

### Assignment -3

Assignment Date	01 October 2022
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Student Roll Number	811519104059
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)

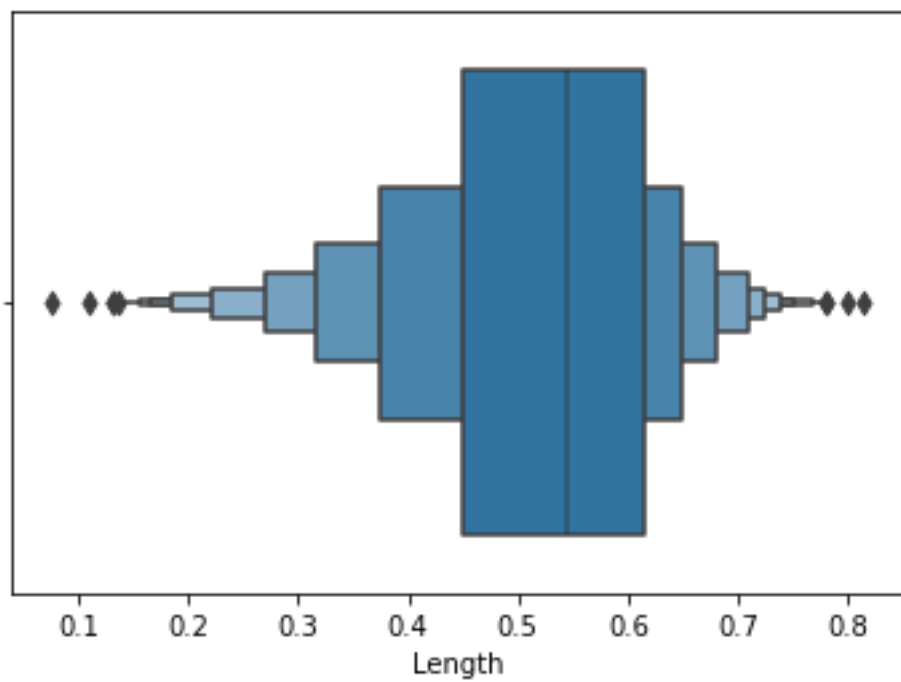
```
[12]: sns.boxplot(data=d,x="Length")
```

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



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

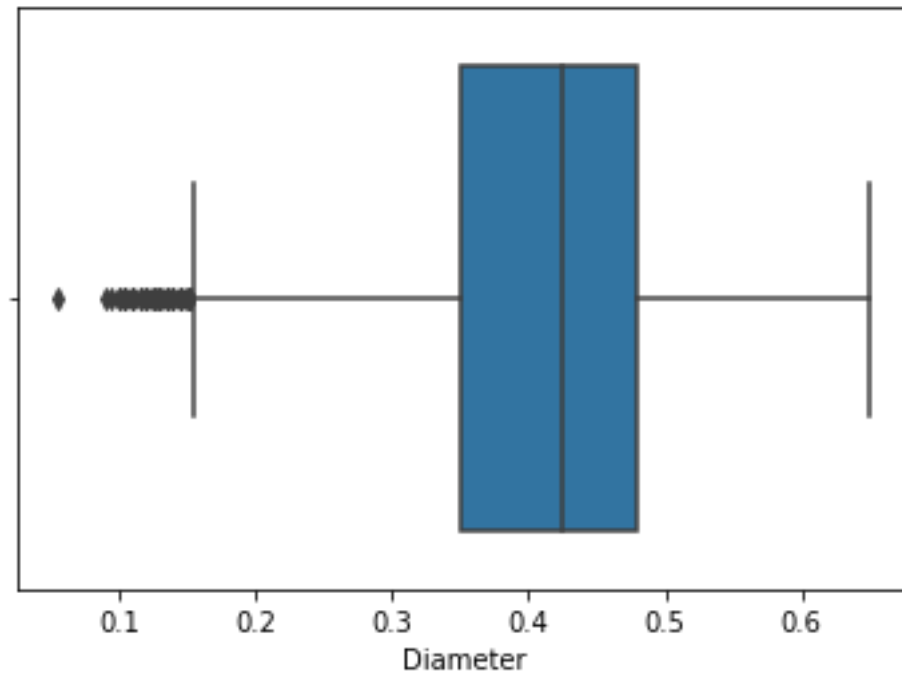
```
[13]: <AxesSubplot:xlabel='Length'>
```





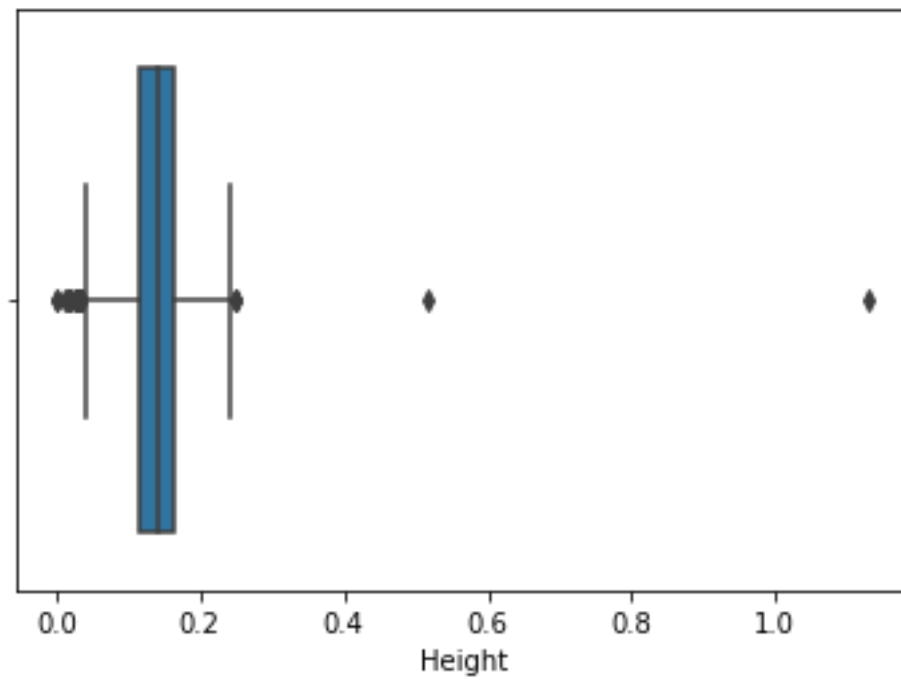
```
[16]: sns.boxplot(data=d,x="Diameter")
```

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



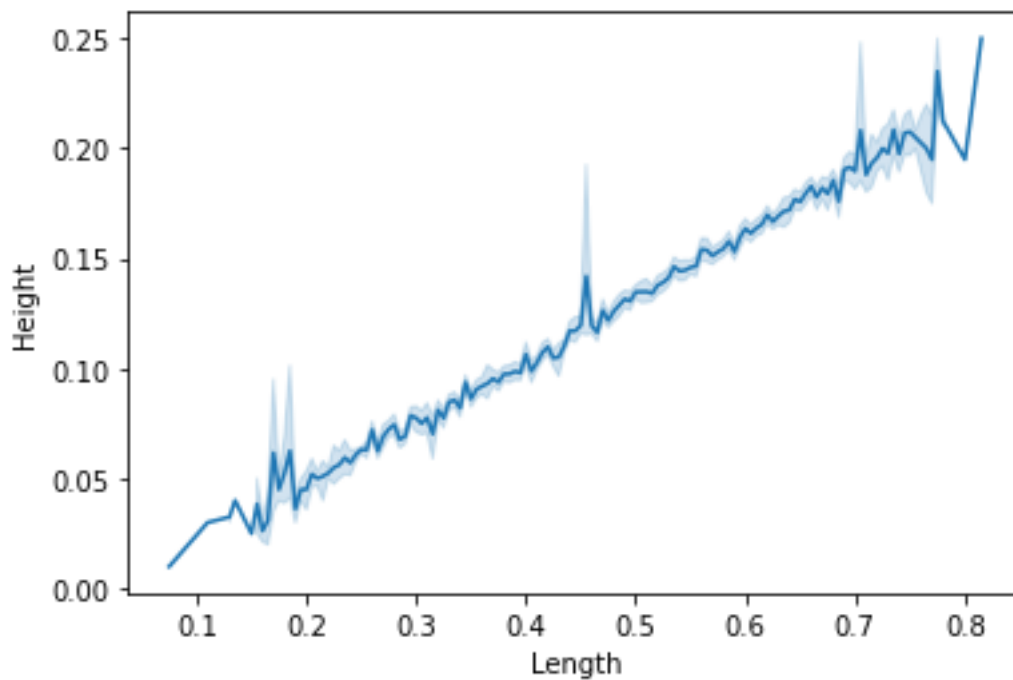
```
[18]: sns.boxplot(data=d,x="Height")
```

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



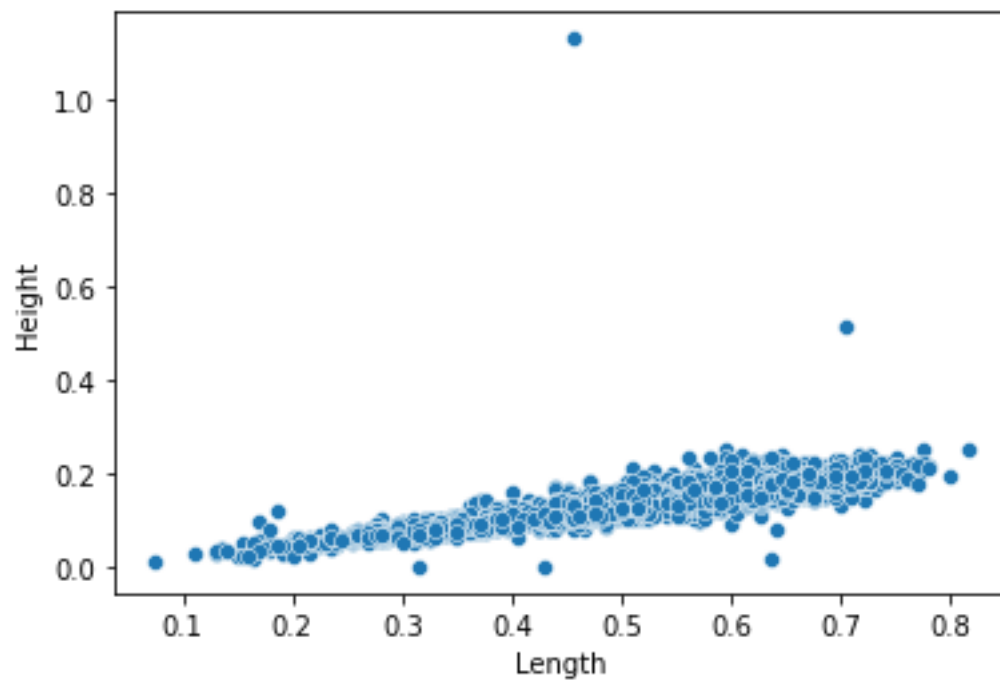
```
[20]: sns.lineplot(data=d,x="Length",y="Height")
```

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



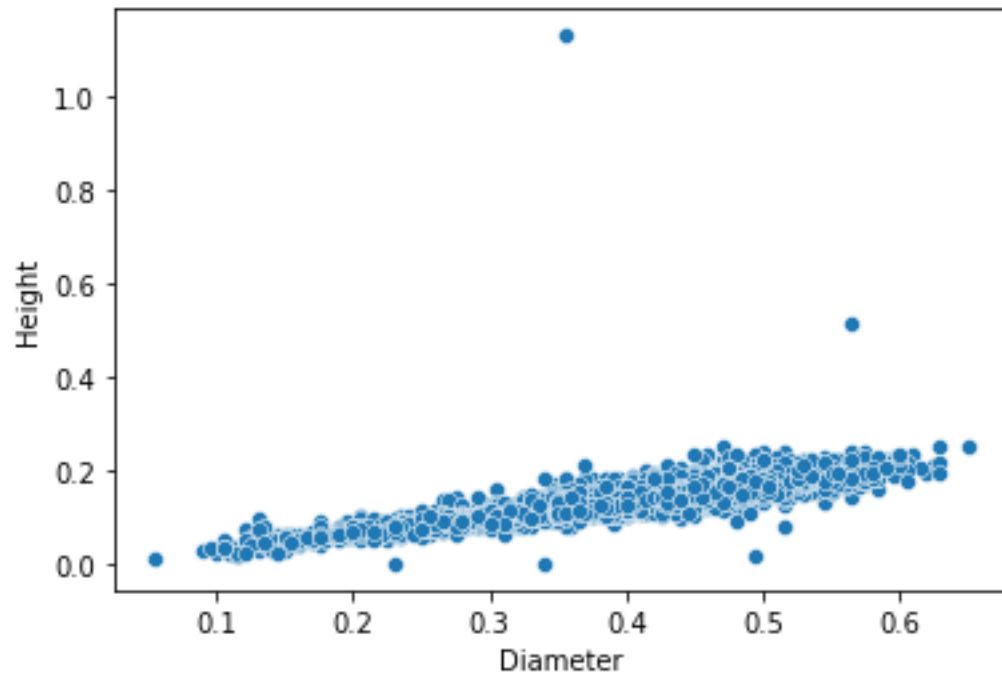
```
[21]: sns.scatterplot(data=d, x="Length", y="Height")
```

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



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

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



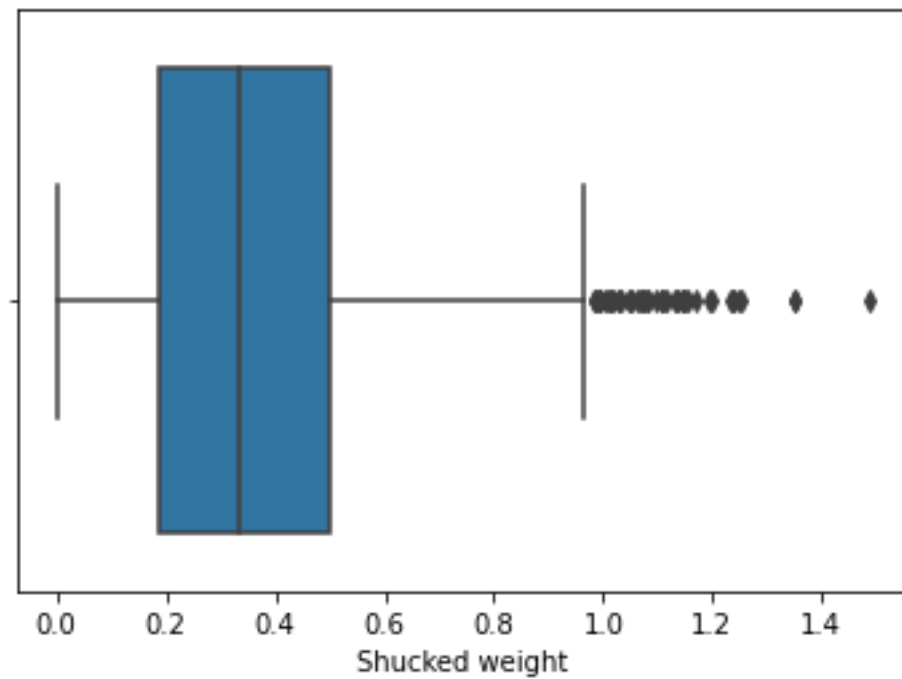
```
[23]: sns.boxplot(data=d, x="Whole weight")
```

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



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

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

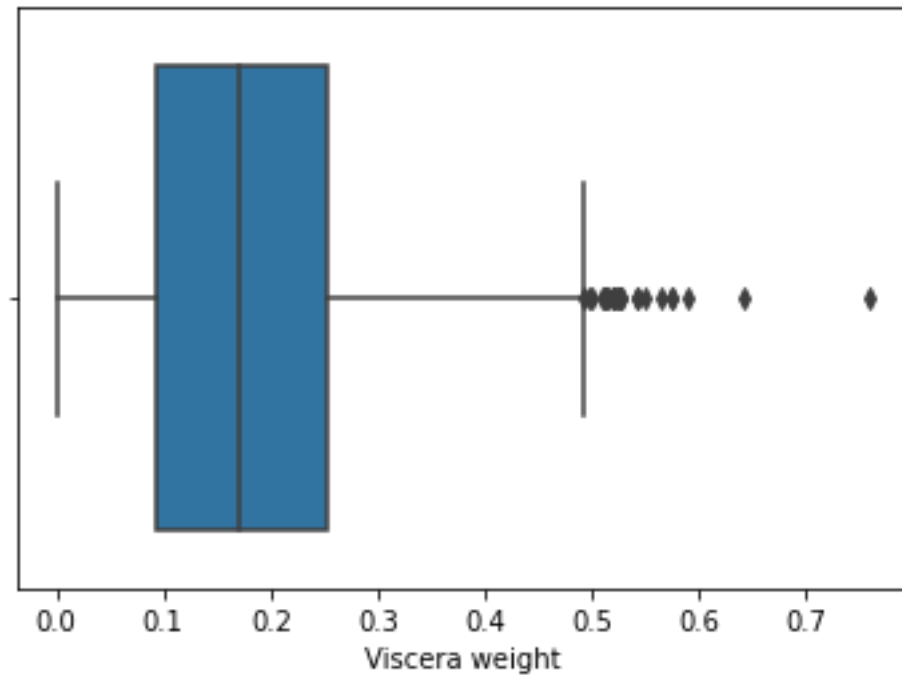


```
[25]: d.columns
```

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

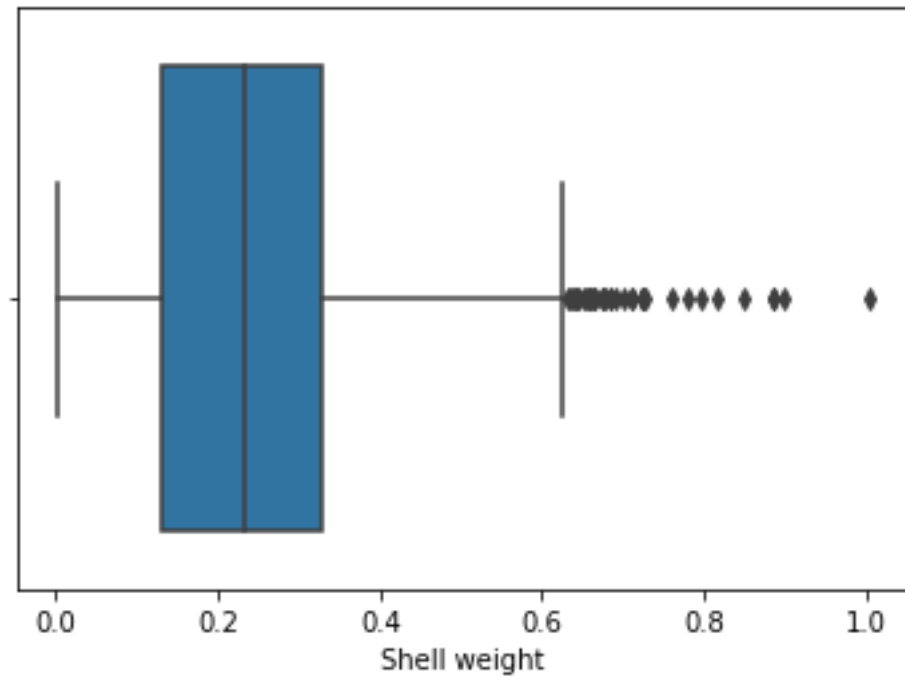
```
[27]: sns.boxplot(data=d, x="Viscera weight")
```

```
[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")
```

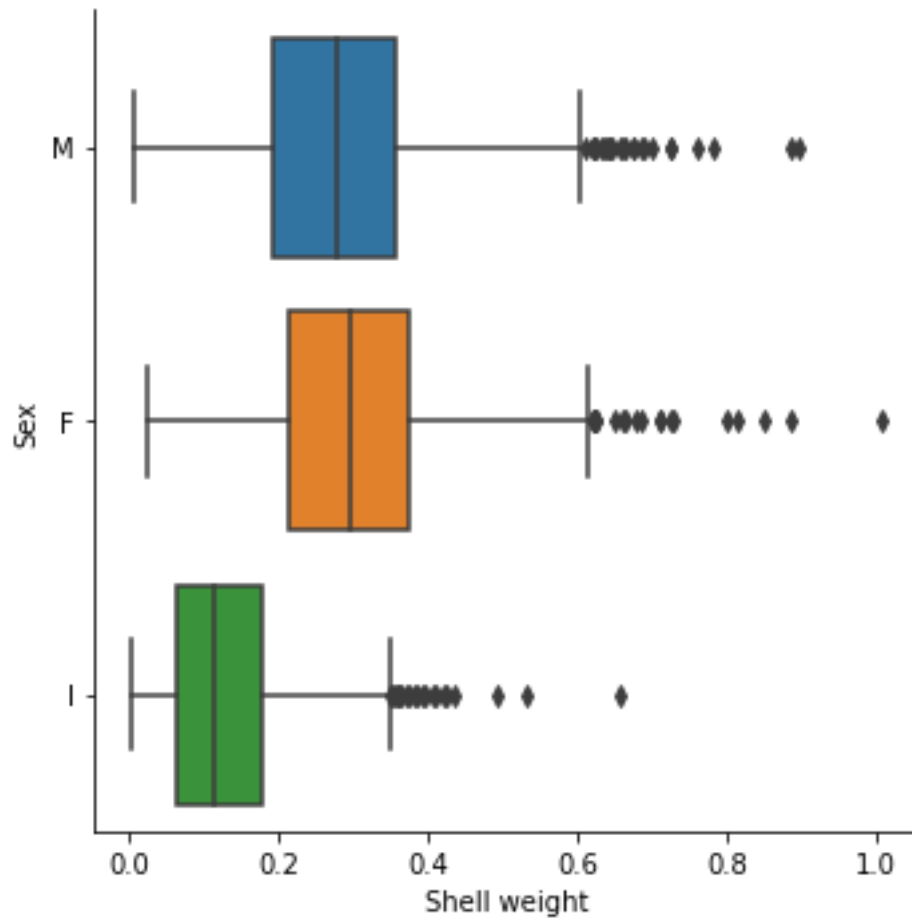
```
[31]: <AxesSubplot:xlabel='Diameter', ylabel='Whole weight'>
```



```
[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
```

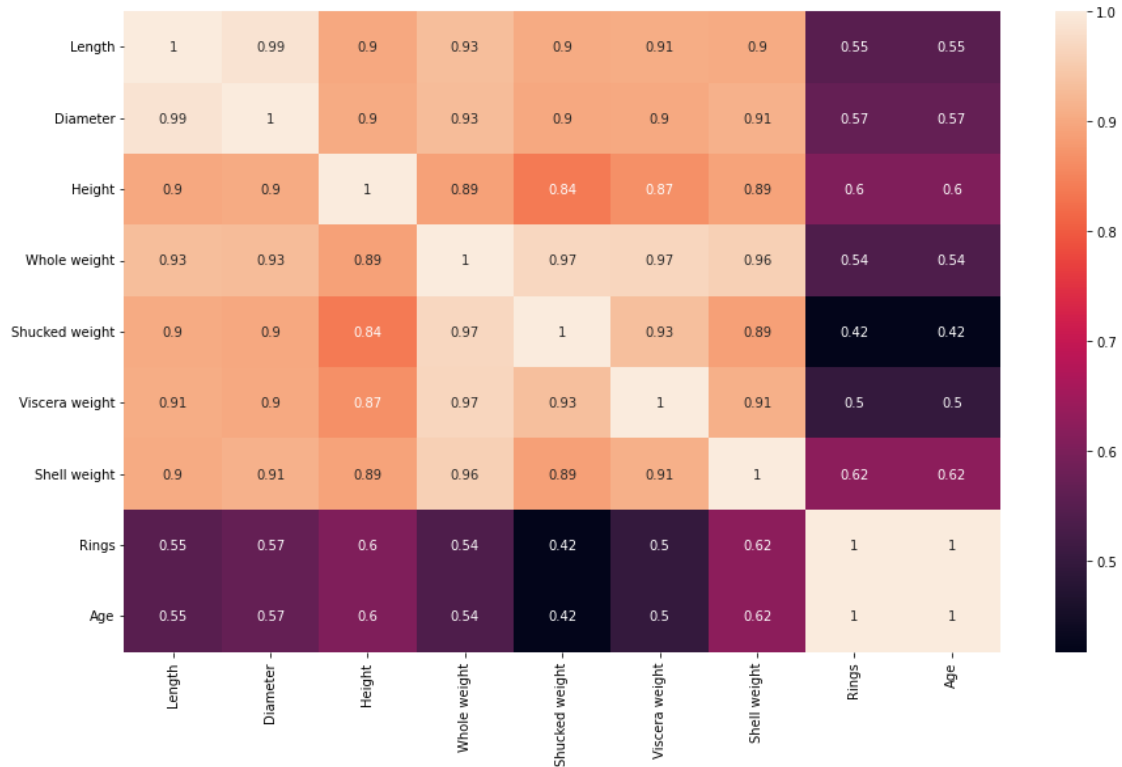
```
[44]: data1.head()
```

```
[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])
```