TEAM DETAILS

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New Section

1.Loading Dataset into tool

```
from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

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

2.Performing Visualization

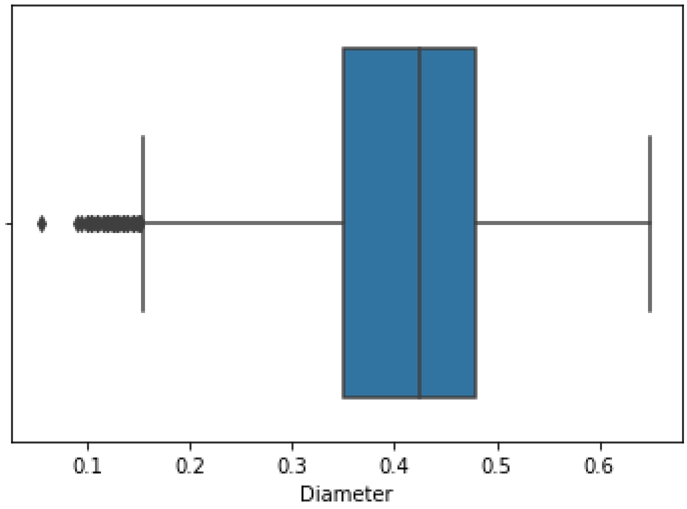
Univariate Analysis

```
data.head()
```

	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	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

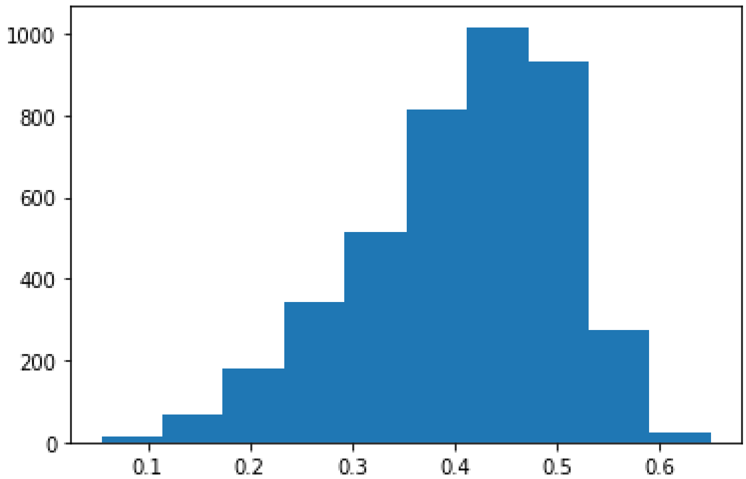
```
sns.boxplot(data['Diameter'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6fb14bf10>
```



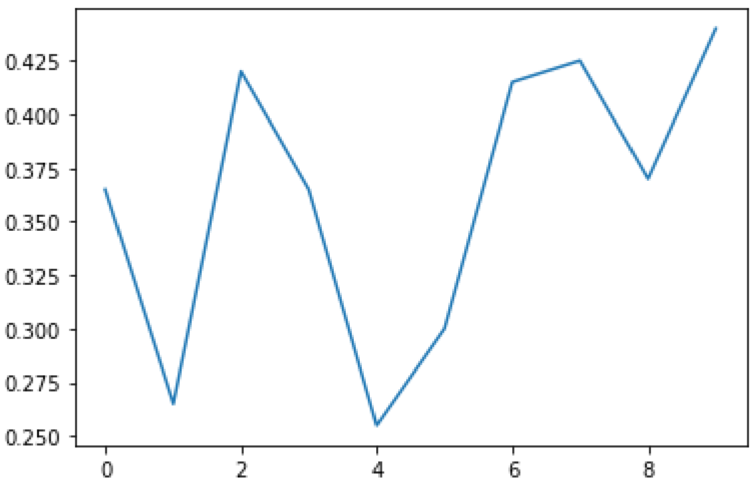

```
plt.hist(data['Diameter'])
```

```
(array([  13.,   66.,  180.,  344.,  513.,  812., 1017.,  934.,  275.,
          23.]),
 array([0.055 , 0.1145, 0.174 , 0.2335, 0.293 , 0.3525, 0.412 , 0.4715,
        0.531 , 0.5905, 0.65  ]),
 <a list of 10 Patch objects>)
```



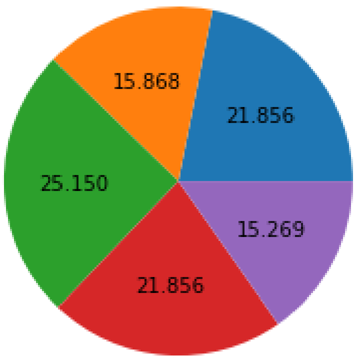

```
plt.plot(data['Diameter'].head(10))
```

```
[<matplotlib.lines.Line2D at 0x7fc6fac11c10>]
```



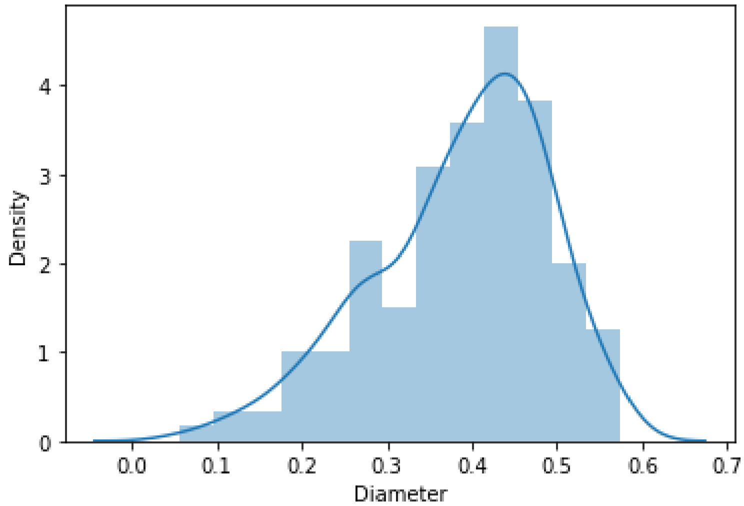
```
plt.pie(data['Diameter'].head(),autopct='%.3f')
```

```
([<matplotlib.patches.Wedge at 0x7fc6fab2a110>,
  <matplotlib.patches.Wedge at 0x7fc6fab2a950>,
  <matplotlib.patches.Wedge at 0x7fc6fab32210>,
  <matplotlib.patches.Wedge at 0x7fc6fab32b10>,
  <matplotlib.patches.Wedge at 0x7fc6faabd690>],
 [Text(0.8507215626110557, 0.6973326486753676, ''),
  Text(-0.32611344931648134, 1.0505474849691026, ''),
  Text(-1.0998053664078908, -0.02069193128747144, ''),
  Text(-0.08269436219656089, -1.096887251480709, ''),
  Text(0.9758446362287218, -0.5076684409569241, '')],
 [Text(0.46402994324239394, 0.3803632629138369, '21.856'),
  Text(-0.17788006326353525, 0.5730259008922377, '15.868'),
  Text(-0.5998938362224858, -0.011286507974984419, '25.150'),
  Text(-0.045106015743578656, -0.5983021371712958, '21.856'),
  Text(0.5322788924883937, -0.2769100587037768, '15.269')])
```



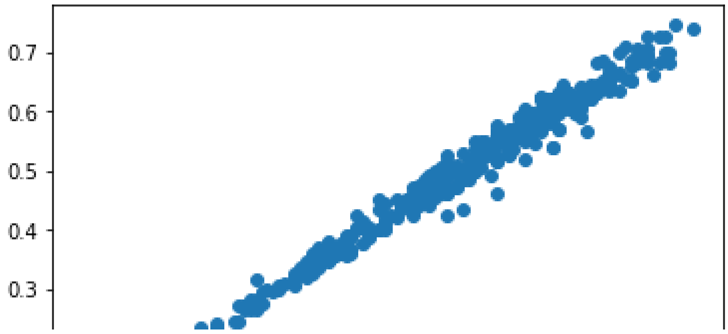

```
sns.distplot(data['Diameter'].head(300))
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6fab6e6d0>
```



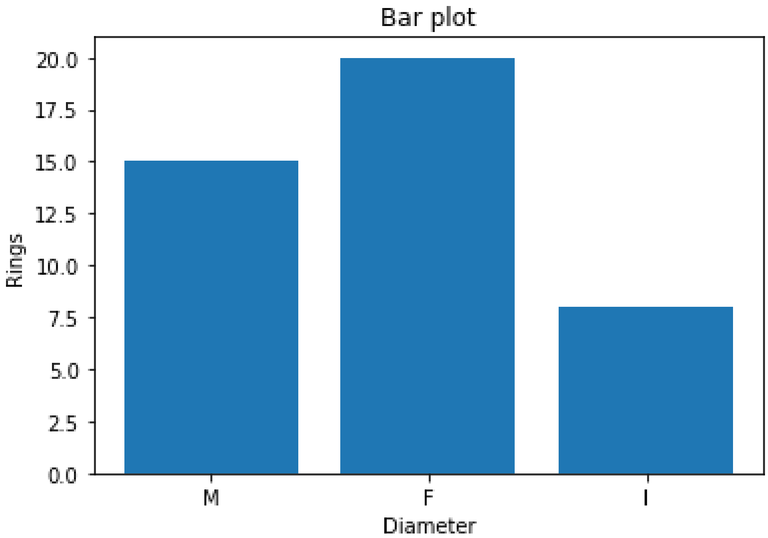

```
plt.scatter(data['Diameter'].head(400),data['Length'].head(400))
```

<matplotlib.collections.PathCollection at 0x7fc6fa9c7750>



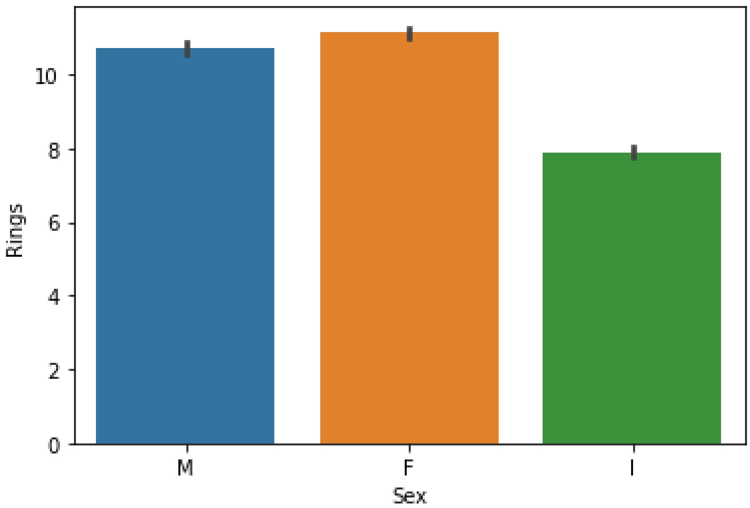

```
plt.bar(data['Sex'].head(20),data['Rings'].head(20))
plt.title('Bar plot')
plt.xlabel('Diameter')
plt.ylabel('Rings')
```

Text(0, 0.5, 'Rings')



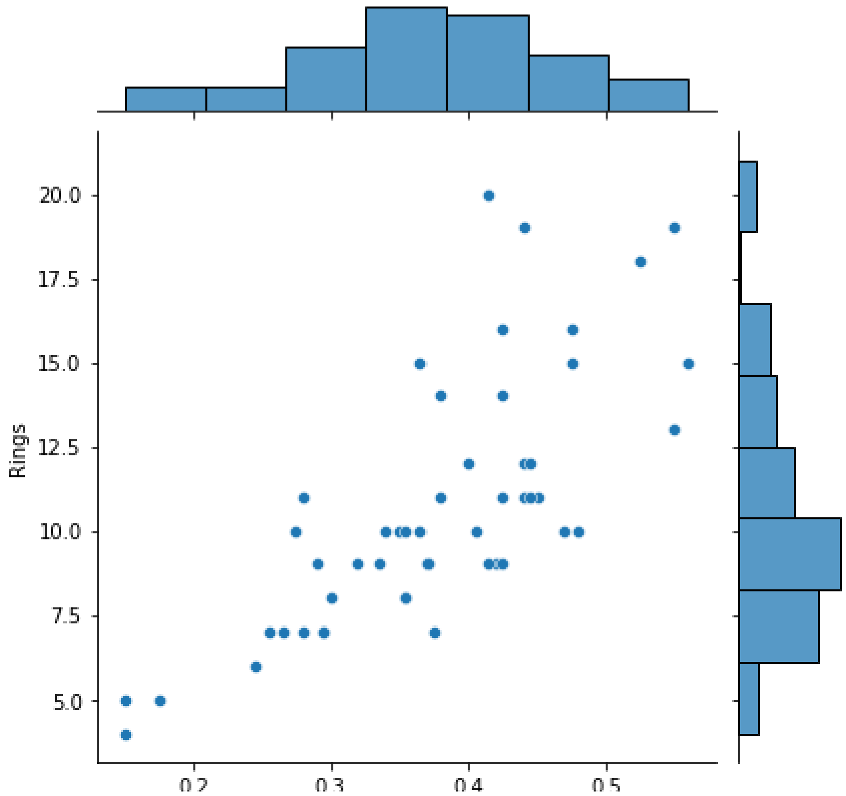

```
sns.barplot(data['Sex'], data['Rings'])
```

<matplotlib.axes._subplots.AxesSubplot at 0x7fc6fab01c50>



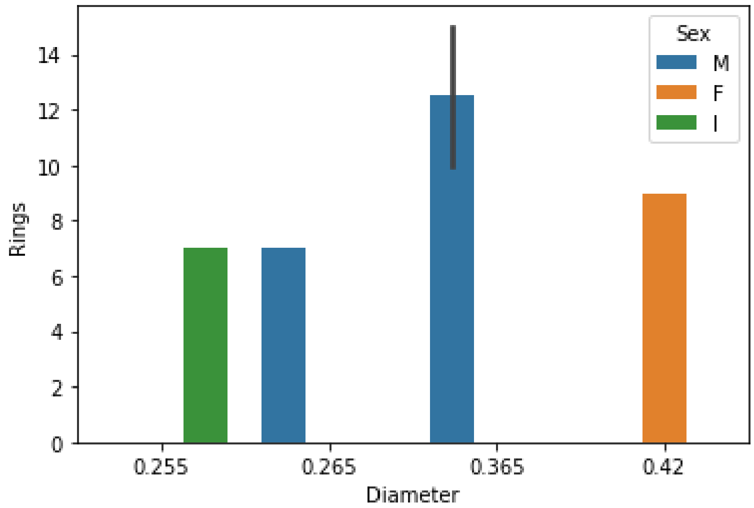

```
sns.jointplot(data['Diameter'].head(50),data['Rings'].head(100))
```

```
<seaborn.axisgrid.JointGrid at 0x7fc6fa886b90>
```




```
sns.barplot('Diameter','Rings',hue='Sex',data=data.head())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f7f29510>
```

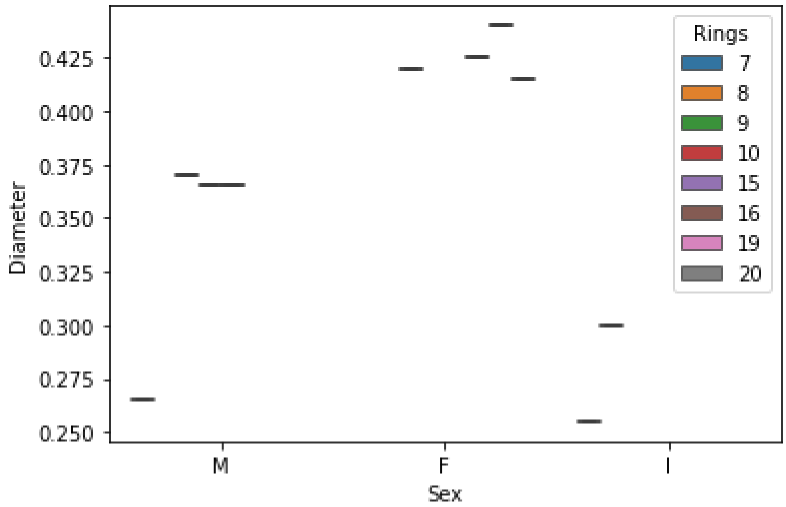



```
sns.lineplot(data['Diameter'].head(),data['Rings'].head())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f7e5a150>
```

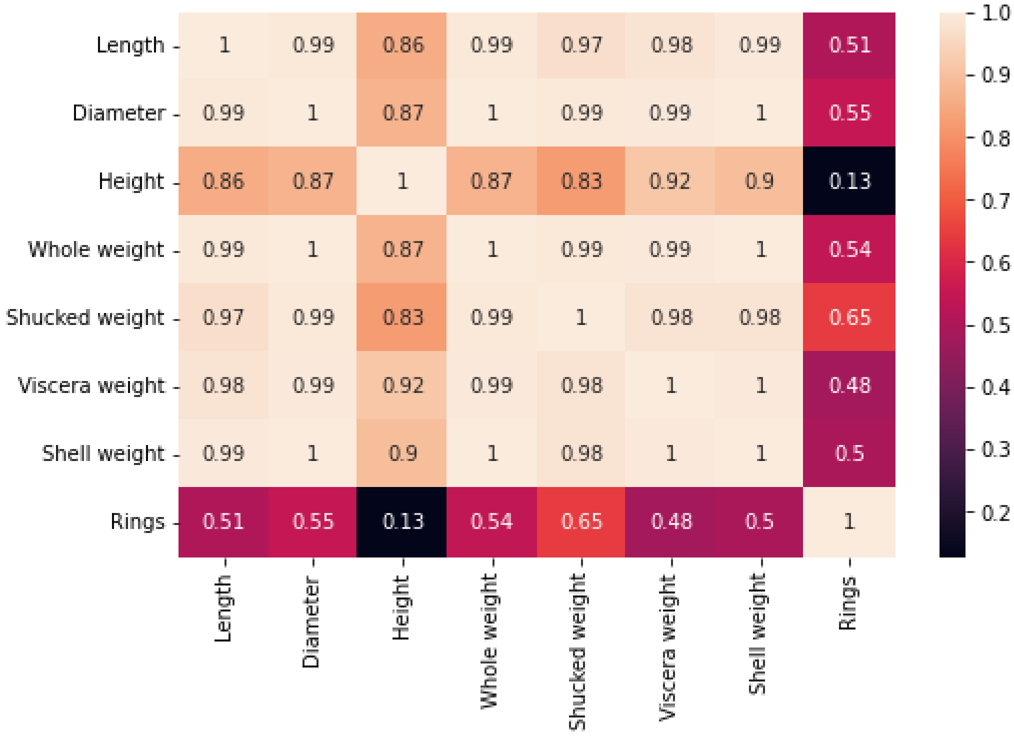

```
sns.boxplot(data['Sex'].head(10),data['Diameter'].head(10),data['Rings'].head(10))
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f7de4050>
```



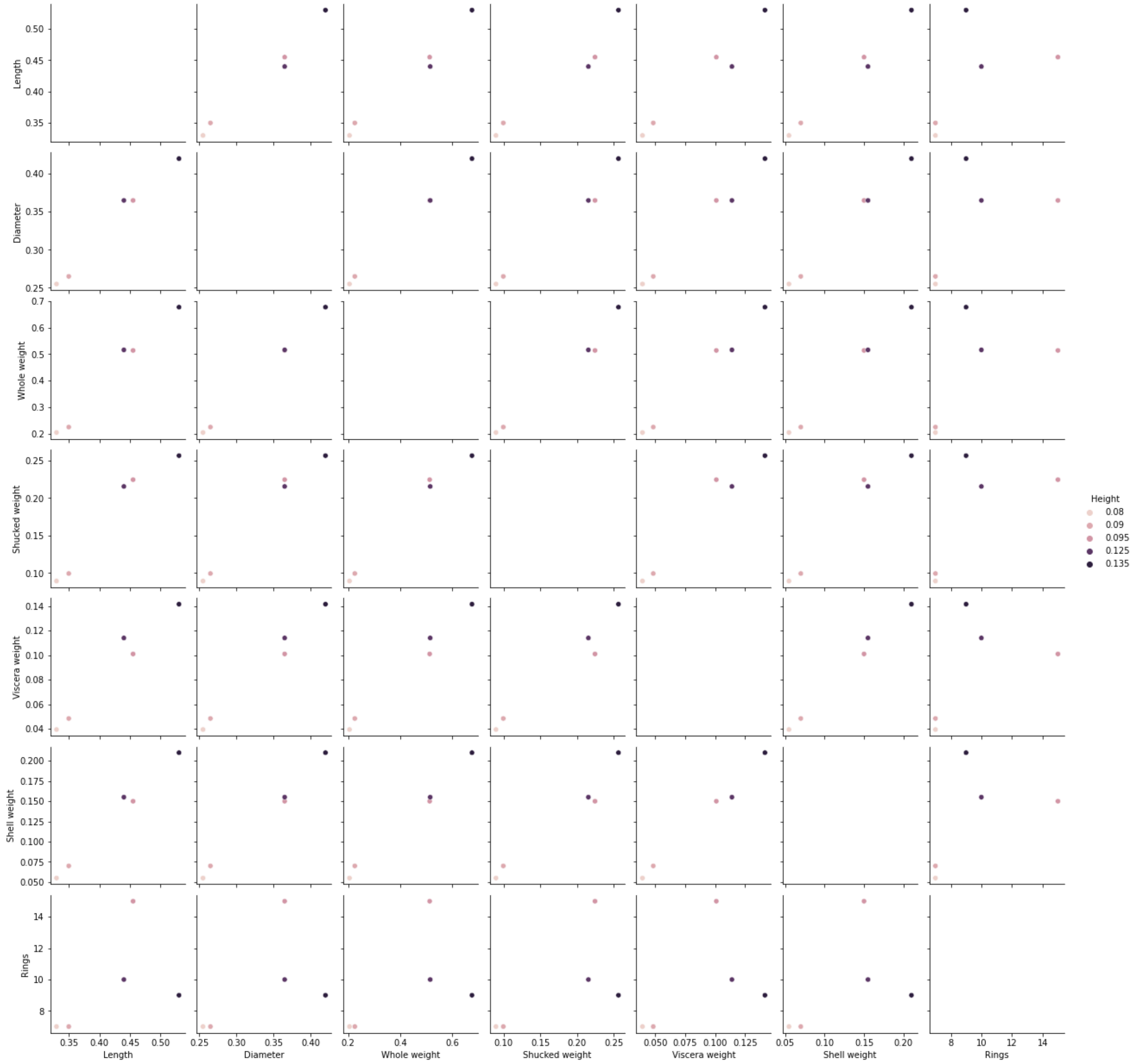

```
fig=plt.figure(figsize=(8,5))
sns.heatmap(data.head().corr(),annot=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6fb08a190>
```



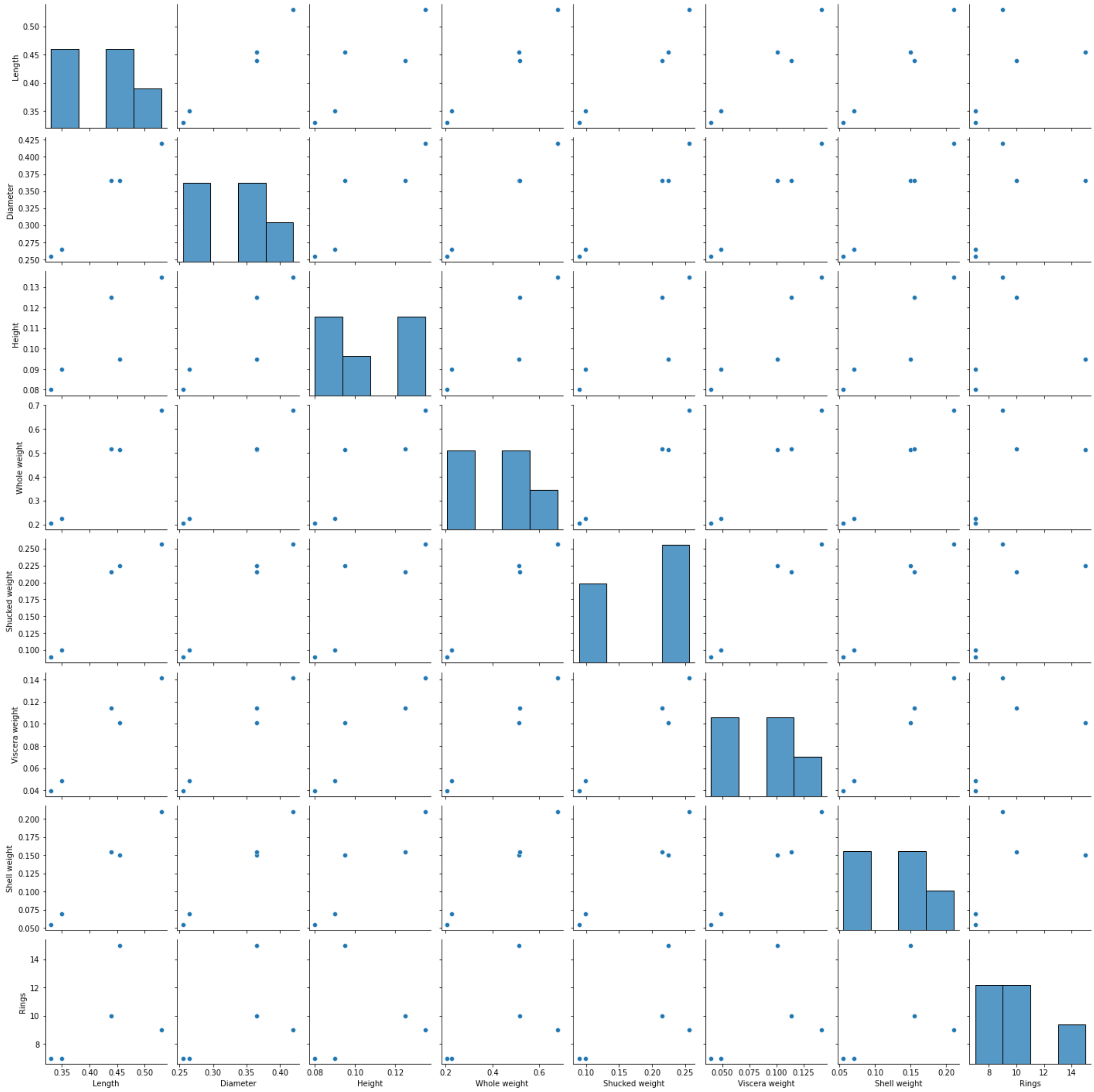

```
sns.pairplot(data.head(),hue='Height')
```

```
<seaborn.axisgrid.PairGrid at 0x7fc6f7b0fd10>
```




```
sns.pairplot(data.head())
```

```
<seaborn.axisgrid.PairGrid at 0x7fc6f653ef10>
```



3.Perform Descriptive Statistics on the dataset

```
data.head()
```

	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	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

```
data.tail()
```

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

```
data.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-null   float64
 6   Viscera weight  4177 non-null   float64
 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
```

```
data.describe()
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	

```
data.mode().T
```

	0	1
Sex	M	NaN
Length	0.55	0.625
Diameter	0.45	NaN
Height	0.15	NaN
Whole weight	0.2225	NaN
Shucked weight	0.175	NaN
Viscera weight	0.1715	NaN
Shell weight	0.275	NaN
Rings	9.0	NaN

```
data.shape
```

```
(4177, 9)
```

```
data.kurt()
```

```
Length             0.064621
Diameter          -0.045476
Height            76.025509
Whole weight      -0.023644
Shucked weight     0.595124
Viscera weight     0.084012
Shell weight       0.531926
Rings              2.330687
dtype: float64
```

```
data.skew()
```

```
Length           -0.639873
Diameter         -0.609198
Height            3.128817
Whole weight      0.530959
Shucked weight    0.719098
Viscera weight    0.591852
Shell weight      0.620927
Rings             1.114102
dtype: float64
```

```
data.var()
```

```
Length             0.014422
Diameter           0.009849
Height             0.001750
Whole weight       0.240481
Shucked weight     0.049268
Viscera weight     0.012015
Shell weight       0.019377
Rings             10.395266
dtype: float64
```

```
data.nunique()
```

```
Sex                  3
Length             134
Diameter           111
Height              51
Whole weight      2429
Shucked weight    1515
Viscera weight     880
Shell weight       926
Rings               28
dtype: int64
```

4.Check for missing values and deal with them

```
data.isna()
```

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

```
data.isna().any()
```

```
Sex               False
Length            False
Diameter          False
Height            False
Whole weight      False
Shucked weight    False
Viscera weight    False
Shell weight      False
Rings             False
dtype: bool
```

```
data.isna().sum()
```

```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

```
data.isna().any().sum()
```

```
0
```

5.Find the outliers and replace them outliers

```
sns.boxplot(data['Diameter'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f3629790>
```

```
quant=data.quantile(q=[0.25,0.75])
quant
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0.25	0.450	0.35	0.115	0.4415	0.186	0.0935	0.130	8.0
0.75	0.615	0.48	0.165	1.1530	0.502	0.2530	0.329	11.0

```
iqr=quant.loc[0.75]-quant.loc[0.25]
iqr
```

```
Length            0.1650
Diameter          0.1300
Height            0.0500
Whole weight      0.7115
Shucked weight    0.3160
Viscera weight    0.1595
Shell weight      0.1990
Rings             3.0000
dtype: float64
```

```
low=quant.loc[0.25]-(1.5*iqr)
low
```

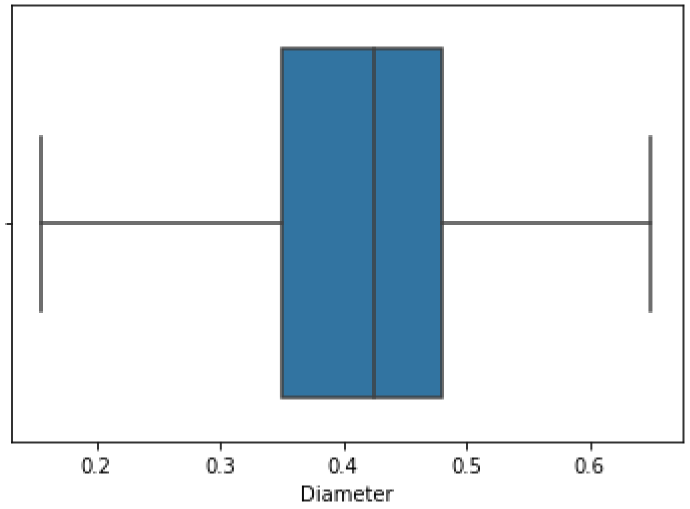
```
Length            0.20250
Diameter          0.15500
Height            0.04000
Whole weight     -0.62575
Shucked weight   -0.28800
Viscera weight   -0.14575
Shell weight     -0.16850
Rings             3.50000
dtype: float64
```

```
up=quant.loc[0.75]+(1.5*iqr)
up
```

```
Length             0.86250
Diameter           0.67500
Height             0.24000
Whole weight       2.22025
Shucked weight     0.97600
Viscera weight     0.49225
Shell weight       0.62750
Rings             15.50000
dtype: float64
```

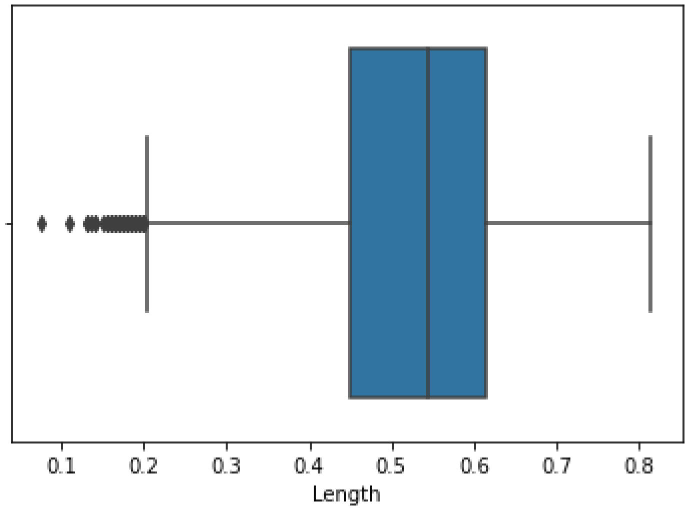
```
data['Diameter']=np.where(data['Diameter']<0.155,0.4078,data['Diameter'])
sns.boxplot(data['Diameter'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f32fb0d0>
```



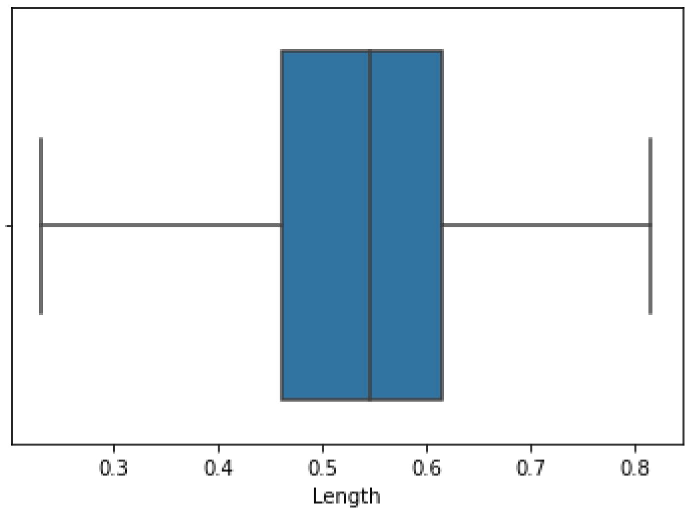

```
sns.boxplot(data['Length'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f32f9b10>
```



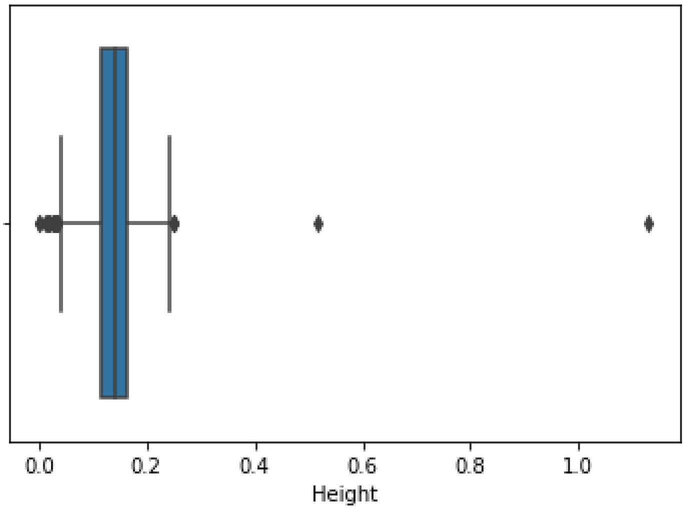

```
data['Length']=np.where(data['Length']<0.23,0.52, data['Length'])
sns.boxplot(data['Length'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f323e710>
```



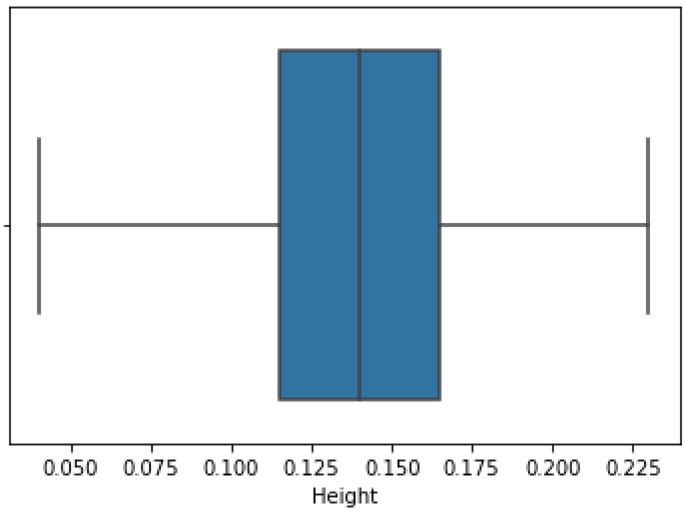

```
sns.boxplot(data['Height'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f320f310>
```



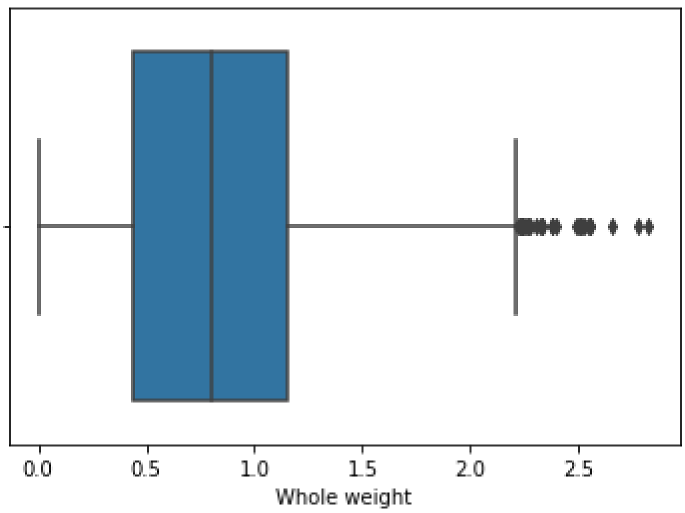

```
data['Height']=np.where(data['Height']<0.04,0.139, data['Height'])
data['Height']=np.where(data['Height']>0.23,0.139, data['Height'])
sns.boxplot(data['Height'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f31a1090>
```



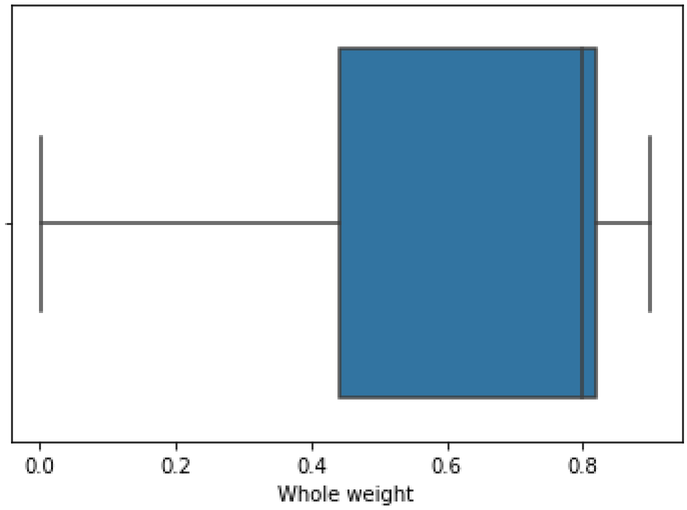

```
sns.boxplot(data['Whole weight'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f31a1050>
```



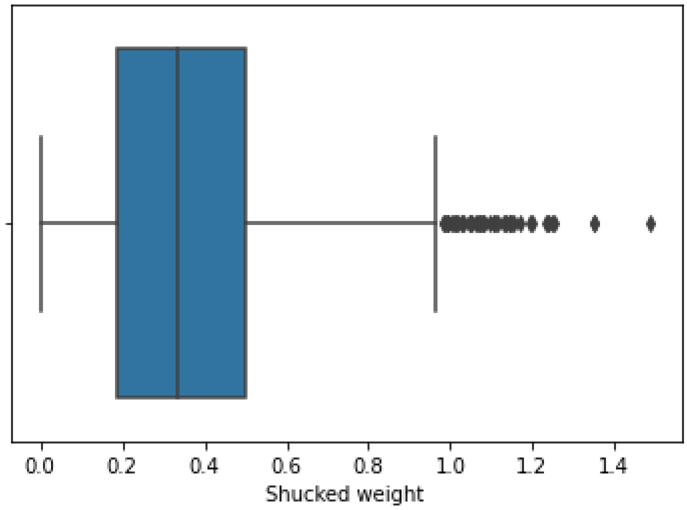
```
data['Whole weight']=np.where(data['Whole weight']>0.9,0.82, data['Whole weight'])
sns.boxplot(data['Whole weight'])
```

<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f30ea050>




```
sns.boxplot(data['Shucked weight'])
```

<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f304f110>

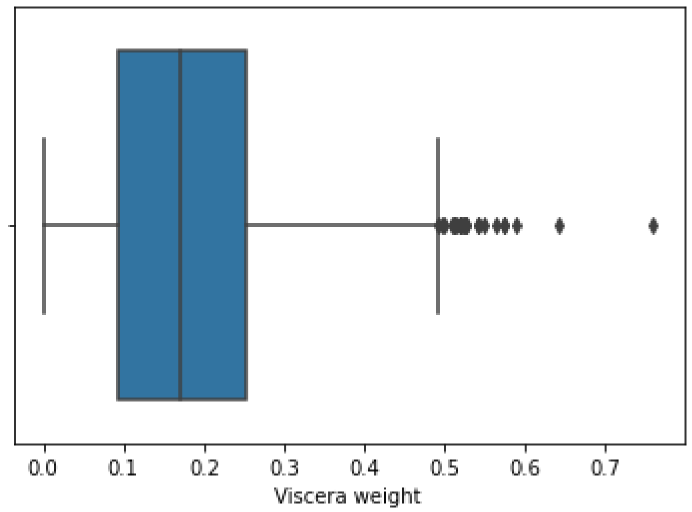



```
data['Shucked weight']=np.where(data['Shucked weight']>0.93,0.35, data['Shucked weight'])
sns.boxplot(data['Shucked weight'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f30d3e10>
```

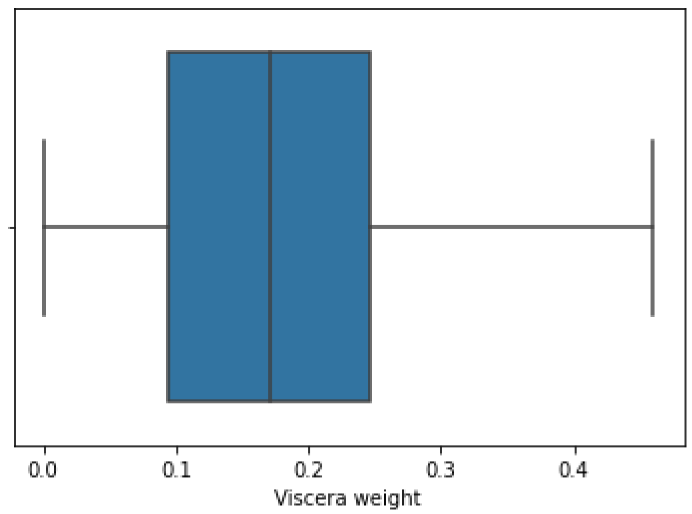
```
sns.boxplot(data['Viscera weight'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f2f81810>
```




```
data['Viscera weight']=np.where(data['Viscera weight']>0.46,0.18, data['Viscera weight'])
sns.boxplot(data['Viscera weight'])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f2f1a310>
```

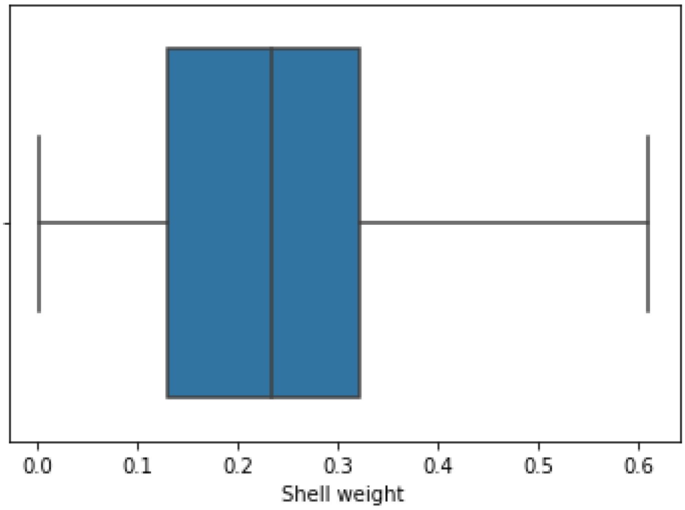



```
sns.boxplot(data['Shell weight'])
```

<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f2e7eb50>

```
data['Shell weight']=np.where(data['Shell weight']>0.61,0.2388, data['Shell weight'])
sns.boxplot(data['Shell weight'])
```

<matplotlib.axes._subplots.AxesSubplot at 0x7fc6f2e5ae50>



6.Check for Categorical columns and perform encoding.

```
data['Sex'].replace({'M':1,'F':0,'I':2},inplace=True)
data
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	1	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500	15
1	1	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	1	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	2	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
...	...	...	...	...	...	...	...	...	...
4172	0	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490	11
4173	1	0.590	0.440	0.135	0.8200	0.4390	0.2145	0.2605	10
4174	1	0.600	0.475	0.205	0.8200	0.5255	0.2875	0.3080	9
4175	0	0.625	0.485	0.150	0.8200	0.5310	0.2610	0.2960	10
4176	1	0.710	0.555	0.195	0.8200	0.3500	0.3765	0.4950	12

4177 rows × 9 columns

7.Split the data into dependent and independent variables.

```
x=data.drop(columns= ['Rings'])
y=data['Rings']
x
```

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
0	1	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.1500
1	1	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700
2	0	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100
3	1	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550
4	2	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550
...	...	...	...	...	...	...	...	...
4172	0	0.565	0.450	0.165	0.8870	0.3700	0.2390	0.2490
4173	1	0.590	0.440	0.135	0.8200	0.4390	0.2145	0.2605
4174	1	0.600	0.475	0.205	0.8200	0.5255	0.2875	0.3080
4175	0	0.625	0.485	0.150	0.8200	0.5310	0.2610	0.2960
4176	1	0.710	0.555	0.195	0.8200	0.3500	0.3765	0.4950

4177 rows × 8 columns

```
y
```

```
0       15
1        7
2        9
3       10
4        7
        ..
4172    11
4173    10
4174     9
4175    10
4176    12
Name: Rings, Length: 4177, dtype: int64
```

8.Scale the independent variables

```
from sklearn.preprocessing import scale
x = scale(x)
x
```

```
array([[-0.0105225 , -0.67088921, -0.50179694, ..., -0.61037964,
        -0.7328165 , -0.64358742],
       [-0.0105225 , -1.61376082, -1.57304487, ..., -1.22513334,
        -1.24343929, -1.25742181],
       [-1.26630752,  0.00259051,  0.08738942, ..., -0.45300269,
        -0.33890749, -0.18321163],
       ...,
```

```
       [-0.0105225 ,  0.63117159,  0.67657577, ...,  0.86994729,
         1.08111018,  0.56873549],
       [-1.26630752,  0.85566483,  0.78370057, ...,  0.89699645,
         0.82336724,  0.47666033],
       [-0.0105225 ,  1.61894185,  1.53357412, ...,  0.00683308,
         1.94673739,  2.00357336]])
```

9.Split the data into training and testing

```
from sklearn.model_selection import train_test_split
x_train, x_test, y_train, y_test = train_test_split(x,y, test_size = 0.2)
print(x_train.shape, x_test.shape)
```

```
(3341, 8) (836, 8)
```

10.Build the Model

```
from sklearn.linear_model import LinearRegression
MLR=LinearRegression()
```

11.Train the model

```
MLR.fit(x_train,y_train)
```

```
LinearRegression()
```

12.Test the model

```
y_pred=MLR.predict(x_test)
y_pred
```

```
array([10.91653685, 12.55744321, 14.1783292 ,  9.35563082,  7.43211414,
       10.7774108 , 13.38144253,  6.66911369, 11.76080726,  7.53439641,
        7.24781575, 13.77037419,  4.91015581, 10.01260524,  8.7898418 ,
        6.28146017, 12.2936104 , 11.06755699, 10.4933959 ,  7.17898304,
        9.95242944,  6.51892481,  9.82454574,  7.7532194 , 10.08484009,
        7.37144014,  3.97011024,  9.32347883,  6.51173485,  9.78511259,
       10.48817652,  7.02717025, 12.23620869, 11.92733123, 11.9889763 ,
        9.48480236,  9.03522977,  9.37259489, 15.81723261, 10.96336071,
       11.21773345,  5.67381233, 12.6814806 , 13.28242539,  9.59962488,
       11.22923672,  7.68329353,  8.9789218 ,  9.12587129,  9.91327472,
        9.27332845, 11.40691421,  7.44863498,  9.70226101, 10.25461244,
       11.0386109 ,  7.08784785,  8.6607063 ,  9.63829063,  8.34731917,
        9.9980484 , 11.37837552,  7.13776877, 13.3970746 ,  6.6005046 ,
       13.80133122, 14.00433854, 12.55379762, 12.71515009,  8.76783583,
        9.67712105, 11.74556463,  7.0481293 , 13.49328878, 14.86989189,
       11.62352645,  5.85855574, 12.90002072,  7.11057015, 10.23755979,
       11.63716039,  7.47199396,  7.73538948,  6.60751726, 10.71168715,
       12.94158748,  9.31771432, 10.73992843, 12.24071745,  9.25418102,
        6.62257397,  7.68153848, 14.49979284, 10.00129705, 14.10599593,
        8.50606455, 12.43504595, 13.34149143,  6.26697755, 12.89253409,
```

```
        8.68848384,  8.54572413, 11.99055703,  7.85121139,  9.56163179,
       13.36290365, 10.78403953,  9.30937974, 11.4594138 ,  4.16215923,
       12.59767471,  6.35526601,  8.4916346 ,  6.19986428,  8.54794644,
        7.58145793,  9.94107683, 10.87611465,  7.44113331, 10.61185092,
        8.71409967, 10.1066312 , 12.86689392,  8.20778755, 10.18096541,
       11.56939474, 10.7563318 , 11.12633881, 10.96626657,  7.64746453,
       13.41757501, 11.51575829, 11.98897165,  9.18701964,  9.85267727,
       10.45124876,  6.64057572, 12.04431206, 10.11158134,  5.82165217,
       12.18607365,  8.60423064, 12.18718685, 11.16390278,  8.72233716,
        8.49650453,  7.86996467,  8.84657686,  9.66808405,  8.73615923,
        9.82792655,  9.6680999 , 10.72665502,  4.2663484 , 11.37121585,
       11.8368494 , 10.91344912,  8.22206639,  9.40991284, 10.35826288,
       10.79331777, 12.12182431, 10.48082557, 11.13014672,  9.60915214,
       10.85040523, 11.94158594,  7.53904291, 16.32969502, 10.0599576 ,
       10.55489637, 12.97231242,  9.82115735, 11.54038743, 10.06498328,
       13.98278119, 11.2312891 , 12.16565027, 13.25618319,  6.84026022,
        7.98855866, 11.33819098, 13.36212886, 11.37696088,  9.75802861,
       12.49069465,  6.61857583,  9.63995432, 10.89865051,  6.39186652,
       11.38711198,  7.26224245,  9.62199106,  8.9485977 , 11.94126235,
        9.90815329,  8.29264567, 13.05631009, 11.15914804, 11.48347318,
       11.69346289,  8.3393152 , 11.07612004,  9.27797441,  8.57070474,
        9.26448714,  9.68189512, 10.79726608, 13.61959519, 11.58284241,
       12.55935344,  9.63744335,  6.75192207,  8.4483055 , 10.16571898,
        9.74165129, 11.19062134, 10.10241387, 12.51229664,  6.06419923,
       11.43234574,  6.91497992, 10.01392441, 10.12005954, 11.70438295,
       10.22112735,  7.6260467 ,  8.3323689 ,  7.68556049, 14.06249379,
        6.52822499, 12.86749644,  9.4623157 , 11.96287382,  7.29195347,
       10.51326401, 11.49069921,  6.50913087, 11.00058015,  9.76280581,
       10.97974981, 10.04155794, 11.02494154, 14.1809637 , 11.40345707,
       11.96717269, 11.06662751,  7.48584774, 10.27747979,  9.75011268,
       12.59168959,  6.71190392,  7.33721287, 13.85825682, 10.19252804,
        6.89308223, 10.7374843 , 11.10384361,  8.56803225, 11.13275726,
        8.33529863, 11.49423452, 15.07212069,  9.39948746, 10.84711907,
       11.50568861, 11.57638575, 17.16819123, 12.31621799,  9.19030825,
       10.73585786, 10.44817603,  8.11579752, 11.76465115, 10.5625014 ,
        7.66488272, 10.71086045, 11.67141199,  8.76119503,  8.58315673,
        7.21100131, 10.02118595, 10.17595407,  9.07289132,  7.07286171,
        7.85996632,  8.6740366 ,  8.5630248 ,  7.85467058,  8.15100189,
```

```
pred=MLR.predict(x_train)
pred
```

```
array([10.95753403, 12.51075719, 12.40779919, ...,  9.07933866,
       11.56316712, 13.05582865])
```

```
from sklearn.metrics import r2_score
accuracy=r2_score(y_test,y_pred)
accuracy
```

```
0.41382564717781056
```

```
MLR.predict([[1,0.455,0.365,0.095,0.5140,0.2245,0.1010,0.150]])
```

```
array([9.91859626])
```

13.Measure the performance using Metrics

```
from sklearn import metrics
from sklearn.metrics import mean_squared_error
np.sqrt(mean_squared_error(y_test,y_pred))
```

```
2.5137607628127996
```

LASSO

```
from sklearn.linear_model import Lasso, Ridge
#intialising model
lso=Lasso(alpha=0.01,normalize=True)
#fit the model
lso.fit(x_train,y_train)
Lasso(alpha=0.01, normalize=True)
#prediction on test data
lso_pred=lso.predict(x_test)
#coef
coef=lso.coef_
coef
```

```
array([-0.        ,  0.        ,  0.        ,  0.39518116,  0.14092063,
        0.        ,  0.        ,  0.91967498])
```

```
from sklearn import metrics
from sklearn.metrics import mean_squared_error
metrics.r2_score(y_test,lso_pred)
```

```
0.32329491047485237
```

```
np.sqrt(mean_squared_error(y_test,lso_pred))
```

```
2.7009109039758865
```

RIDGE

```
#initialising model
rg=Ridge(alpha=0.01,normalize=True)
#fit the model
rg.fit(x_train,y_train)
Ridge(alpha=0.01, normalize=True)
#prediction
rg_pred=rg.predict(x_test)
rg_pred
```

```
array([10.94284897, 12.55766909, 14.10332643,  9.46590794,  7.46924252,
       10.84374888, 13.31875055,  6.65332469, 11.69140963,  7.50414008,
        7.24475396, 13.60946869,  5.0169634 , 10.02178785,  8.74951312,
        6.37222921, 12.31857953, 11.03870168, 10.49466108,  7.57409317,
        9.98428586,  6.49266759,  9.84030265,  7.78278199, 10.19140983,
        7.39626063,  4.1188049 ,  9.31722402,  6.4991906 ,  9.87481467,
```

```
       10.45452133,  7.05292159, 12.19226412, 11.88058887, 11.94176185,
        9.45558448,  9.06859106,  9.4380396 , 15.54387597, 10.87360643,
       11.20175072,  5.63482434, 12.59657969, 13.11927611,  9.55165419,
       11.2562201 ,  7.64193974,  9.03206614,  9.15363186,  9.94026085,
        9.25301756, 11.41125447,  7.42301827,  9.70191307, 10.26573426,
       11.08877416,  7.07965658,  8.69369519,  9.63125155,  8.35676932,
        9.93919976, 11.31014253,  7.12871125, 13.27672043,  6.63861343,
       13.67994264, 13.90203172, 12.44586244, 12.76817899,  8.8034988 ,
        9.71751121, 11.82803549,  7.03886776, 13.40189233, 14.74059217,
       11.61507368,  5.83139586, 12.79745889,  7.1515056 , 10.34467008,
       11.63301292,  7.47023681,  7.71387173,  6.57316872, 10.73587515,
       12.87928907,  9.34315194, 10.78785181, 12.26796854,  9.37745276,
        6.78922748,  7.68734781, 14.34194069,  9.98310639, 13.96447937,
        8.53787527, 12.42359455, 13.34447633,  6.26339643, 12.58179517,
        8.69409607,  8.54383129, 11.94010954,  8.1946398 ,  9.68244419,
       13.26318783, 10.82008989,  9.36552525, 11.4907786 ,  4.30726312,
       12.44922397,  6.35701734,  8.68860271,  6.20646585,  8.59848595,
        7.63009379,  9.94773274, 10.98012079,  7.46937269, 10.62344088,
        8.88228329, 10.19672373, 12.86160653,  8.19526719, 10.23768626,
       11.60327133, 10.79218988, 11.02069875, 11.00699291,  7.60610003,
       13.36361692, 11.5001681 , 11.8862438 ,  9.3112327 ,  9.80266528,
       10.4561747 ,  6.61208891, 12.0188652 , 10.07950545,  5.83817825,
       12.10925296,  8.58950503, 12.21901876, 11.14230194,  8.80164233,
        8.47970329,  7.868846  ,  8.84692525,  9.71954025,  8.80133574,
        9.94539604,  9.66443074, 10.67620234,  4.41311216, 11.38000599,
       11.82690585, 11.01848448,  8.25251755,  9.4282695 , 10.30600249,
       10.83507059, 12.09765308, 10.50555409, 11.1258249 ,  9.64946864,
       10.86249846, 11.87144177,  7.56481939, 16.09047806, 10.12645866,
       10.55382485, 12.90061432,  9.76527987, 11.50905489, 10.09195624,
       13.84575226, 11.24850011, 12.16689801, 13.17750628,  6.82202086,
        7.98381948, 11.3172104 , 13.20797834, 11.33163535,  9.72350255,
       12.43979567,  6.62481266,  9.59872613, 10.82060265,  6.3839089 ,
       11.51849218,  7.27601802,  9.59291787,  8.93509554, 11.78079094,
        9.93000685,  8.369916  , 12.94527836, 11.17246295, 11.52651747,
       11.78751614,  8.32318974, 11.1001638 ,  9.31644338,  8.59486775,
        9.30284616,  9.84731307, 10.90224953, 13.54597748, 11.51809613,
       12.6077395 ,  9.61396008,  6.73559313,  8.43671541, 10.13183962,
        9.71644509, 11.13047849, 10.11506636, 12.5431072 ,  6.02801715,
       11.42567449,  7.29787387,  9.95811538, 10.14655093, 11.68566229,
       10.23824892,  7.66218   ,  8.35979732,  7.72654777, 13.94137525,
        6.50124904, 12.78422455,  9.41120031, 11.99078295,  7.5690498 ,
       10.59963443, 11.45096506,  6.55795791, 11.08043936,  9.90628875,
       11.05943396, 10.12296683, 11.06098623, 14.00848616, 11.37825823,
       11.87240228, 11.06310896,  7.47483432, 10.31308671,  9.7785197 ,
       12.48134598,  6.68424648,  7.33411183, 13.75537421, 10.16269344,
        6.91382568, 10.74358733, 11.0538112 ,  8.6157287 , 11.13847756,
        8.31586114, 11.42146266, 14.91667617,  9.36837014, 10.81938363,
       11.5305361 , 11.54418845, 16.93766664, 12.18356495,  9.31738089,
       10.7555976 , 10.50502172,  8.09538677, 11.73799171, 10.77361763,
        7.67458578, 10.66594777, 11.67663851,  9.05482079,  8.583721  ,
        7.24914069,  9.98945701, 10.25967048,  9.15198791,  7.04613797,
        7.8642291 ,  8.67148719,  8.61567912,  7.85428151,  8.13317584,
```

```
rg.coef_
```

```
array([-0.27998868, -0.781349  ,  0.23517567,  0.93481937,  0.97644297,
       -1.41006666, -0.09708902,  1.9317592 ])
```

```
metrics.r2_score(y_test,rg_pred)
```

```
0.41685467364102824
```

```
np.sqrt(mean_squared_error(y_test,rg_pred))
```

```
2.5072574844843873
```