Assignment -1

Assignment Date	01 October 2022
Student Name	Arvind Y
Student Roll Number	811519104011
Maximum Marks	2 Marks

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

[2]:
```python
d=pd.read_csv("abalone.csv")
d.head()
```

[2]:
```
  Sex Length Diameter Height Whole weight Shucked weight Viscera weight
\
0  M    0.455    0.365  0.095       0.5140         0.2245         0.1010
1  M    0.350    0.265  0.090       0.2255         0.0995         0.0485
2  F    0.530    0.420  0.135       0.6770         0.2565         0.1415
3  M    0.440    0.365  0.125       0.5160         0.2155         0.1140
4  I    0.330    0.255  0.080       0.2050         0.0895         0.0395

   Shell weight Rings
0        0.150    15
1        0.070     7
2        0.210     9
3        0.155    10
4        0.055     7
```

[3]:
```python
d.info()
```

```
<class
'pandas.core.frame.DataFrame'>
RangeIndex: 4177 entries, 0 to
4176 Data columns (total 9
columns):
#   Column         Non-Null Count  Dtype
--- ------         --------------  -----
 0   Sex           4177 non-null object
 1   Length        4177 non-null float64
 2   Diameter      4177 non-null float64
 3   Height        4177 non-null float64
 4   Whole weight  4177 non-null float64
 5   Shucked weight 4177 non-   float64
     null
 6   Viscera weight 4177 non-   float64
     null
 7   Shell weight  4177 non-null float64
 8   Rings         4177 non-null int64
dtypes: float64(7), int64(1), object(1)
memory usage: 293.8+ KB
```

```
[7]: for i in d.columns:
         print(d[i].value_counts())
```

```
M   1528
I   1342
F   1307
Name: Sex, dtype: int64
0.625 94
0.550 94
0.575 93
0.580 92
0.600   87
         ..
0.075 1 0.815
 1 0.110    1
0.150 1
0.800    1
Name: Length, Length: 134, dtype: int64
0.450 139
0.475 120
0.400 111
0.500 110
0.470   100
        …
0.610 1 0.650
 1 0.620    1
0.095 1
0.615     1
Name: Diameter, Length: 111, dtype: int64
0.150 267
0.140 220
0.155 217
0.175 211
0.160 205
0.125 202
0.165 193
0.135 189
0.145 182
0.130 169
0.120 169
0.170 160
0.100 145
0.110   135
0.115 133
0.180 131
0.090 124
0.105 114
```

```
0.185 103
0.190 103
0.095 91 0.195
 78 0.080   76
0.085 74 0.200
 68 0.075   61
0.070 47 0.205
 45 0.065   39
0.215 31 0.060
 26 0.055   25
0.210 23 0.050
 18 0.220   17
0.040 13 0.225
 13 0.045   11
0.230 10
0.030 6 0.035
 6 0.235    6
0.025 5 0.240
 4 0.250    3
0.020 2 0.015
 2 0.000    2
0.010 1 0.515
 1
1.130     1
Name: Height, dtype: int64
0.2225   8
1.1345   7
0.9700   7
0.4775   7
0.1960   7
..
0.0475   1
1.8930   1
1.8725   1
2.1055   1
1.9485   1
Name: Whole weight, Length: 2429, dtype: int64
0.1750   11
0.2505   10
0.0970    9
0.0960    9
```

```
    0.4190    9
..
    0.4175    1
    0.1935    1
    0.1790    1
    0.1275    1
    0.9455    1
    Name: Shucked weight, Length: 1515, dtype: int64
    0.1715   15
    0.1960   14
    0.0575   13
    0.0610   13
    0.0370   13
..
    0.4270    1
    0.4075    1
    0.4920    1
    0.4650    1
    0.5260    1
    Name: Viscera weight, Length: 880, dtype: int64
    0.2750   43
    0.2500   42
    0.2650   40
    0.3150   40
    0.1850   40
..
    0.0060    1
    0.6460    1
    0.5010    1
    0.3295    1
    0.0920    1
    Name: Shell weight, Length: 926, dtype: int64
```

```
9     689
10    634
8     568
11    487
7     391
12    267
6     259
13    203
14    126
5     115
15     103
16      67
17      58
4      57
18      42
19      32
20      26
3      15
21      14
23       9
22       6
27       2
24       2
1        1
26       1
29       1
2        1
25       1
Name: Rings, dtype: int64
```

[8]:
```
d.isnull().sum()
```

[8]:

Sex	0
Length	0
Diameter	0
Height	0
Whole weight	0
Shucked weight	0
Viscera weight	0
Shell weight	0
Rings	0

dtype: int64

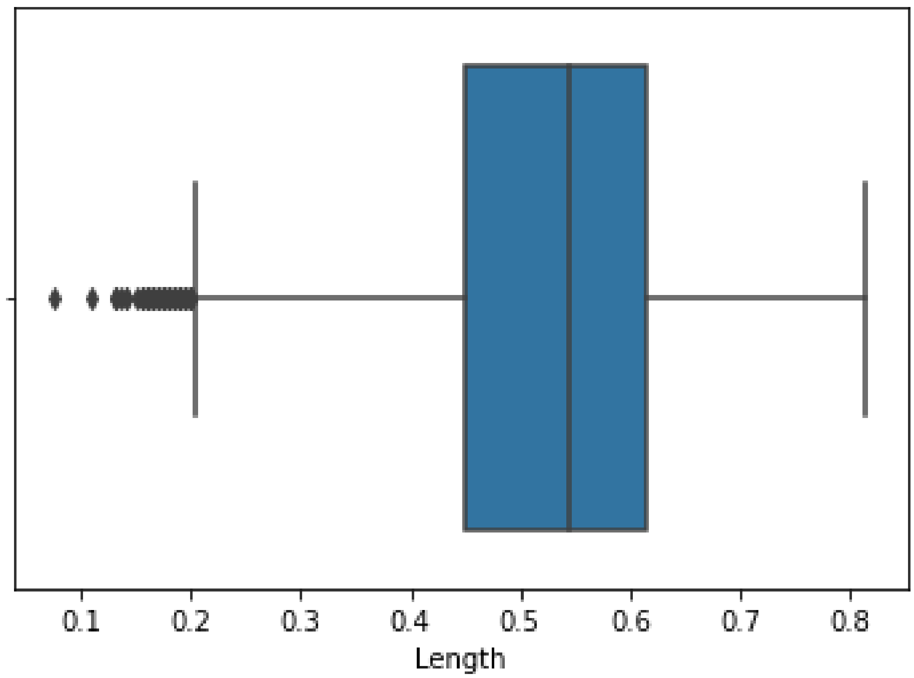
```
[9]: d.duplicated().value_counts()
```

```
[9]: False4177
     dtype: int64
```

1 Data visualization(EDA Analysis)

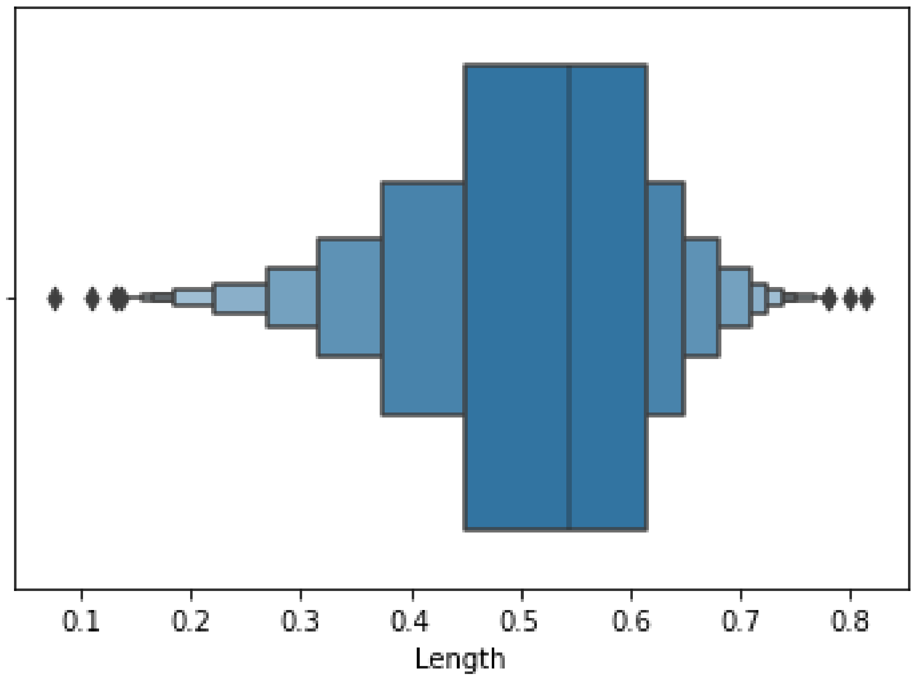
```
[12]: sns.boxplot(data=d,x="Length")
```

```
[12]: <AxesSubplot:xlabel='Length'>
```



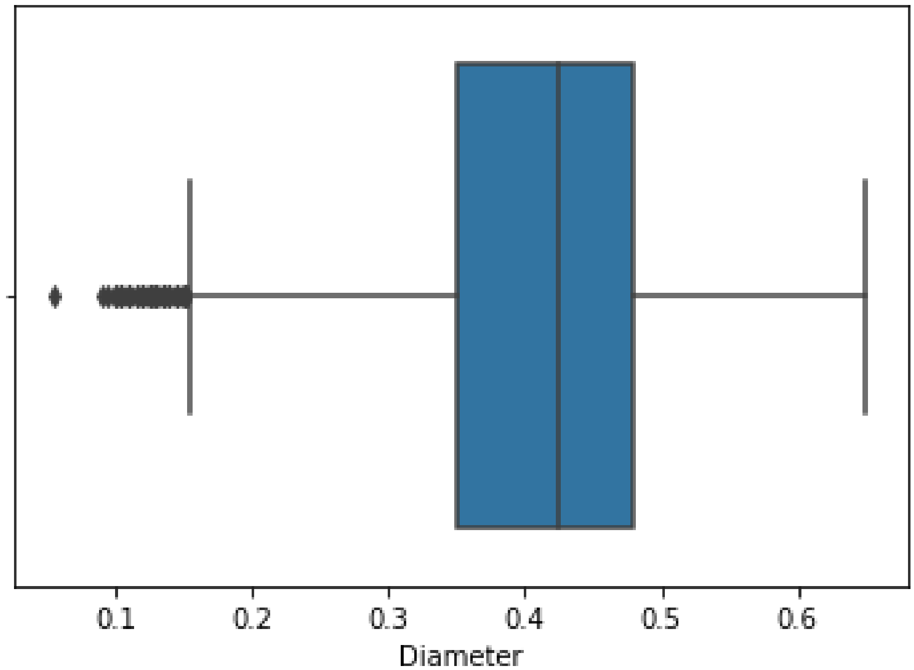

```
[13]: sns.boxenplot(data=d,x="Length")
```

```
[13]: <AxesSubplot:xlabel='Length'>
```


0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Length

```
[16]: sns.boxplot(data=d,x="Diameter")
```

```
[16]: <AxesSubplot:xlabel='Diameter'>
```

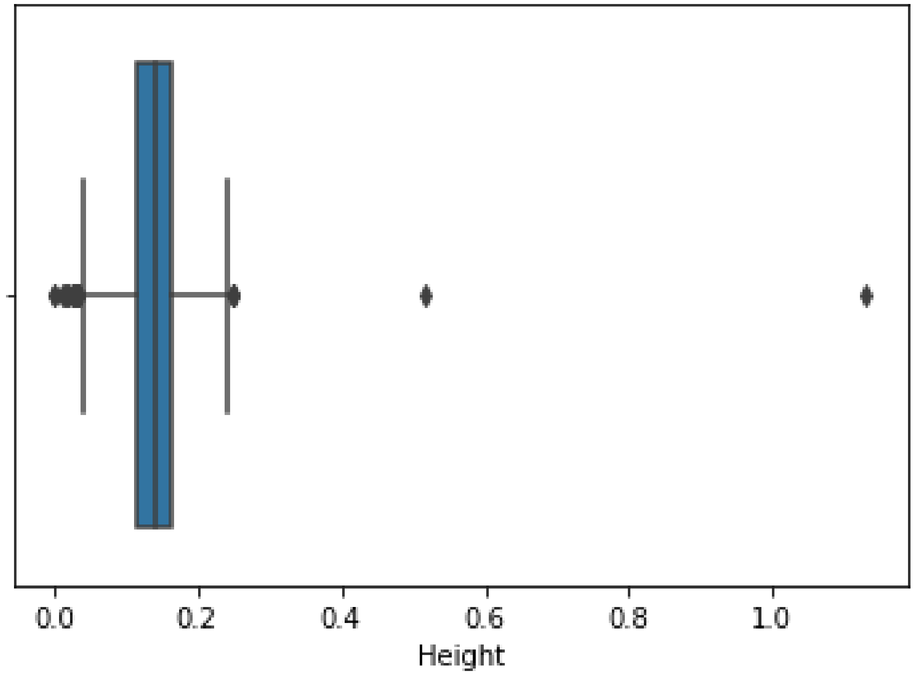



```
[18]: sns.boxplot(data=d,x="Height")
```

```
[18]: <AxesSubplot:xlabel='Height'>
```

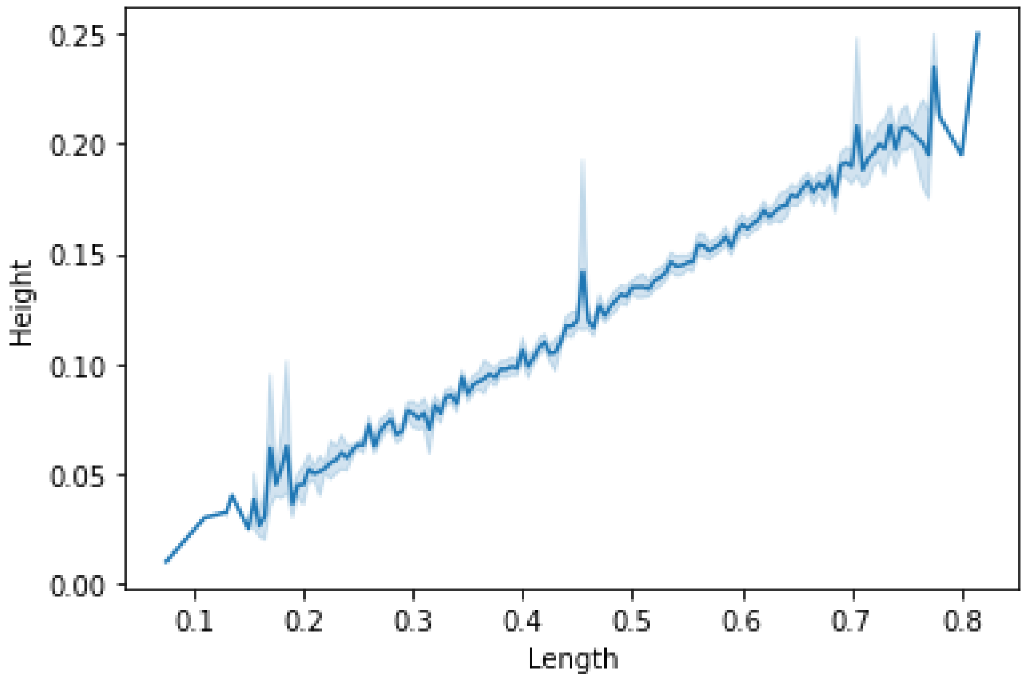
```

```



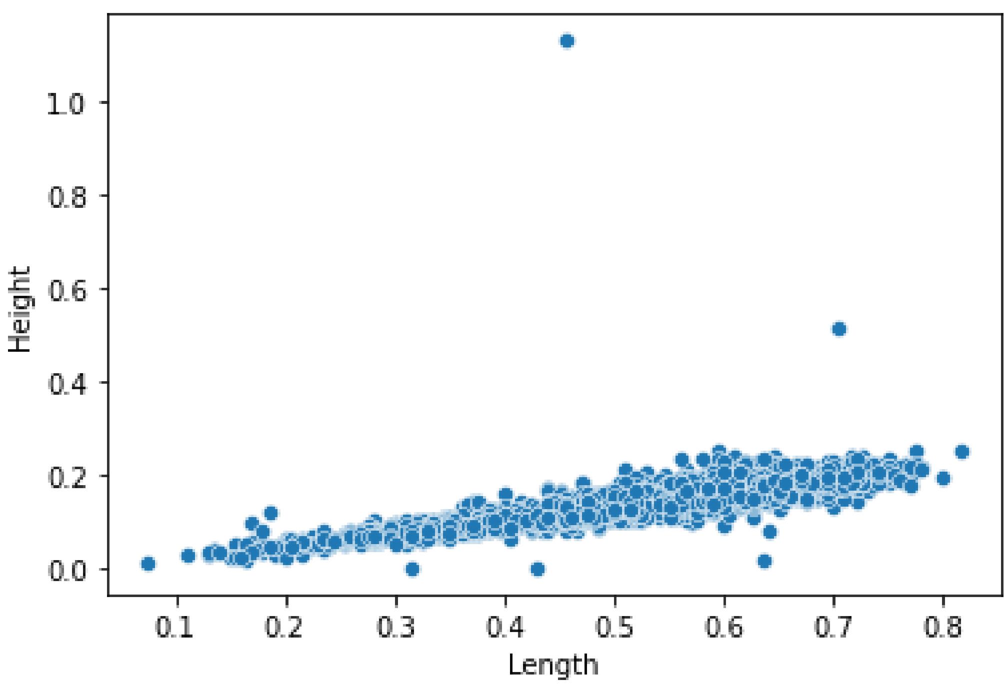
[20]:
```
sns.lineplot(data=d,x="Length",y="Height")
```

[20]: <AxesSubplot:xlabel='Length', ylabel='Height'>



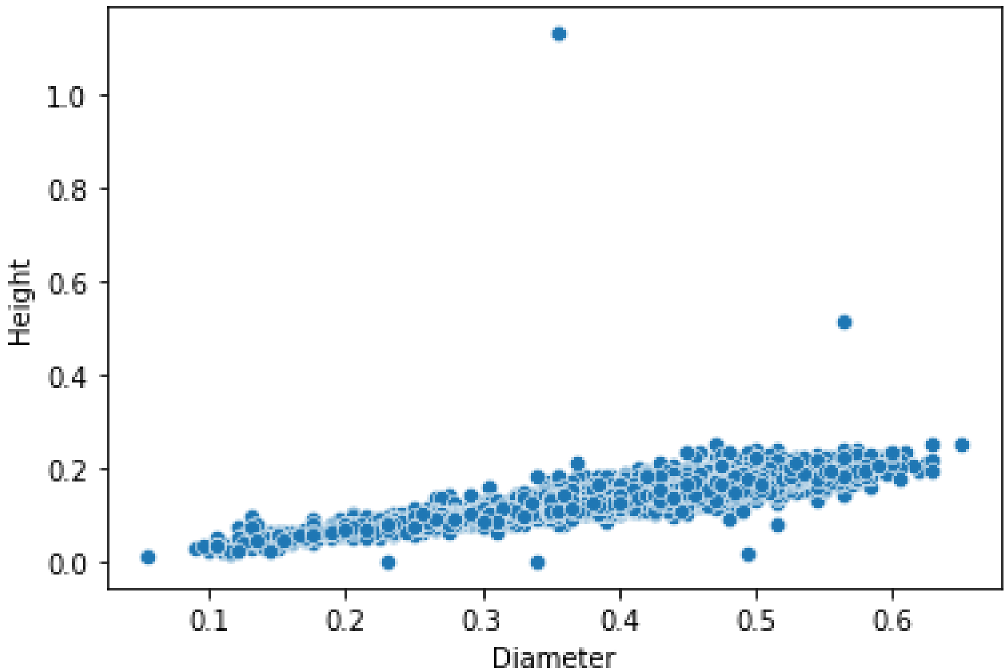

```
[21]: sns.scatterplot(data=d,x="Length",y="Height")
```

```
[21]: <AxesSubplot:xlabel='Length', ylabel='Height'>
```



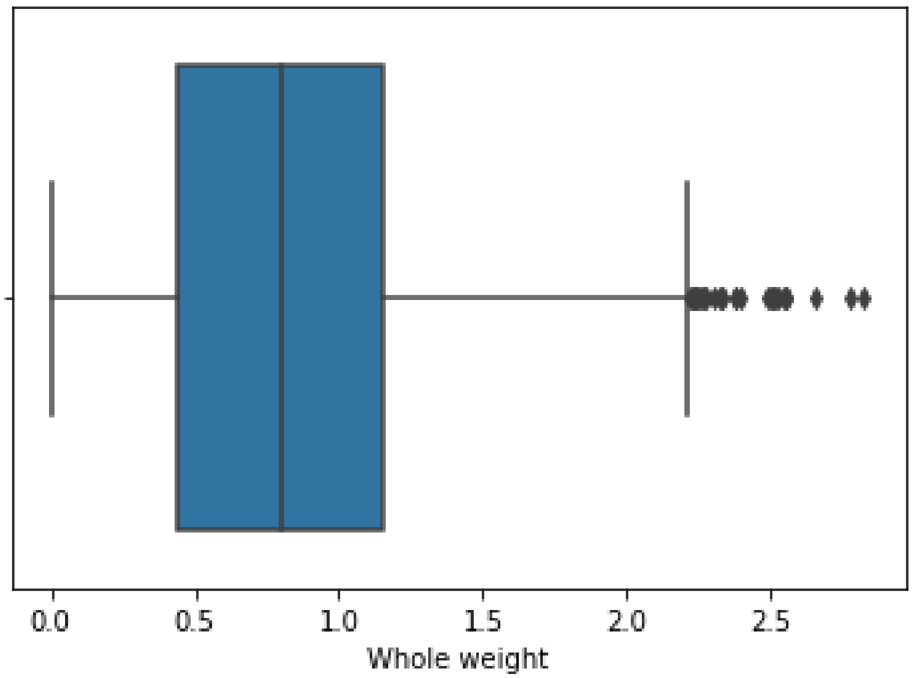
[22]:
```
sns.scatterplot(data=d,x="Diameter",y="Height")
```

[22]: <AxesSubplot:xlabel='Diameter', ylabel='Height'>



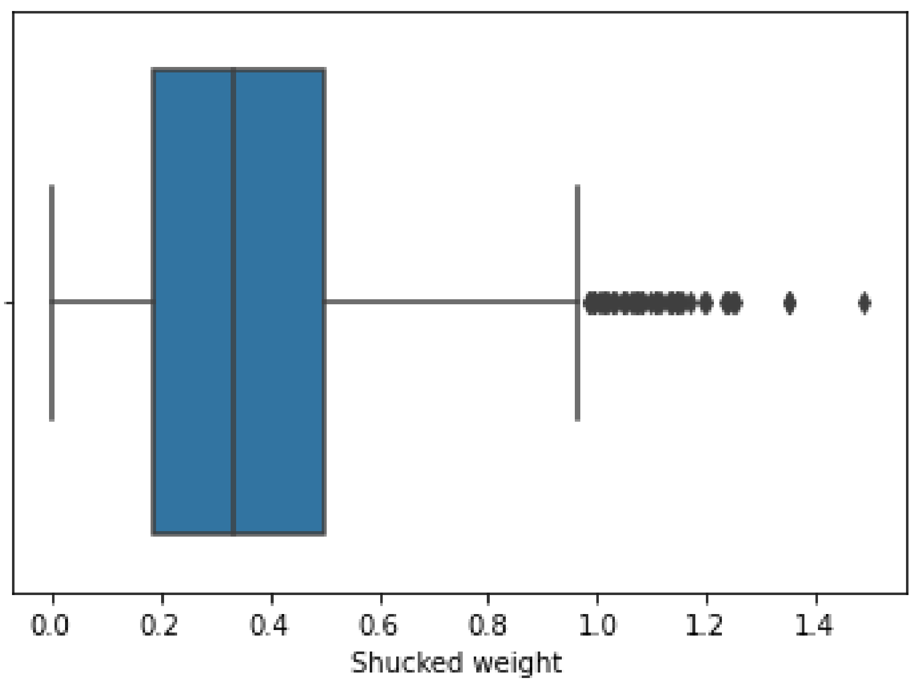
[23]:
```
sns.boxplot(data=d,x="Whole weight")
```

[23]: <AxesSubplot:xlabel='Whole weight'>




```
[24]: sns.boxplot(data=d,x="Shucked weight")
```

```
[24]: <AxesSubplot:xlabel='Shucked weight'>
```

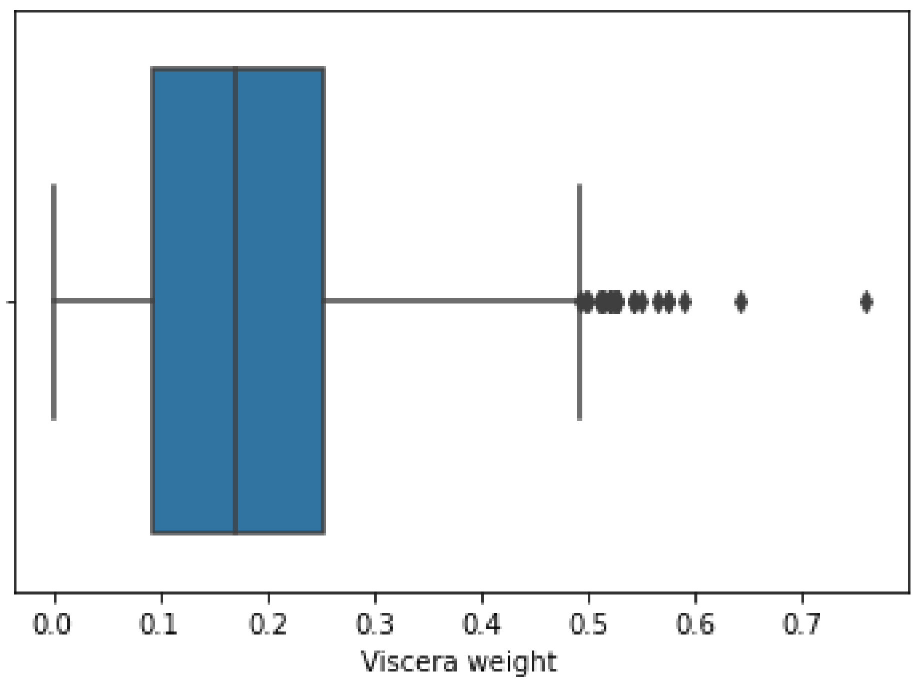


[25]:
```
d.columns
```

[25]:
```
Index(['Sex', 'Length', 'Diameter', 'Height', 'Whole weight',
'Shucked weight',
       'Viscera weight', 'Shell weight', 'Rings'],
      dtype='object')
```

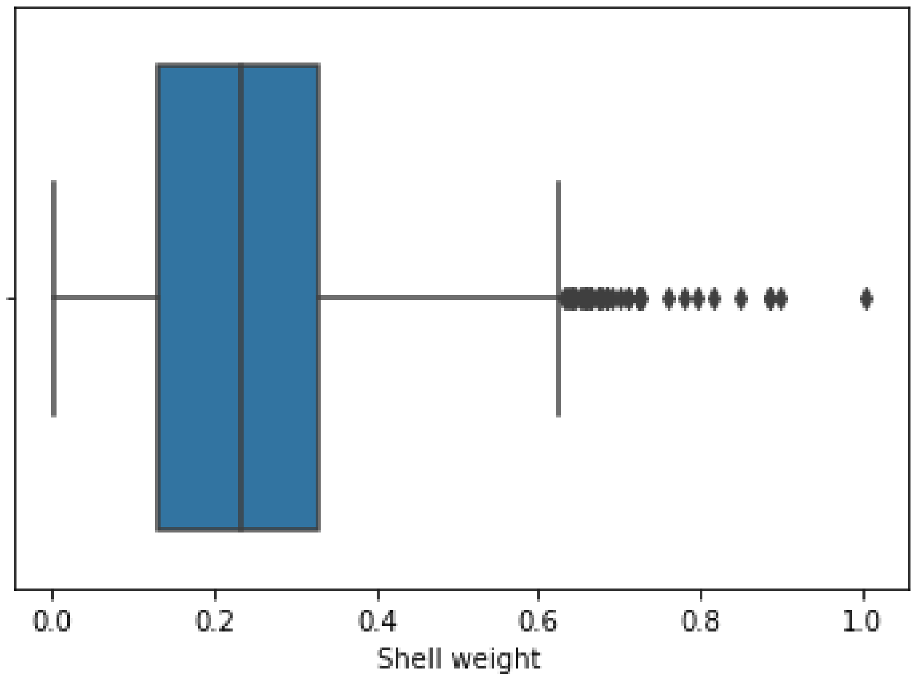
[27]:
```
sns.boxplot(data=d,x="Viscera weight")
```

[27]:
```
<AxesSubplot:xlabel='Viscera weight'>
```



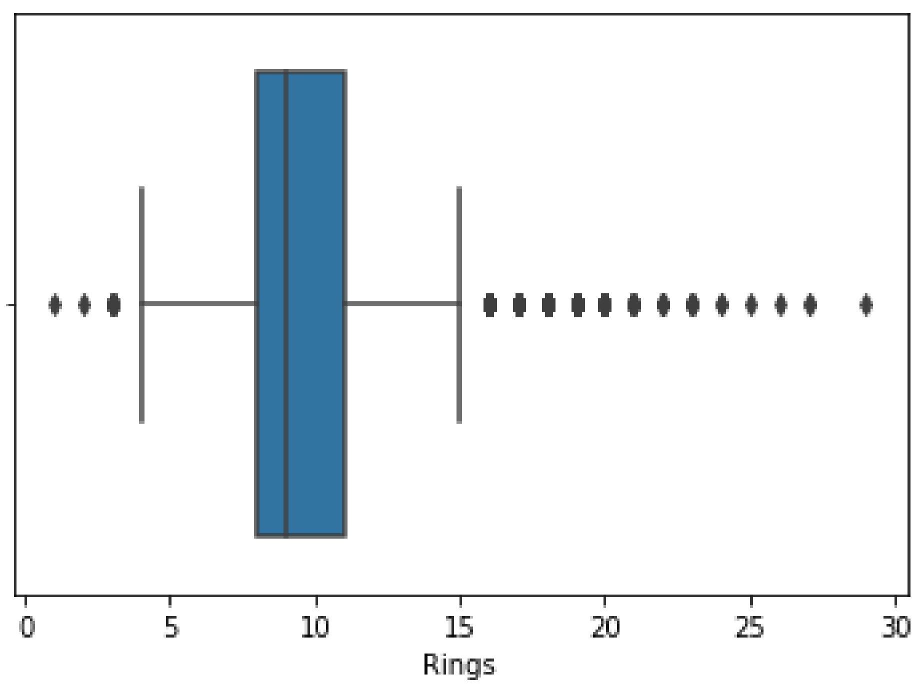
[28]:
```
sns.boxplot(data=d,x="Shell weight")
```

[28]:
```
<AxesSubplot:xlabel='Shell weight'>
```



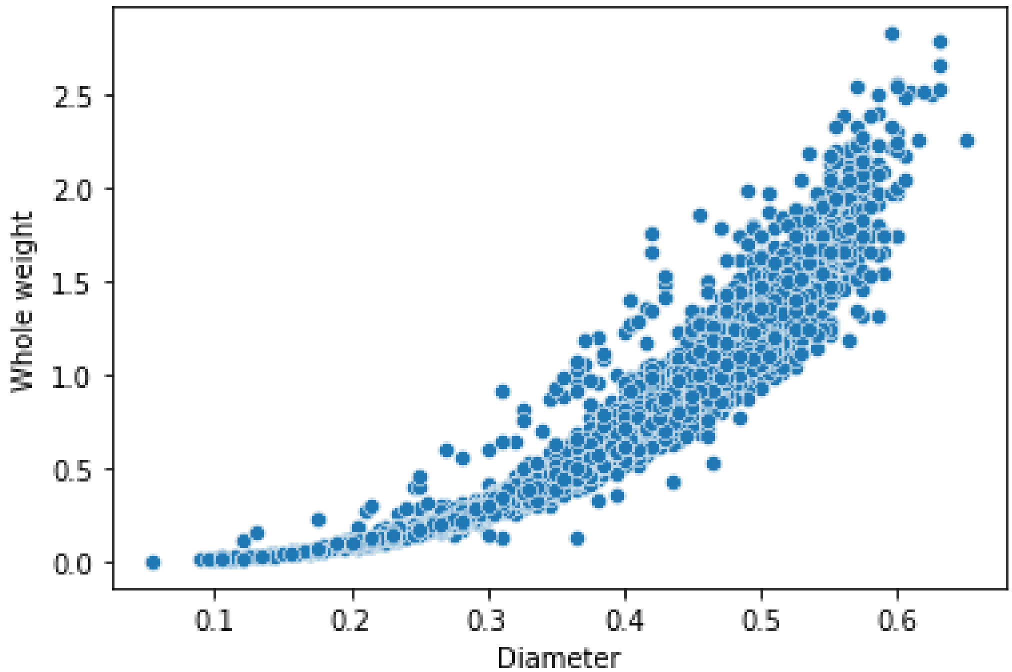

```
[29]: sns.boxplot(data=d,x="Rings")
```

```
[29]: <AxesSubplot:xlabel='Rings'>
```



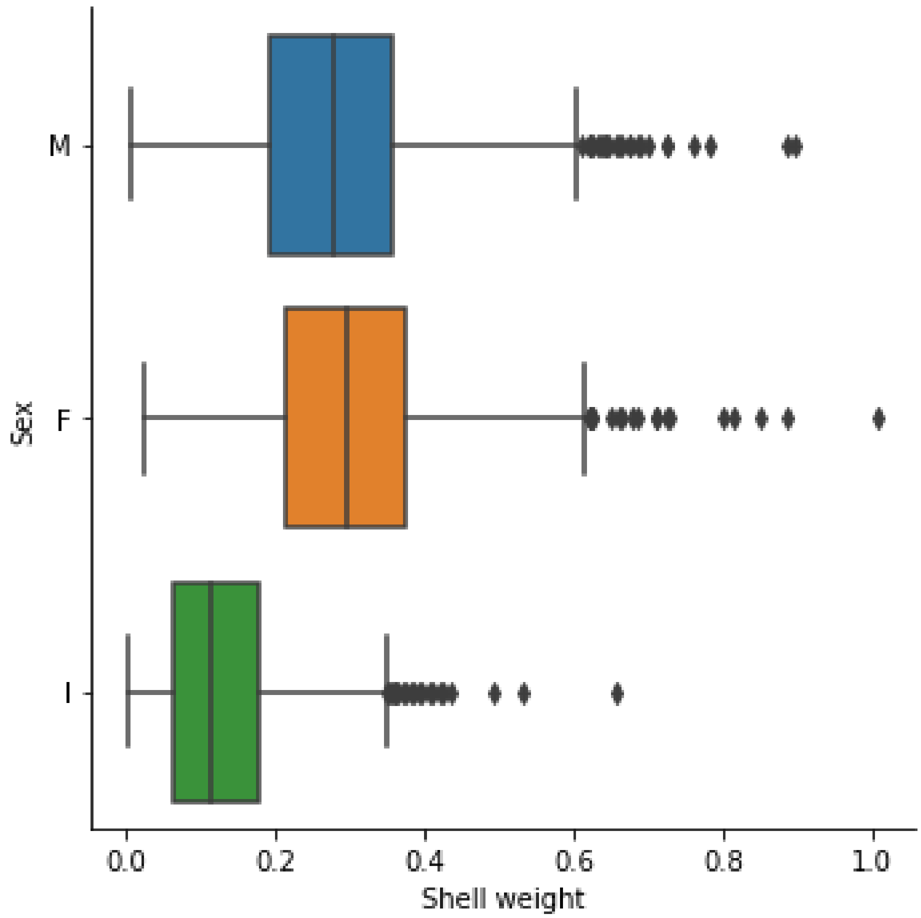
[31]:
```
sns.scatterplot(data=d,x="Diameter",y="Whole weight")
```

[31]: <AxesSubplot:xlabel='Diameter', ylabel='Whole weight'>



[33]:
```
sns.catplot(x="Shell weight",y="Sex",data=d,kind='box')
```

[33]: <seaborn.axisgrid.FacetGrid at 0x1ca496c8970>



2 Removing Outliners

[35]:
```
data1=d[~(d["Height"]>0.4)]
```

[36]:
```
data1=data1[~(data1["Length"]<0.15)]
```

[37]:
```
data1=data1[~(data1["Shell weight"]>0.8)]
```

[38]:
```
data1=data1[~(data1["Whole weight"]>2.5)]
```

[40]:
```
data1=data1[~(data1["Shucked weight"]>1.2)]
```

[42]:
```
data1.shape,d.shape
```

[42]:
```
((4148, 9), (4177, 9))
```

[43]:
```
data1["Age"]=data1["Rings"]+1.5
```

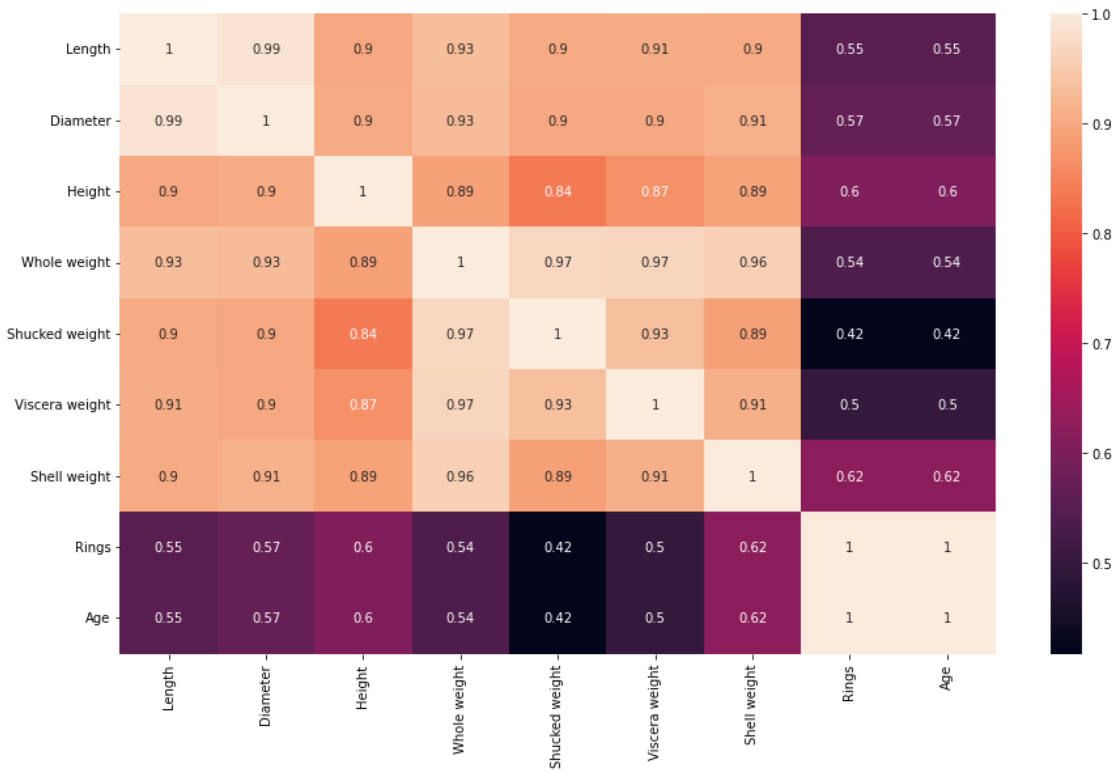
[44]:
```
data1.head()
```

[44]:
```
  Sex  Length  Diameter  Height  Whole weight  Shucked weight  Viscera weight  \
0   M   0.455     0.365   0.095        0.5140          0.2245          0.1010
1   M   0.350     0.265   0.090        0.2255          0.0995          0.0485
2   F   0.530     0.420   0.135        0.6770          0.2565          0.1415
3   M   0.440     0.365   0.125        0.5160          0.2155          0.1140
4   I   0.330     0.255   0.080        0.2050          0.0895          0.0395

   Shell weight  Rings   Age
0         0.150     15  16.5
1         0.070      7   8.5
2         0.210      9  10.5
3         0.155     10  11.5
4         0.055      7   8.5
```

[45]:
```
plt.figure(figsize=(15,9))
sns.heatmap(data1.corr(),annot=True)
```

[45]: <AxesSubplot:>



[46]:
```
q1=data1["Height"].quantile(0.25)
q3=data1["Height"].quantile(0.75)
iq=q3-q1
data2=data1[~((data1["Height"]<(q1-1.5*iq))|(data1["Height"]>(q3+1.5*iq)))]
```

[47]:
```
q1=data2["Length"].quantile(0.25)
q3=data2["Length"].quantile(0.75)
iq=q3-q1
data2=data2[~((data2["Length"]<(q1-1.5*iq))|(data2["Length"]>(q3+1.5*iq)))]
```

[48]:
```
q1=data2["Whole weight"].quantile(0.25)
q3=data2["Whole weight"].quantile(0.75)
iq=q3-q1
data2=data2[~((data2["Whole weight"]<(q1-1.5*iq))|(data2["Whole weight"]>(q3+1.
↪5*iq)))]
data2.shape
```

[48]: (4084, 10)

3 Split the data into dependent and independent variables.Check for Categorical columns and perform encoding

[49]:
```
x=data1.drop(columns=["Age","Rings"])
x["Sex"].replace({'M':2,'F':1,'I':0},inplace=True)
y=data1["Age"]
```

4 Scale the independent

variables

[50]:
```
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
x1=sc.fit_transform(x)
x1
```

[50]:
```
array([[ 1.15517188, -0.57962568, -0.43426571, …, -
        0.61179664, -0.72983642, -0.64298618],
       [ 1.15517188, -1.46650489, -1.4556039 , …, -
        1.19199725, -1.21854392, -1.23398399],
       [-0.05270635, 0.05385947, 0.12747029, …, -
       0.46326529,
        -0.35283349, -0.19973781],
       …,
       [ 1.15517188, 0.64511228, 0.6892063 , …, 0.78532642,
         1.00623881, 0.52423451],
       [-0.05270635, 0.856274 , 0.79134012, …, 0.81085524,
         0.75955788, 0.43558484],
   [ 1.15517188, 1.57422383, 1.50627685, …, 2.73480045,
         1.83471439, 1.90569191]])
```

5 Model Building

6 Linear Regression

[51]:
```
 from sklearn.model_selection import train_test_split
from sklearn import metrics
x_train,x_test,y_train,y_test=train_test_split(x1,y,tes
t_size=0.
 ↪2,random_state=42)
x_train.shape,x_test.shape
```

```
[51]: ((3318, 8), (830, 8))
```

```
[52]: from sklearn.linear_model import LinearRegression
      lr=LinearRegression()
      lr.fit(x_train,y_train)
      lr.score(x_test,y_test)
```

```
[52]: 0.5676481741929682
```

7 Lasso

```
[53]: from sklearn.linear_model import Lasso
      lr1=Lasso(alpha=0.001)
      lr1.fit(x_train,y_train)
      lr1.score(x_test,y_test)
```

```
[53]: 0.5672651558727646
```

8 Ridge

```
[54]: from sklearn.linear_model import Ridge
      r1=Ridge(alpha=0.01)
      r1.fit(x_train,y_train)
      r1.score(x_test,y_test)
```

```
[54]: 0.5676440857767044
```

9 Prediction

```
[55]: x_test[231],y_test[231]
```

```
[55]: (array([1.15517188, 0.56064759, 0.94454085, 0.28941484,
0.66861919,
              0.59734142, 0.79679274, 0.797571 ]),
       15.5)
```

```
[56]: x_test[23],y_test[23]
```

```
[56]: (array([1.15517188, 0.89850634, 1.09774158, 0.68448704,
1.10789396,
              0.61126624, 1.57872474, 1.57325563]),
       10.5)
```

```
[57]: lr.predict([x_test[231]])
```

```
[57]: array([13.06004481])
```

```
[58]: lr.predict([x_test[23]])
```

```
[58]: array([15.2756354])
```