395	0.055	7	0	1	0	...	0	0	0	0	0	0	0	0	0

5 rows × 144 columns

Question-8:

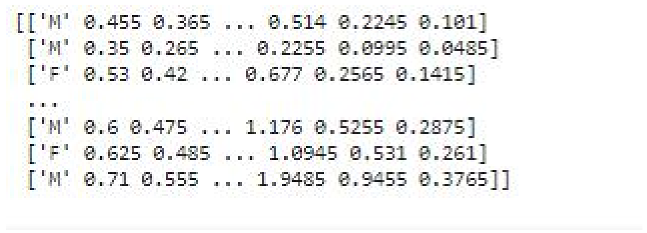
8. Split the data into dependent and independent variables

8.1 Split the data into Independent variables.

Solution:

```
X = df.iloc[:, :-2].values
print(X)
```

Output:



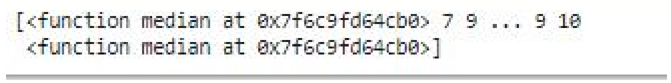
```
[['M' 0.455 0.365 ... 0.514 0.2245 0.101]
 ['M' 0.35 0.265 ... 0.2255 0.0995 0.0485]
 ['F' 0.53 0.42 ... 0.677 0.2565 0.1415]
 ...
 ['M' 0.6 0.475 ... 1.176 0.5255 0.2875]
 ['F' 0.625 0.485 ... 1.0945 0.531 0.261]
 ['M' 0.71 0.555 ... 1.9485 0.9455 0.3765]]
```

8.2 Split the data into Dependent variables.

Solution:

```
Y = df.iloc[:, -1].values
print(Y)
```

Output:



```
[<function median at 0x7f6c9fd64cb0> 7 9 ... 9 10
 <function median at 0x7f6c9fd64cb0>]
```

Question-9 :

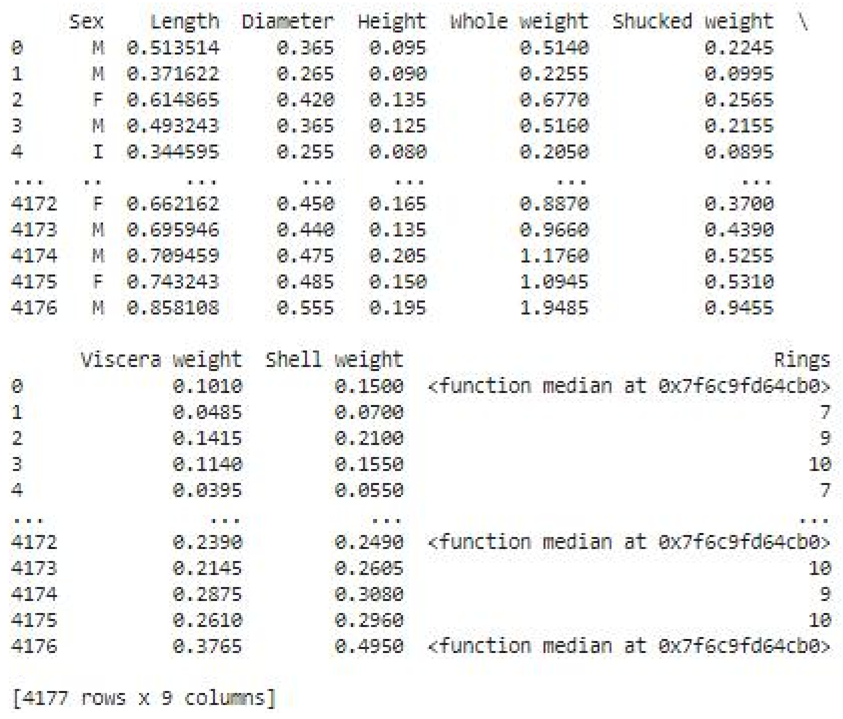
9. Scale the independent variables

Solution:

```
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
```

```
df[["Length"]] = scaler.fit_transform(df[["Length"]])
print(df)
```

Output:



```
     Sex    Length  Diameter  Height  Whole weight  Shucked weight  \
0      M  0.513514     0.365   0.095        0.5140          0.2245
1      M  0.371622     0.265   0.090        0.2255          0.0995
2      F  0.614865     0.420   0.135        0.6770          0.2565
3      M  0.493243     0.365   0.125        0.5160          0.2155
4      I  0.344595     0.255   0.080        0.2050          0.0895
...   ..       ...       ...     ...           ...             ...
4172   F  0.662162     0.450   0.165        0.8870          0.3700
4173   M  0.695946     0.440   0.135        0.9660          0.4390
4174   M  0.709459     0.475   0.205        1.1760          0.5255
4175   F  0.743243     0.485   0.150        1.0945          0.5310
4176   M  0.858108     0.555   0.195        1.9485          0.9455

      Viscera weight  Shell weight                                 Rings
0             0.1010        0.1500  <function median at 0x7f6c9fd64cb0>
1             0.0485        0.0700                                     7
2             0.1415        0.2100                                     9
3             0.1140        0.1550                                    10
4             0.0395        0.0550                                     7
...              ...           ...                                   ...
4172          0.2390        0.2490  <function median at 0x7f6c9fd64cb0>
4173          0.2145        0.2605                                    10
4174          0.2875        0.3080                                     9
4175          0.2610        0.2960                                    10
4176          0.3765        0.4950  <function median at 0x7f6c9fd64cb0>

[4177 rows x 9 columns]
```

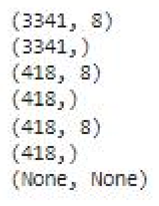
Question-10 :

10. Split the data into training and testing

Solution:

```
from sklearn.model_selection import train_test_split
train_size=0.8
X = df.drop(columns = ['Sex']).copy()
y = df['Sex']
X_train, X_rem, y_train, y_rem = train_test_split(X,y, train_size=0.8)
test_size = 0.5
X_valid, X_test, y_valid, y_test = train_test_split(X_rem,y_rem, test_size=0.
5)
print(X_train.shape), print(y_train.shape)
print(X_valid.shape), print(y_valid.shape)
print(X_test.shape), print(y_test.shape)
```

Output:



```
(3341, 8)
(3341,)
(418, 8)
(418,)
(418, 8)
(418,)
(None, None)
```

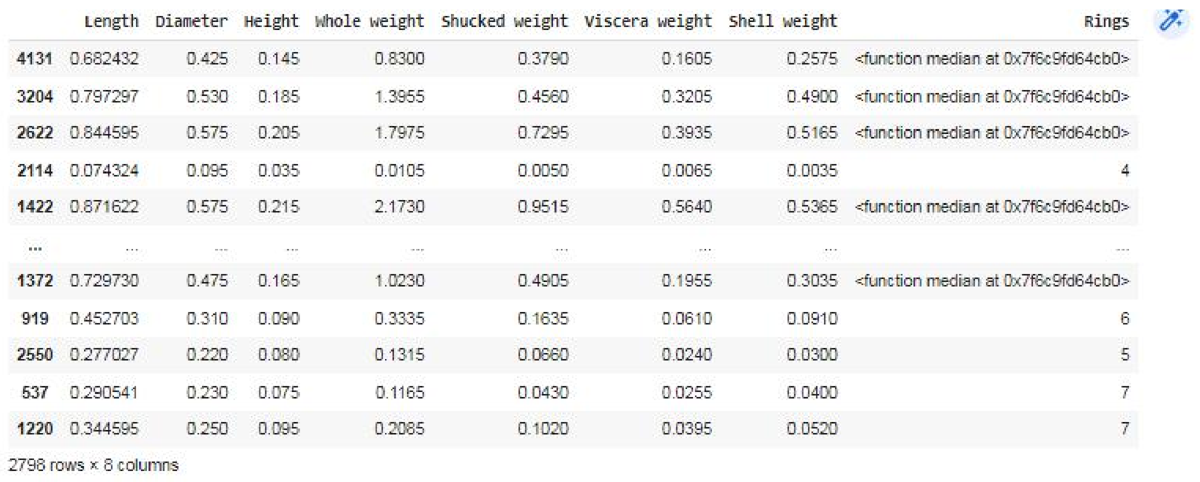
11.Build the Model

```
test_size = 0.33
seed = 7
X_train, X_test, y_train, y_test =  train_test_split(X, y, test_size=test_
size, random_state=seed)
```

12.Train the model

```
X_train
```

Output:

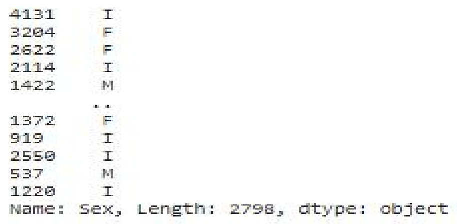


	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
4131	0.682432	0.425	0.145	0.8300	0.3790	0.1605	0.2575	<function median at 0x7f6c9fd64cb0>
3204	0.797297	0.530	0.185	1.3955	0.4560	0.3205	0.4900	<function median at 0x7f6c9fd64cb0>
2622	0.844595	0.575	0.205	1.7975	0.7295	0.3935	0.5165	<function median at 0x7f6c9fd64cb0>
2114	0.074324	0.095	0.035	0.0105	0.0050	0.0065	0.0035	4
1422	0.871622	0.575	0.215	2.1730	0.9515	0.5640	0.5365	<function median at 0x7f6c9fd64cb0>
...	...	...	...	...	...	...	...	...
1372	0.729730	0.475	0.165	1.0230	0.4905	0.1955	0.3035	<function median at 0x7f6c9fd64cb0>
919	0.452703	0.310	0.090	0.3335	0.1635	0.0610	0.0910	6
2550	0.277027	0.220	0.080	0.1315	0.0660	0.0240	0.0300	5
537	0.290541	0.230	0.075	0.1165	0.0430	0.0255	0.0400	7
1220	0.344595	0.250	0.095	0.2085	0.1020	0.0395	0.0520	7

2798 rows × 8 columns

```
y_train
```

Output:

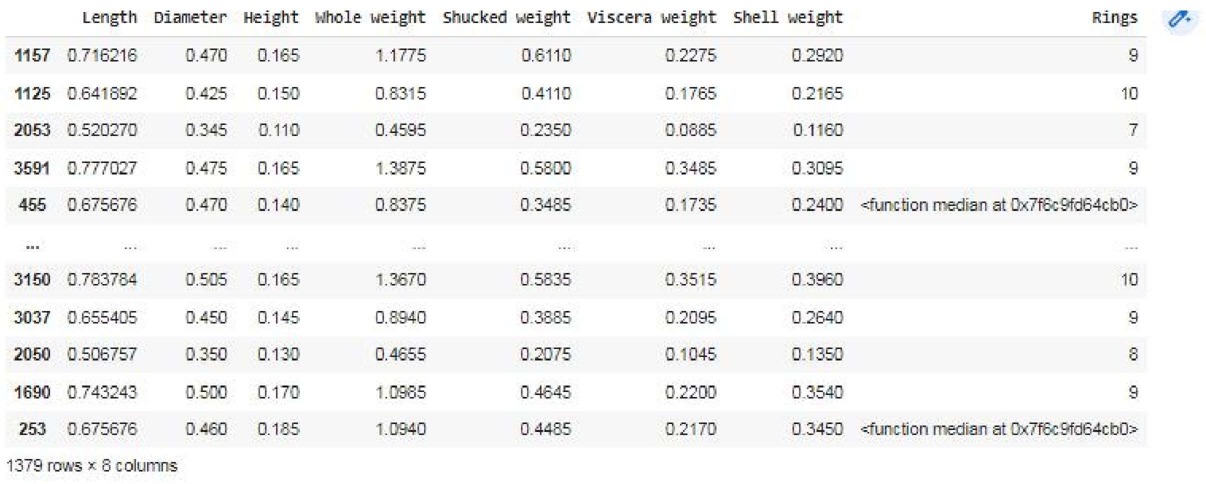


```
4131    I
3204    F
2622    F
2114    I
1422    M
       ..
1372    F
919     I
2550    I
537     M
1220    I
Name: Sex, Length: 2798, dtype: object
```

13.Test the model:

```
X_test
```

Output:

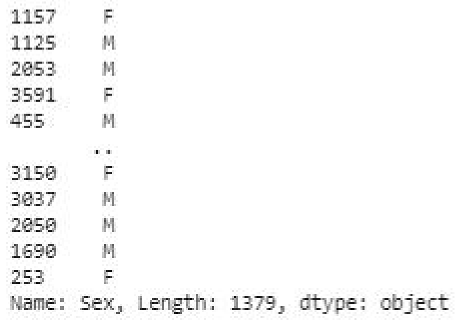


	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
1157	0.716216	0.470	0.165	1.1775	0.6110	0.2275	0.2920	9
1125	0.641892	0.425	0.150	0.8315	0.4110	0.1765	0.2165	10
2053	0.520270	0.345	0.110	0.4595	0.2350	0.0885	0.1160	7
3591	0.777027	0.475	0.165	1.3875	0.5800	0.3485	0.3095	9
455	0.675676	0.470	0.140	0.8375	0.3485	0.1735	0.2400	<function median at 0x7f6c9fd64cb0>
...	...	...	...	...	...	...	...	...
3150	0.783784	0.505	0.165	1.3670	0.5835	0.3515	0.3960	10
3037	0.655405	0.450	0.145	0.8940	0.3885	0.2095	0.2640	9
2050	0.506757	0.350	0.130	0.4655	0.2075	0.1045	0.1350	8
1690	0.743243	0.500	0.170	1.0985	0.4645	0.2200	0.3540	9
253	0.675676	0.460	0.185	1.0940	0.4485	0.2170	0.3450	<function median at 0x7f6c9fd64cb0>

1379 rows × 8 columns

```
y_test
```

Output:

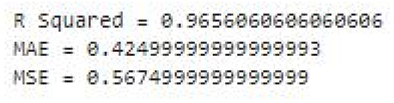


```
1157    F
1125    M
2053    M
3591    F
455     M
       ..
3150    F
3037    M
2050    M
1690    M
253     F
Name: Sex, Length: 1379, dtype: object
```

14.Measure the performance using Metrics

```
from sklearn.metrics import r2_score
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error
X_train = [5, -1, 2, 10]
y_test = [3.5, -0.9, 2, 9.9]
print ('R Squared =',r2_score(X_train, y_test))
print ('MAE =',mean_absolute_error(X_train, y_test))
print ('MSE =',mean_squared_error(X_train, y_test))
```

Output:



```
R Squared = 0.9656060606060606
MAE = 0.42499999999999993
MSE = 0.5674999999999999
```