Project Name	Global Sales Data Analytics
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Assignment -4

Import Libraries

```
import pandas as pd
import
matplotlib.pyplot as
pltimport numpy as
np
import seaborn as sns
from sklearn.model_selection import
train_test_splitfrom
sklearn.preprocessing import
StandardScaler
from sklearn.linear_model import
LinearRegressionfrom sklearn.tree
import DecisionTreeRegressor
```

Import Dataset

```
data =
pd.read_csv('abalone.c
sv')data
```

	weight	weight			

					weight		
				0.095 0.5140	0.2245 0.1010		
				0.090 0.2255	0.0995 0.0485		
				0.135 0.6770	0.2565 0.1415		
				0.125	0.2155		

				0.5160	0.1140		
				0.0800 0.2050	0.0895 0.0395		
...				... ...	... ...		
4172				0.165 0.8870	0.3700 0.2390		
4173				0.135 0.966	0.4390 0.21		

				0	45		
4174				0.205 1.1760	0.5255 0.2875		
4175				0.150 1.0945	0.5310 0.2610		
4176				0.195 1.9485	0.9455 0.3765		

Sex Length Diameter Height Whole

Shucked

Viscera

Shell

Rings

4177 rows × 9 columns

```
data.info()
```

```
<class
'pandas.core.frame.DataFra
me'>RangeIndex: 4177
entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
```

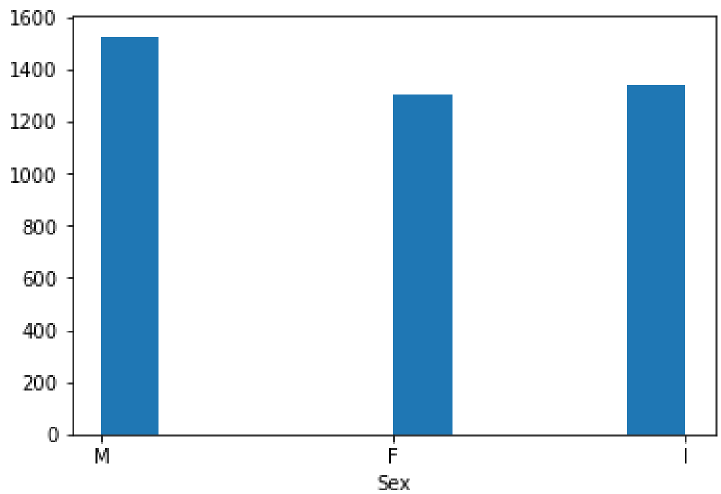
- Sex 4177 non-null object
- Length 4177 non-null float64

- Diameter 4177 non-null float64
- Height 4177 non-null float64
- Whole weight 4177 non-null float64
- Shucked weight 4177 non-null float64
- Viscera weight 4177 non-null float64
- Shell weight 4177 non-null float64
- Rings 4177 non-

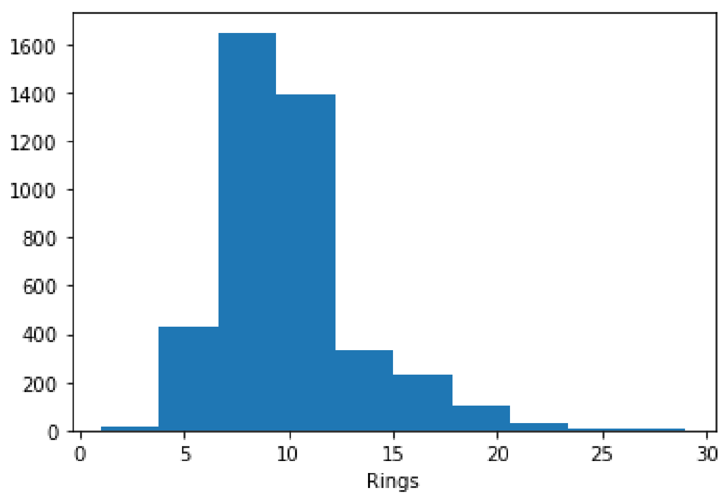
```
null int64dtypes: float64(7),
int64(1), object(1)
memory usage: 293.8+ KB
```

Univariate Analysis

```
plt.hist(data['Sex']);
plt.xlabel('Sex');
```



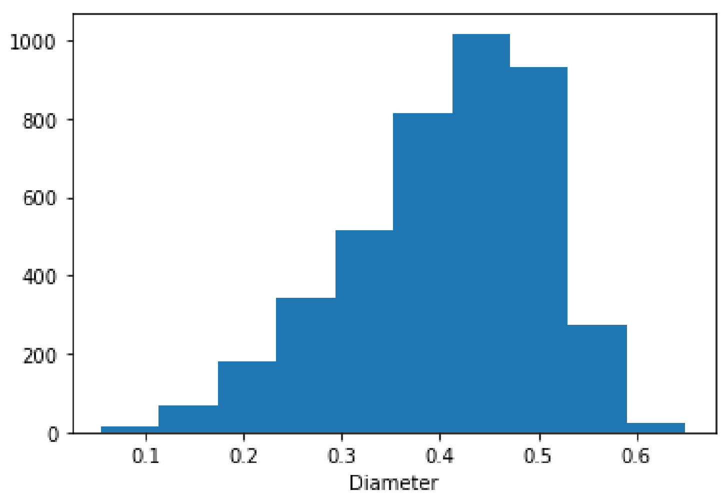

```
plt.hist(data
['Rings']);
plt.xlabel('R
ings');
```



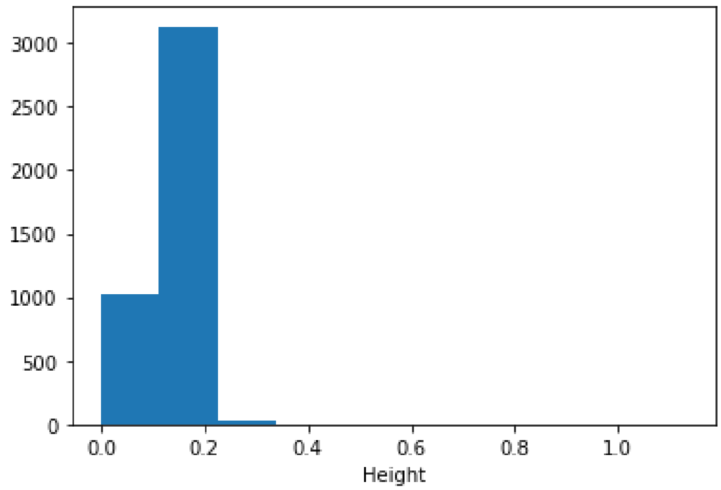

```
sns.boxplot(x=data
['Length'])
```

```
plt.xlabel('Length
');
```

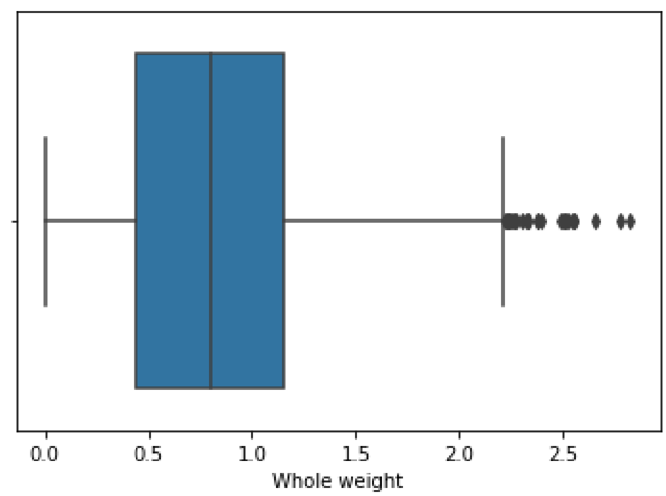
```
plt.hist(data['D
iameter']);
plt.xlabel('Diam
eter');
```



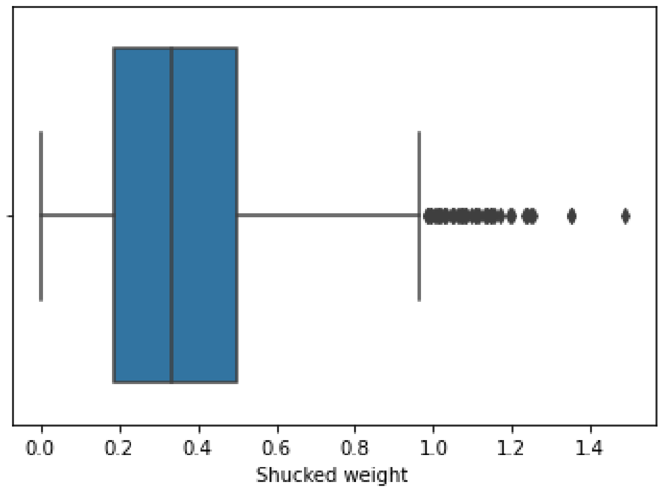

```
plt.hist(data[
'Height']);
plt.xlabel('He
ight');
```



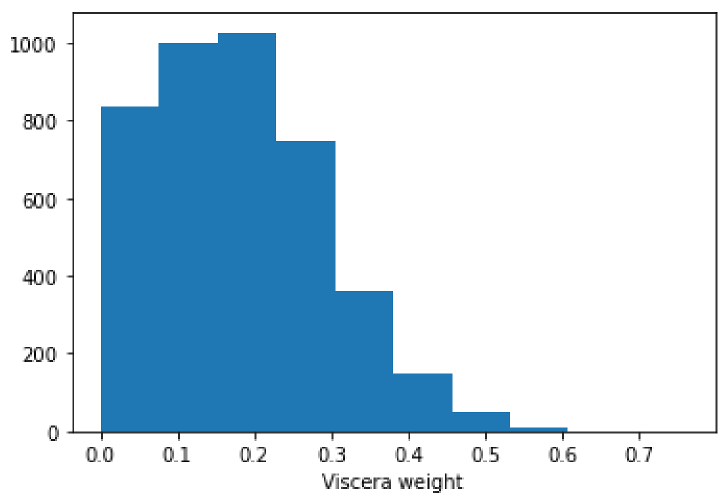

```
sns.boxplot(x=data['Whol
e weight'])
plt.xlabel('Whole
weight');
```



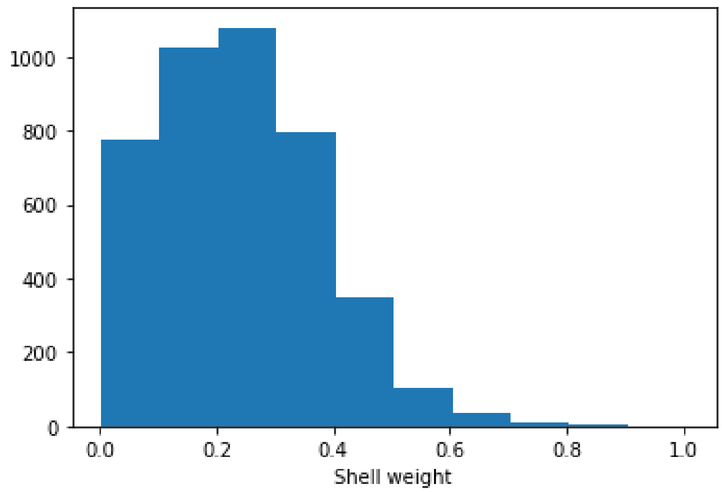

```
sns.boxplot(x=data['Shucke
d weight'])
plt.xlabel('Shucked
weight');
```




```
plt.hist(data['Viscera
weight']);
plt.xlabel('Viscera
weight');
```

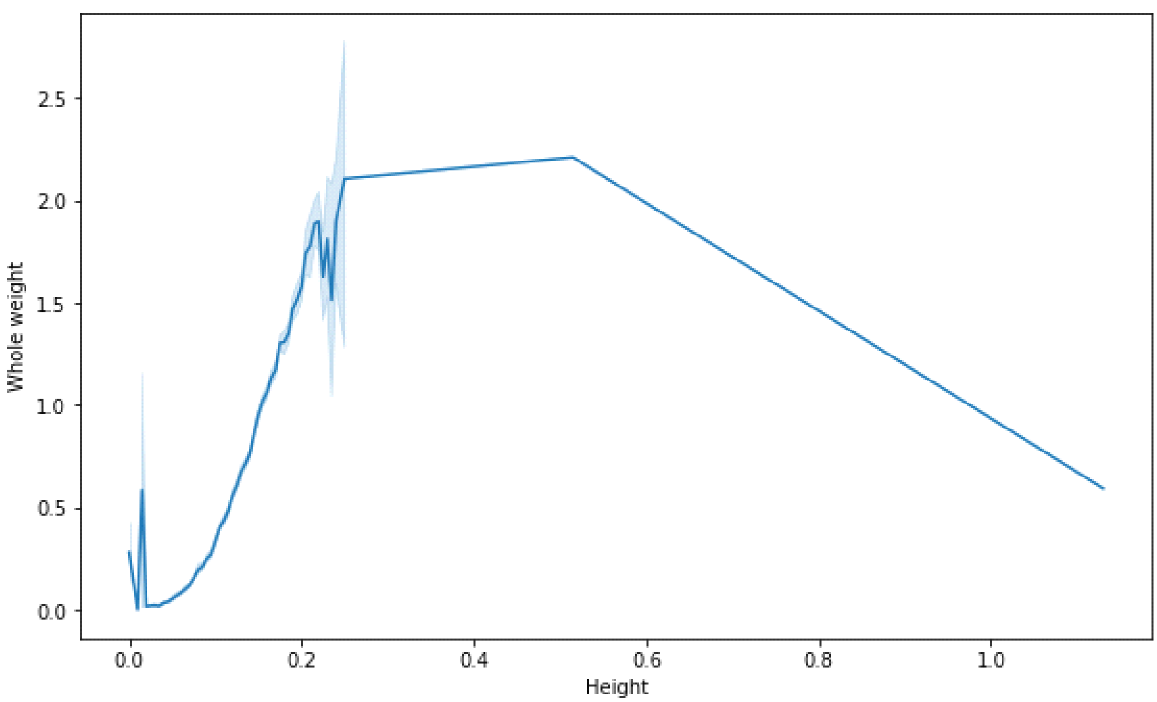



```
plt.hist(data['Shell
weight']);
plt.xlabel('Shell
weight');
```



Bivariate Analysis

```
plt.figure(figsize=(10, 6))
sns.lineplot(x=data["Height"], y=data["Whole
weight"]);plt.xlabel('Height');
plt.ylabel('Whole weight');
```




```
plt.figure(figsize=(10, 6))
```

```
sns.lineplot(x=data["Length"],
y=data["Height"]);
plt.xlabel('Length');
plt.ylabel('Height');
```

```
plt.figure(figsize=(10, 6))
sns.lineplot(x=data["Diameter"],
y=data["Height"]);
plt.xlabel('Diameter');
plt.ylabel('Height');
```

```
plt.figure(figsize=(10, 6))
sns.lineplot(x=data["Length"],
y=data["Diameter"]);
plt.xlabel('Length');
plt.ylabel('Diameter');
```

```
plt.figure(figsize=(10, 6))
plt.scatter(x=data["Shucked weight"], y=data["Whole
weight"]);plt.xlabel('Shucked weight');
plt.ylabel('Whole weight');
```

```
plt.figure(figsize=(10, 6))
plt.scatter(x=data["Viscera weight"], y=data["Whole
weight"]);plt.xlabel('Viscera weight');
plt.ylabel('Whole weight');
```

Multi-variate Analysis

```
sns.pairplot(data, hue='Sex');
```

```
plt.figure(figsize=(10, 6));
sns.heatmap(data.corr(), annot=True);
```

				weight	weight	weight	
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	41
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	
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	

Handling Missing Values

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

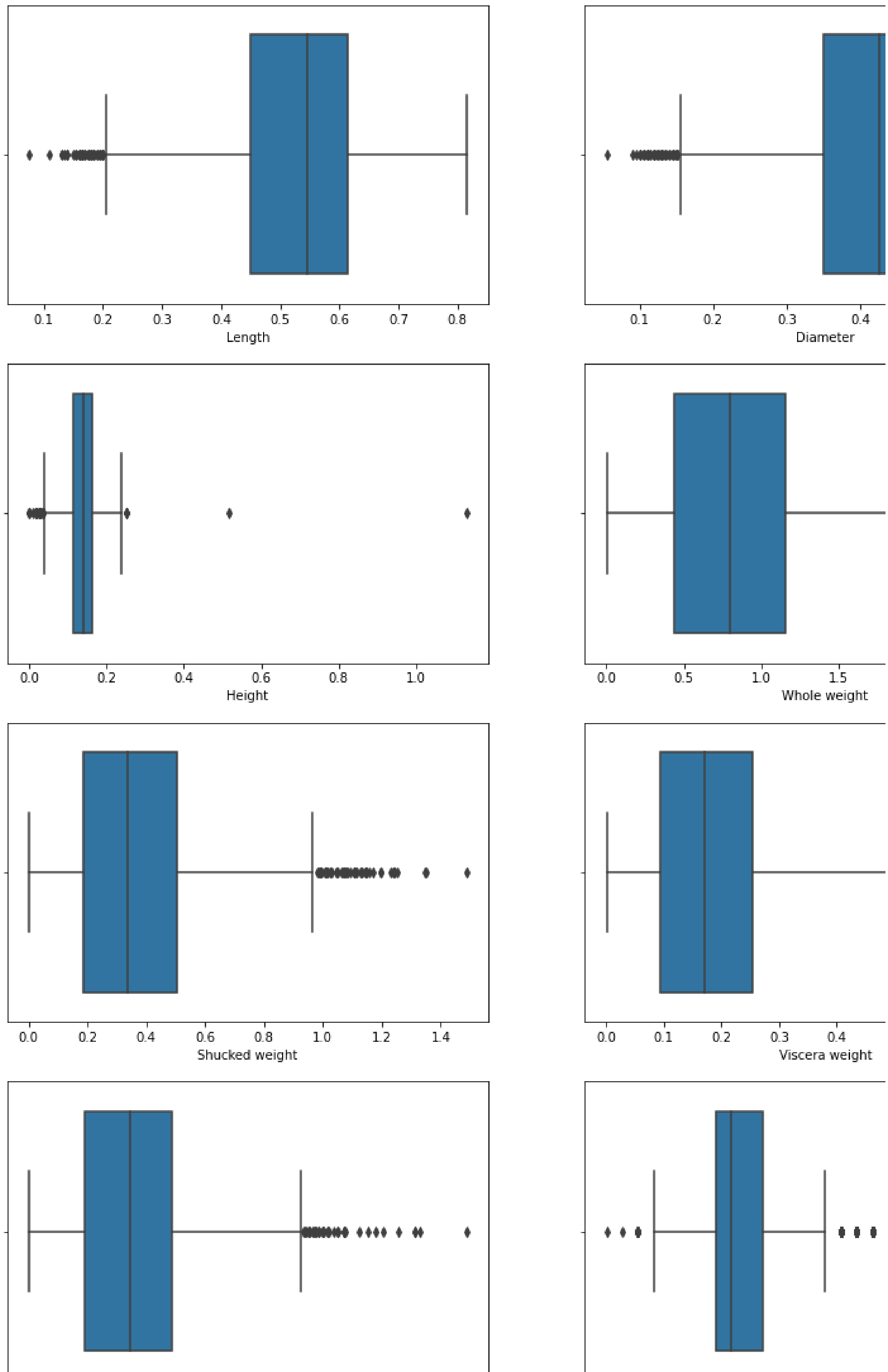
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Rings             0
dtype: int64
```

Outlier Handling

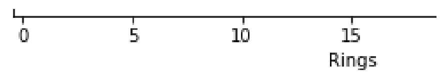
```
numeric_cols = ['Length', 'Diameter', 'Height', 'Whole weight', 'Shucked
weight', 'Viscera

def boxplots(cols):

    fig, axes = plt.subplots(4, 2, figsize=(15, 20))

    t=0
    for i in range(4):
        for j in range(2):
            sns.boxplot(ax=axes[i][j], data=data,
            x=cols[t])t+=1

    plt.show()


def Flooring_outlier(col):
    Q1 =
    data[col].quantile
    (0.25)Q3 =
```

```
    data[col].quantile
    (0.75)
    IQR = Q3 - Q1
    whisker_width = 1.5
    lower_whisker = Q1 -
    (whisker_width*IQR) upper_whisker =
    Q3 + (whisker_width*IQR)
    data[col]=np.where(data[col]>upper_whisker,upper_whisker,np.where(data[col]<
    lower_whis


print('Before Outliers
Handling')
print('='*100)
boxplots(nume
ric_cols) for
col in
numeric_cols:
    Flooring_outlier(col)
print('\n\n\nAfter Outliers
Handling')print('='*100)
boxplots(numeric_cols)
```

```
Before Outliers Handling
============================================================================
=========
```



0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8
Length
0.1 0.2 0.3 0.4
Diameter
0.0 0.2 0.4 0.6 0.8 1.0
Height
0.0 0.5 1.0 1.5
Whole weight
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4
Shucked weight
0.0 0.1 0.2 0.3 0.4
Viscera weight




```
After Outliers Handling
===========================================================================
=========
```

Encode Categorical Columns

```
data = pd.get_dummies(data, columns
= ['Sex'])data
```

		weight	weight	weight	weight	
0 0.455	0.365	0.095 0.514 0	0.2245	0.1010	0.1500	15.0
1 0.350	0.265	0.090 0.225 5	0.0995	0.0485	0.0700	7.0
2 0.530	0.420	0.135 0.677 0	0.2565	0.1415	0.2100	9.0
3 0.440	0.365	0.125 0.516 0	0.2155	0.1140	0.1550	10.0
4 0.330	0.255	0.080 0.205 0	0.0895	0.0395	0.0550	7.0
... ...	...	... ...	...	...	...	...
4172 0.56 5	0.450	0.165 0.887 0	0.3700	0.2390	0.2490	11.0
4173 0.59 0	0.440	0.135 0.966 0	0.4390	0.2145	0.2605	10.0
4174 0.60 0	0.475	0.205 1.176 0	0.5255	0.2875	0.3080	9.0
4175 0.62 5	0.485	0.150 1.094 5	0.5310	0.2610	0.2960	10.0
4176 0.71	0.555	0.195 1.948	0.9455	0.3765	0.4950	12.0

0		5				

```
Y = data[['Rings']]
X = data.drop(['Rings'], axis=1)
```

Scale the independent Variables

```
scaler  =
StandardScaler()
X =
scaler.fit_trans
form(X)X
```

array([[-0.58311728,	-0.44088378, -1.15809314,		...,	-0.67483383,
-0.68801788,	1.31667716],			
[-1.46569411,	-1.45976205, -1.28875125,		...,	-0.67483383,
-0.68801788,	1.31667716],			
[0.04729474,	0.11949927, -0.1128283 ,		...,	1.48184628,
-0.68801788, ...,	-0.75948762],			
[0.63567929,	0.67988232,	1.71638519,	...,	-0.67483383,
-0.68801788,	1.31667716],			
[0.84581663,	0.78177015,	0.27914602,	...,	1.48184628,
-0.68801788,	-0.75948762],			
[1.56028358,	1.49498494,	1.45506898,	...,	-0.67483383,
-0.68801788,	1.31667716]])			

Train Test Split

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,
random_state=42)
```

```
X_train.shape, X_test.shape, Y_train.shape,

     Y_test.shape((3341, 10), (836, 10),

     (3341, 1), (836, 1))
```

Model Training & Testing

```
model =
LinearRegression
()
model.fit(X_trai
n, Y_train)
model.score(X_train, Y_train),

     model.score(X_test, Y_test)

     (0.5743537797259437, 0.574066914479568)
```

```
model = DecisionTreeRegressor(max_depth=15,
max_leaf_nodes=40)model.fit(X_train, Y_train)
model.score(X_train, Y_train),

     model.score(X_test, Y_test)

     (0.6299341126842184, 0.5533377990647702)
```