

Assignment -3

Assignment Date	01 October 2022
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Student Roll Number	811519104053
Maximum Marks	2 Marks

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

```
[2]: 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]: 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()
```

```

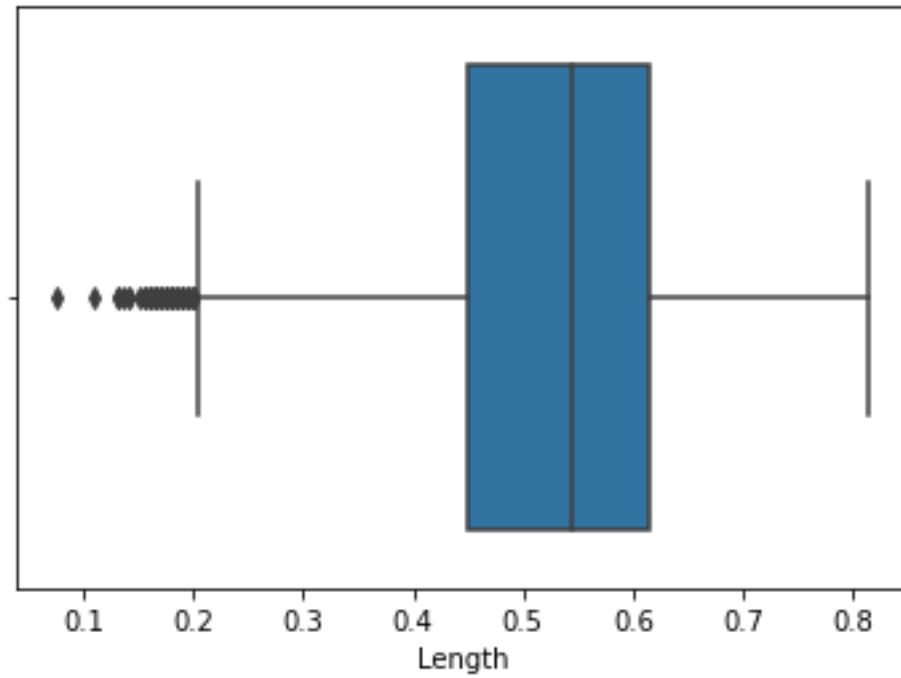
[9]: False4177
     dtype: int64

```

1 Data visualization(EDA Analysis)

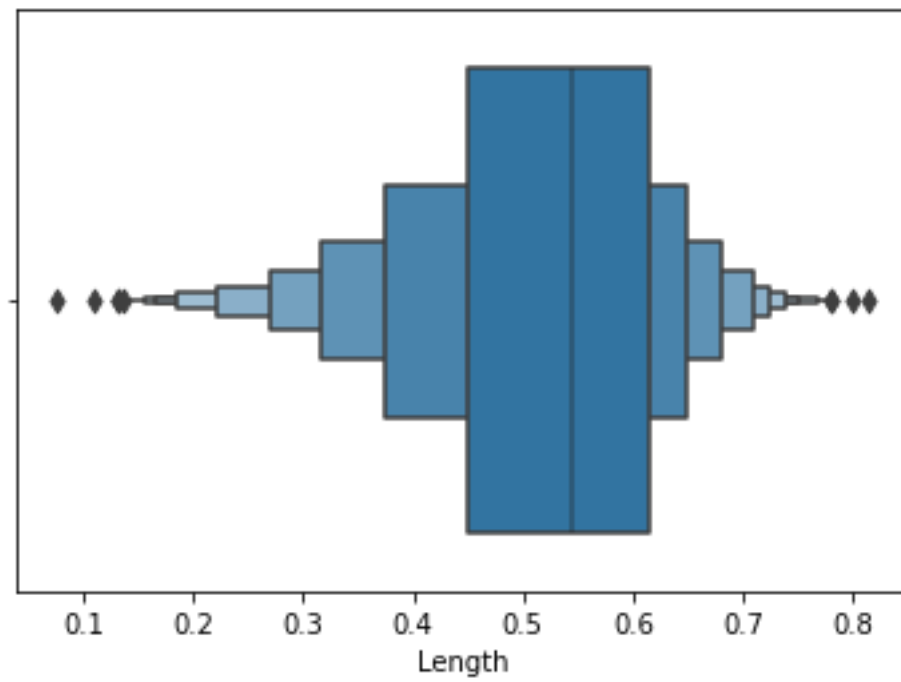
```
[12]: sns.boxplot(data=d, x="Length")
```

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



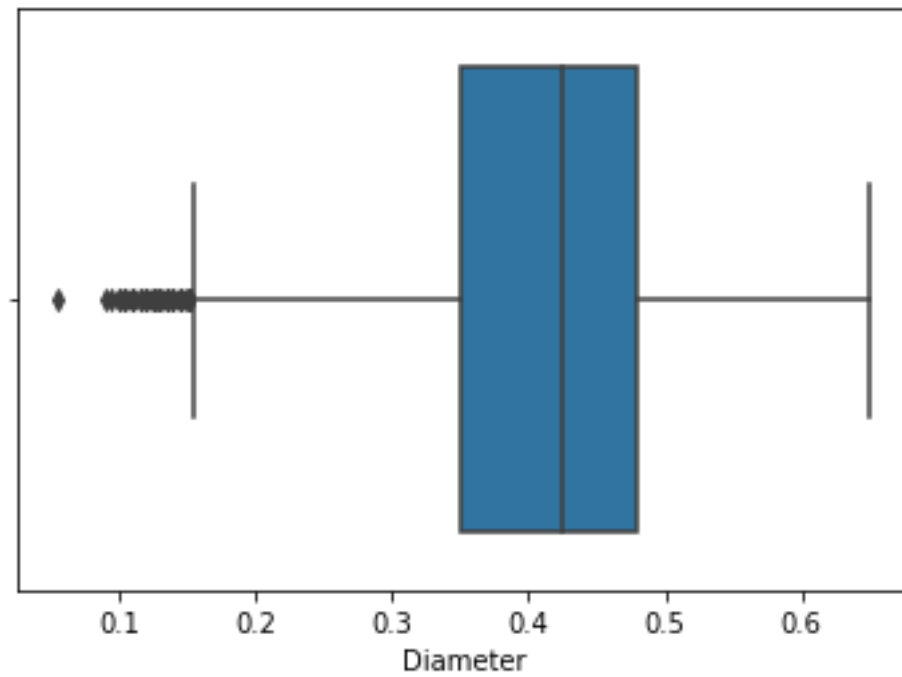
```
[13]: sns.boxenplot(data=d,x="Length")
```

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



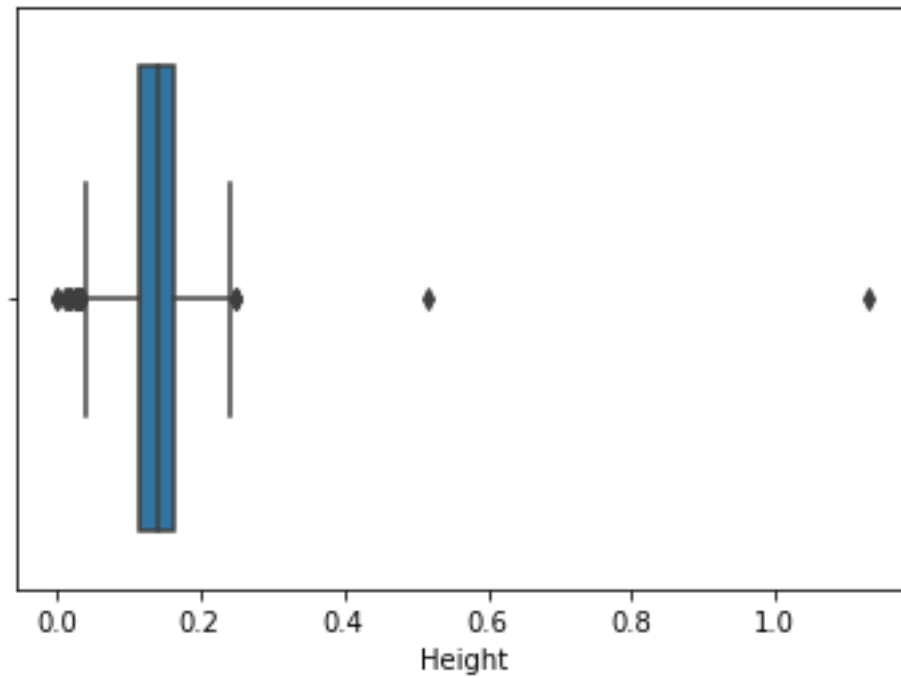
```
[16]: sns.boxplot(data=d,x="Diameter")
```

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



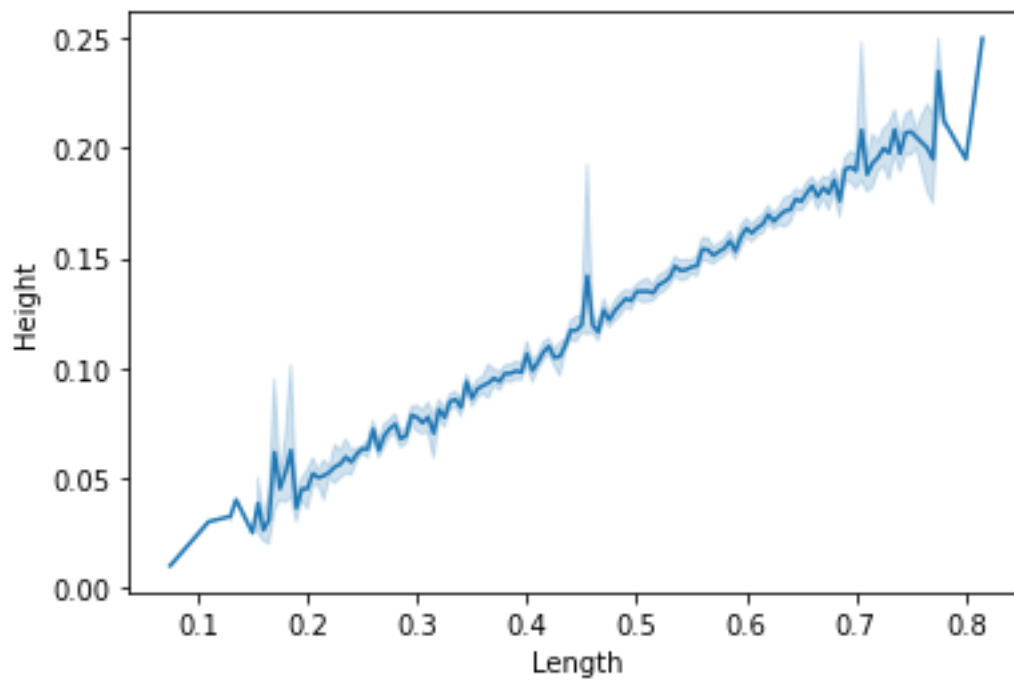
```
[18]: sns.boxplot(data=d,x="Height")
```

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

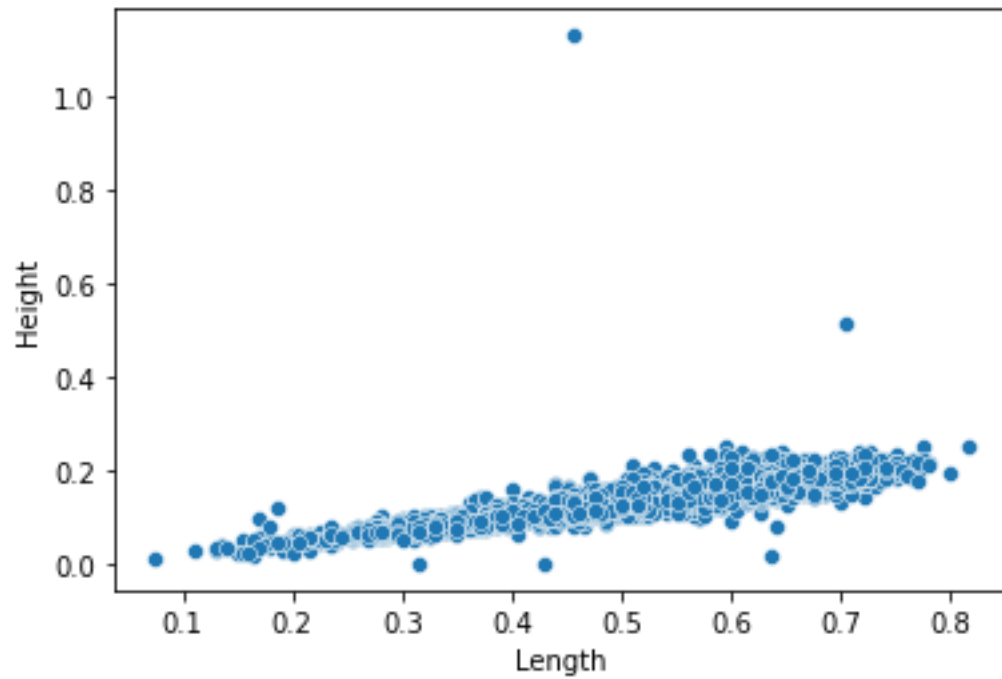
```
[20]: sns.lineplot(data=d,x="Length",y="Height")
```

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



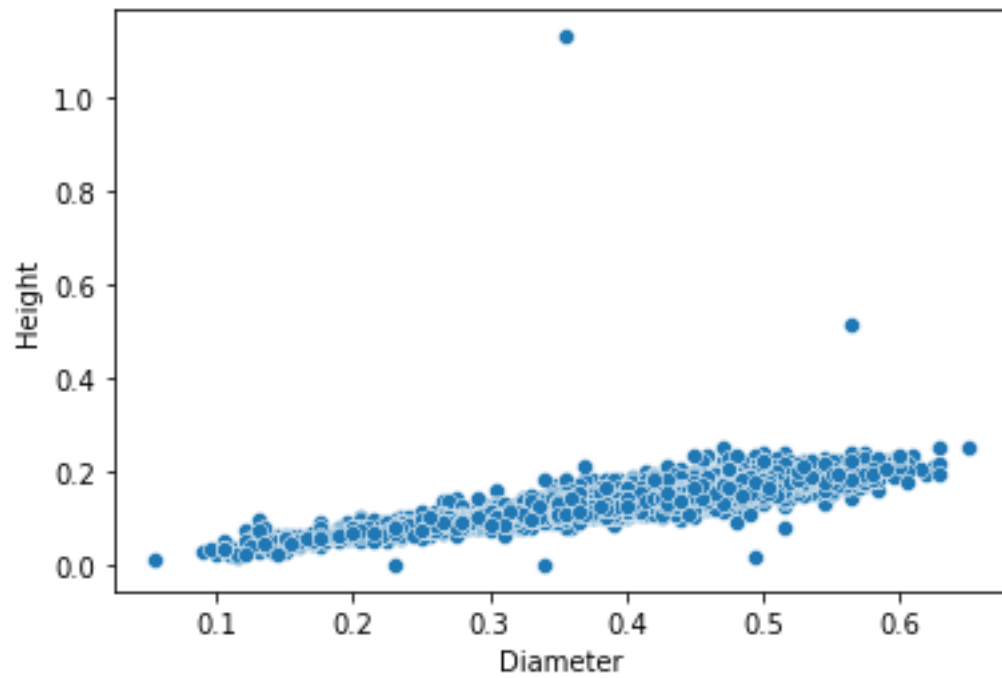
```
[21]: sns.scatterplot(data=d,x="Length",y="Height")
```

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



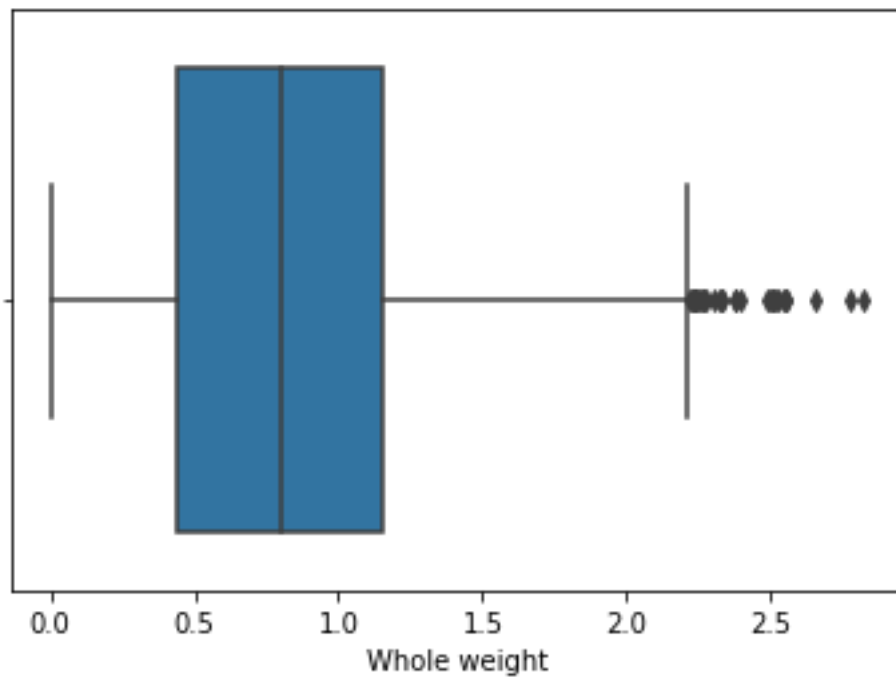
```
[22]: sns.scatterplot(data=d,x="Diameter",y="Height")
```

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



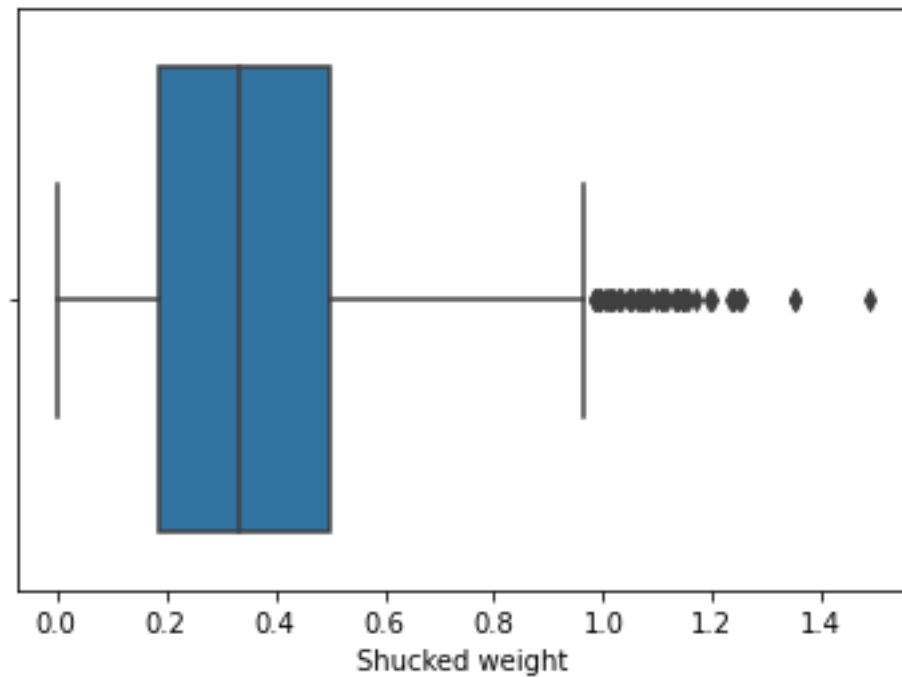
```
[23]: sns.boxplot(data=d, x="Whole weight")
```

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



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

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

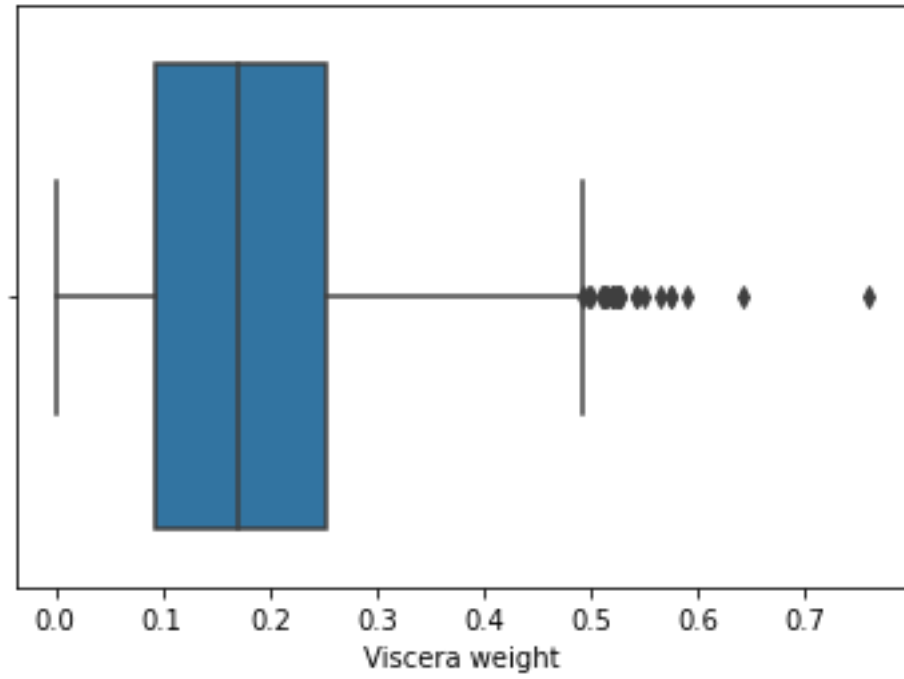


```
[25]: d.columns
```

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

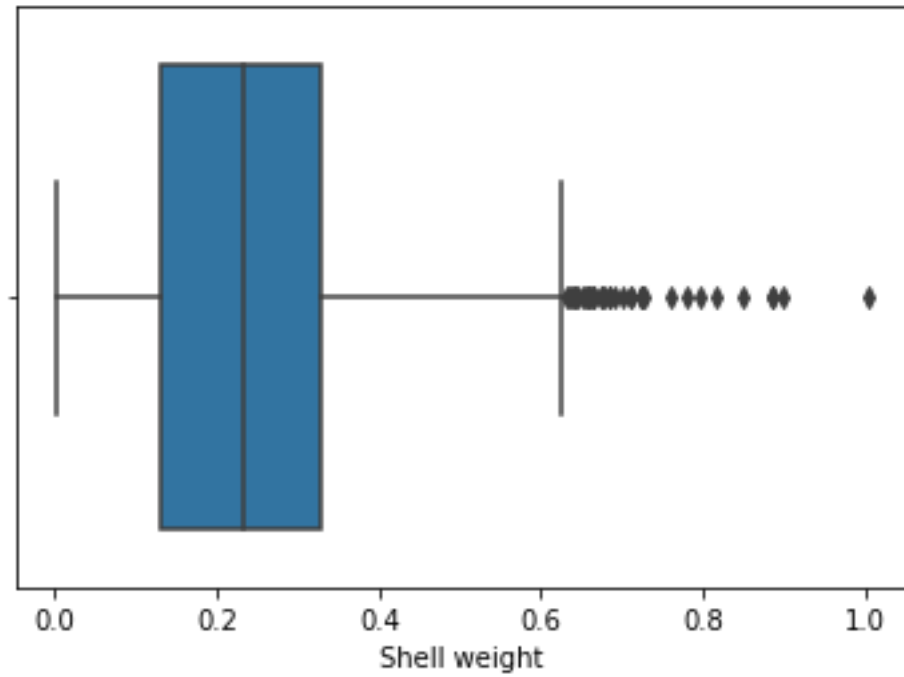
```
[27]: sns.boxplot(data=d,x="Viscera weight")
```

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



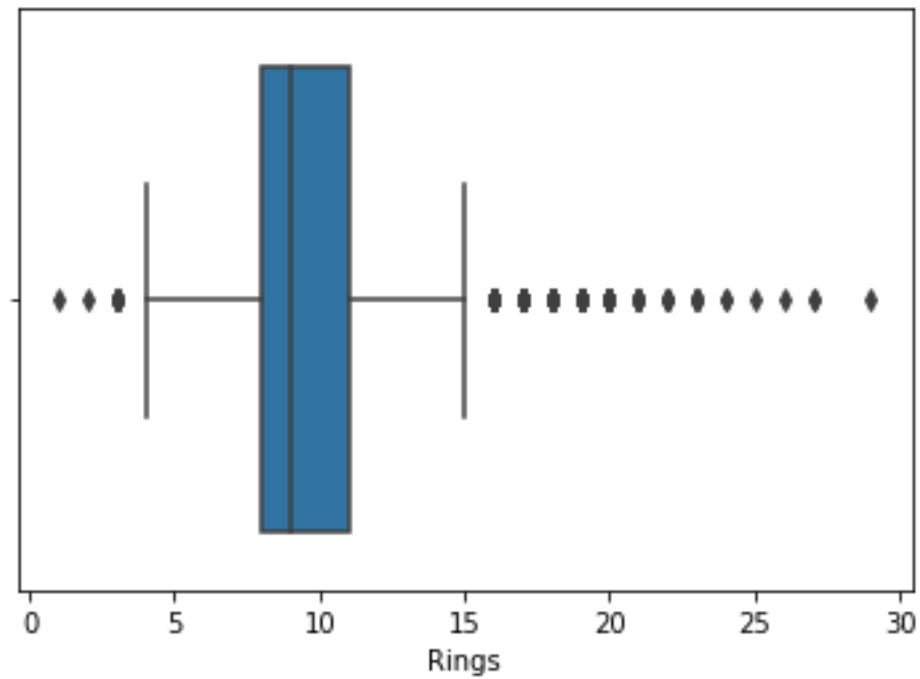
```
[28]: sns.boxplot(data=d, x="Shell weight")
```

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



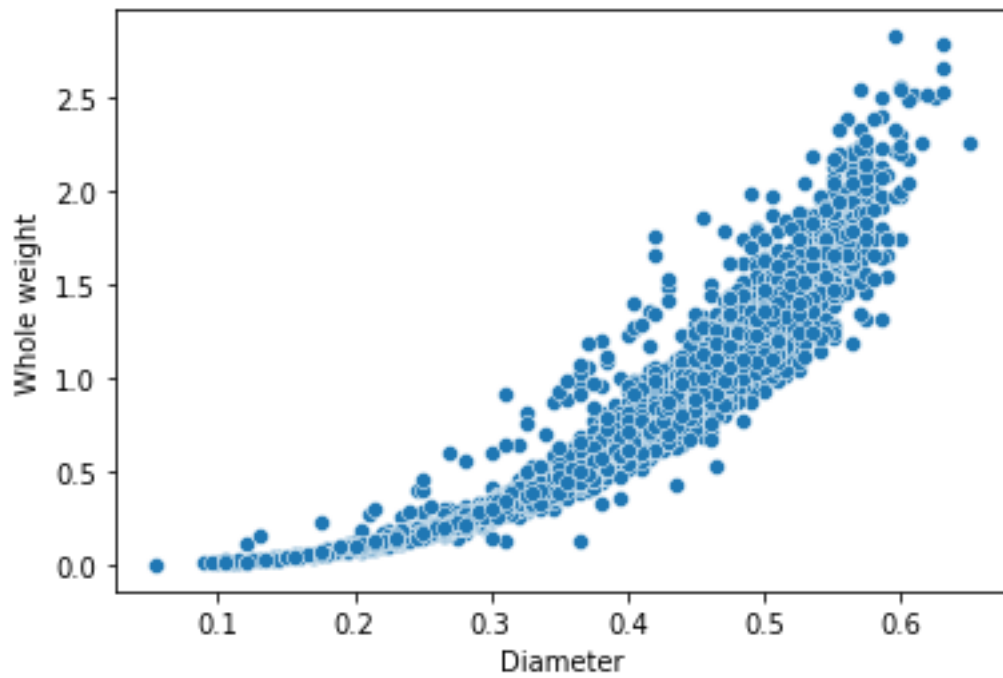
```
[29]: sns.boxplot(data=d,x="Rings")
```

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



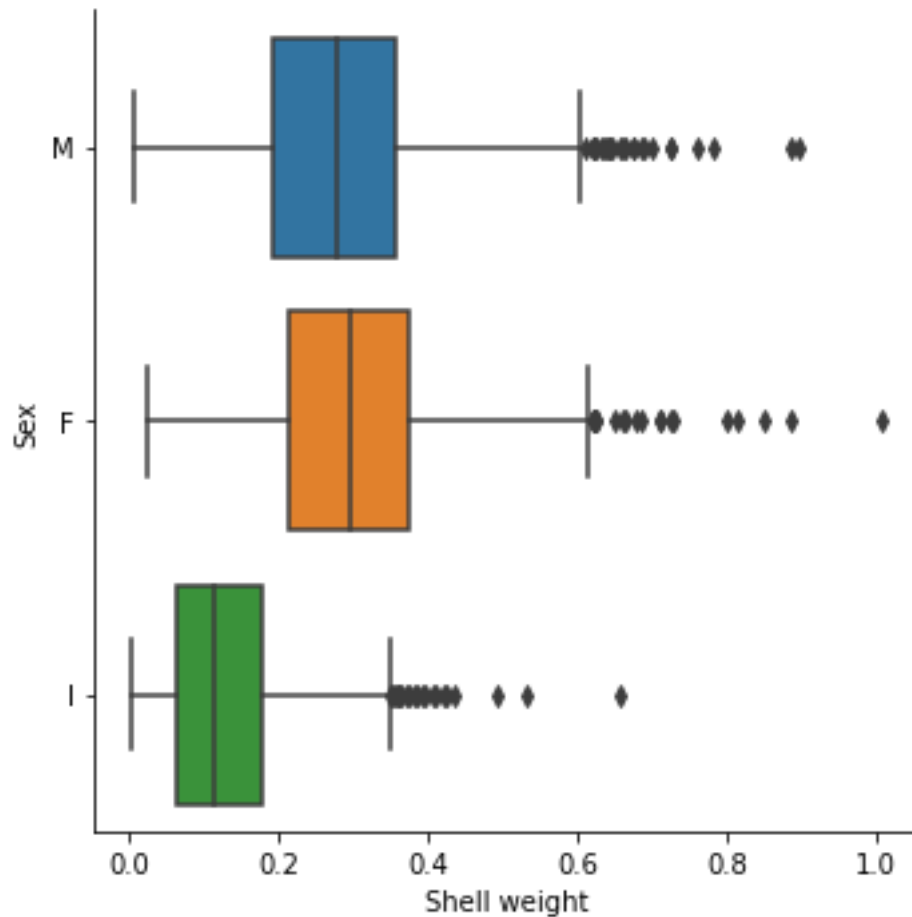
```
[31]: sns.scatterplot(data=d,x="Diameter",y="Whole weight")
```

```
[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 Outliers

```
[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
```



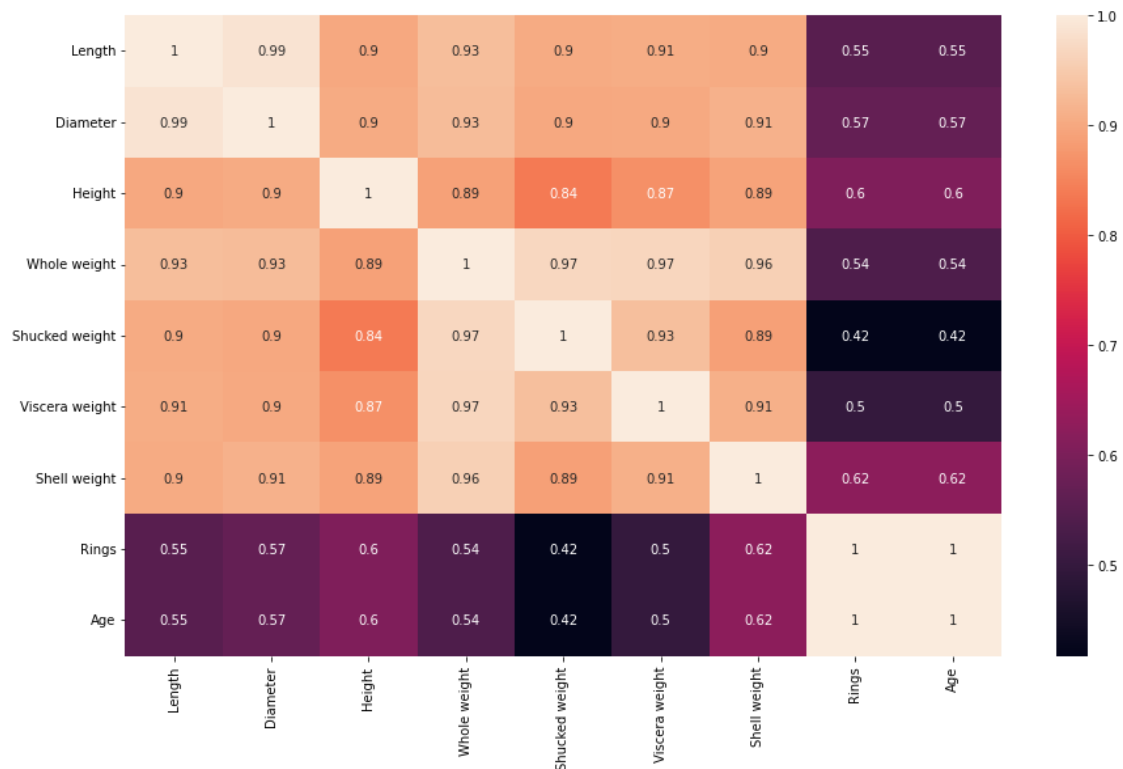
```
[44]: data1.head()
```

```
[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
lrl=Lasso(alpha=0.001)
lrl.fit(x_train,y_train)
lrl.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])
```