1. Download the Dataset

The dataset was download and some changes applied in this dataset.

In [122…
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

2. Load the Dataset

In [123…
```
k1 = pd.read_csv("abalone.csv")
```

In [124…
```
k1.head()
```

Out[124]:

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Age
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	16.5
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	8.5
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	10.5
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	11.5
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	8.5

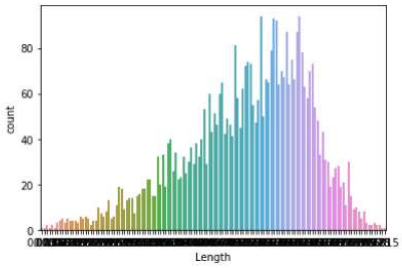
In [125…
```
k1.columns
```

Out[125]:
```
Index(['Sex', 'Length', 'Diameter', 'Height', 'Whole weight', 'Shucked weight',
       'Viscera weight', 'Shell weight', 'Age'],
      dtype='object')
```

3. Perform the Visualization

Univariate Analysis

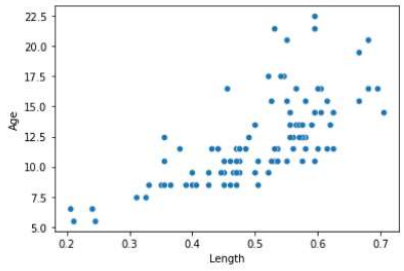
In [127…
```
#countplot
sns.countplot(x=k1["Length"])
plt.show()
```



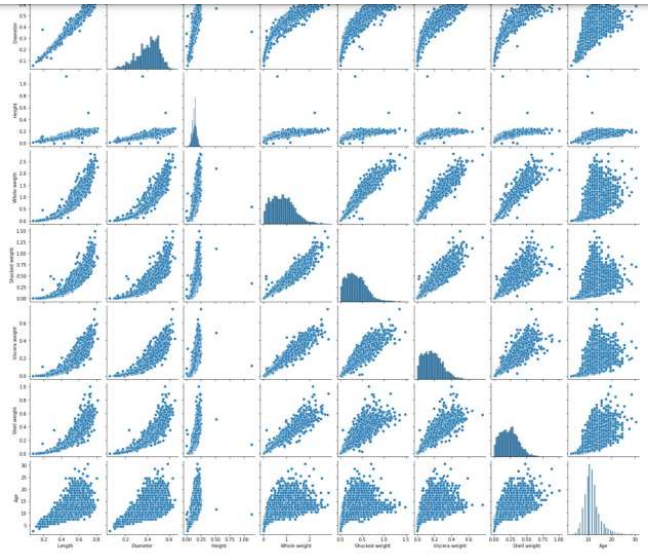
In [126…
```
#pie chart
data1=k1.groupby("Sex",axis=0)
plt.pie(data1.count()["Length"], labels=data1.indices)
plt.show()
```

Bi-Variate analysis

In [129…
```
#scatterplot for Length and Age
sns.scatterplot(x=k1.iloc[:100,:]["Length"],y=f1.iloc[:100,:]["Age"])
plt.show()
```

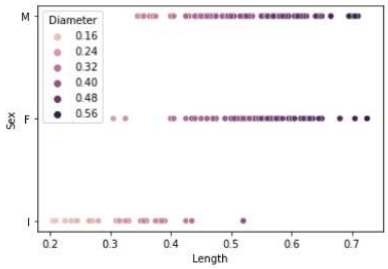


In [128…
```
#pairplot
sns.pairplot(k1)
plt.show()
```

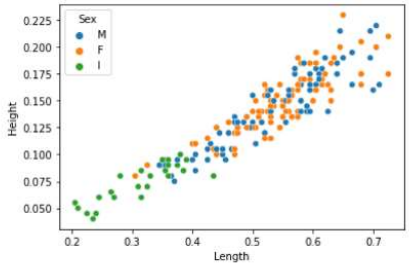


Multi-Variate Analysis

In [158…
```
#scatterplot for Sex, Length and Diameter
sns.scatterplot(x=k1.iloc[:200,:]["Length"],y=f1.iloc[:200,:]["Sex"],hue=f1.iloc[:200,
plt.show()
```



In [159…
```
#scatterplot for Length, Height and Age
sns.scatterplot(x=k1.iloc[:200,:]["Length"],y=f1.iloc[:200,:]["Height"],hue=f1.iloc[:
plt.show()
```



4. Perform the Descriptive Statistics on the Dataset

```
In [132...] k1.describe()
```

Out[132]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight
count	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000	4177.000000
mean	0.523992	0.407881	0.139516	0.828742	0.359367	0.180594	0.238831
std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203
min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000

```
In [133...] k1.mode(numeric_only=True)
```

Out[133]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Age
0	0.550	0.45	0.15	0.2225	0.175	0.1715	0.275	10.5
1	0.625	NaN	NaN	NaN	NaN	NaN	NaN	NaN

```
In [134...] k1.median(numeric_only=True)
```

Out[134]:
```
Length            0.5450
Diameter          0.4250
Height            0.1400
Whole weight      0.7995
Shucked weight    0.3360
Viscera weight    0.1710
Shell weight      0.2340
Age              10.5000
dtype: float64
```

```
In [135...] k1.skew(numeric_only=True)
```

Out[135]:
```
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
Age               1.114102
dtype: float64
```

```
In [136...] k1.kurt(numeric_only=True)
```

Out[136]:
```
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
Age               2.330687
dtype: float64
```

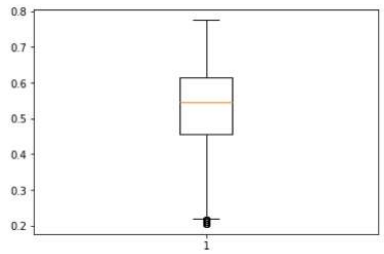
5. Handle the Missing Values

```
In [137...] #find the null columns
            k1.isnull().sum()
```

Out[137]:
```
Sex               0
Length            0
Diameter          0
Height            0
Whole weight      0
Shucked weight    0
Viscera weight    0
Shell weight      0
Age               0
dtype: int64
```

6. Find out the Outliers and Replace the Outliers.

In [162…
```
#find outliers
plt.boxplot(k1["Length"])
plt.show()
```

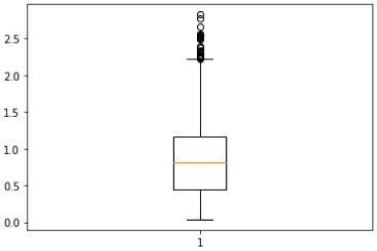


In [164…
```
upperOutlayers=Q3+1.5*IQR
lowerOutlayers=Q1-1.5*IQR
print(upperOutlayers)
print(lowerOutlayers)
```

```
0.8624999999999999
0.2025000000000004
```

In [141…
```
k1.drop(np.where(k1["Length"]>=upperOutlayers)[0],inplace=True)
k1.drop(np.where(k1["Length"]<=lowerOutlayers)[0],inplace=True)
```

In [142…
```
#find outliers
plt.boxplot(k1["Whole weight"])
plt.show()
```



In [143…
```
#handling outliers: InterQuartile Range(IQR)
Q3=np.percentile(f1["Whole weight"],75,interpolation='midpoint')
Q1=np.percentile(f1["Whole weight"],25,interpolation='midpoint')
IQR=Q3-Q1
print("Q1: ", Q1)
print("Q3:", Q3)
print("IQR: ", IQR)
```

```
Q1:  0.4415
Q3: 1.153
IQR:  0.7115
```

In [144…
```
upperOutlayers=Q3+1.5*IQR
lowerOutlayers=Q1-1.5*IQR
print(upperOutlayers)
print(lowerOutlayers)
```

```
2.22025
-0.62575
```

In [145…
```
k1.drop(np.where(f1["Whole weight"]>=upperOutlayers)[0],inplace=True)
k1.drop(np.where(f1["Whole weight"]<=lowerOutlayers)[0],inplace=True)
```

7. Check the Categorical Columns and Perform Encoding

```
In [146…] k1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 4098 entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Sex             4098 non-null   object
 1   Length          4098 non-null   float64
 2   Diameter        4098 non-null   float64
 3   Height          4098 non-null   float64
 4   Whole weight    4098 non-null   float64
 5   Shucked weight  4098 non-null   float64
 6   Viscera weight  4098 non-null   float64
 7   Shell weight    4098 non-null   float64
 8   Age             4098 non-null   float64
dtypes: float64(8), object(1)
```

```
In [147…] from sklearn.preprocessing import LabelEncoder
k1["Sex"]=LabelEncoder().fit_transform(k1["Sex"])
print(k1["Sex"].unique())
```

```
[2 0 1]
```

```
In [148…] k1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 4098 entries, 0 to 4176
Data columns (total 9 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Sex             4098 non-null   int32
```

8. Split the Dataset into Independent and Dependent Variables.

```
In [165…] X=k1.iloc[:,:-2].values #independent variables
Y=k1.iloc[:,-2].values #dependent variable

X
```

```
Out[165]: array([[2.    , 0.455 , 0.365 , ..., 0.514 , 0.2245, 0.101 ],
                 [2.    , 0.35  , 0.265 , ..., 0.2255, 0.0995, 0.0485],
                 [0.    , 0.53  , 0.42  , ..., 0.677 , 0.2565, 0.1415],
                 ...,
                 [2.    , 0.6   , 0.475 , ..., 1.176 , 0.5255, 0.2875],
                 [0.    , 0.625 , 0.485 , ..., 1.0945, 0.531 , 0.261 ],
                 [2.    , 0.71  , 0.555 , ..., 1.9485, 0.9455, 0.3765]])
```

```
In [166…] Y
```

```
Out[166]: array([0.15 , 0.07 , 0.21 , ..., 0.308, 0.296, 0.495])
```

9. Scale the Independent Variable

```
In [151…] from sklearn.preprocessing import StandardScaler
std_scaler=StandardScaler().fit_transform(X)
std_scaler
```

```
Out[151]: array([[ 1.15199292, -0.63240755, -0.4775494 , -1.12098668, -0.66806029],
                 [ 1.15199292, -1.55987395, -1.54217646, -1.24510998, -1.28439797],
                 [-1.27331764,  0.03006846,  0.10799548, -0.12800026, -0.31983485],
                 ...,
                 [ 1.15199292,  0.64837939,  0.69354036,  1.60972597,  0.74620502],
                 [-1.27331764,  0.86920473,  0.80000306,  0.24436964,  0.5720923 ],
                 [ 1.15199292,  1.62001086,  1.54524201,  1.36147936,  2.39653728]])
```

10. Split the Dataset into Training Testing.

```
In [152…] from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size = 0.3, random_stat
X_train.shape
```

```
Out[152]: (2868, 5)
```

```
In [153…] X_test.shape
```

```
Out[153]: (1230, 5)
```

11. Build the Model.

```
In [154…] #Linear Regression
from sklearn.linear_model import LinearRegression
reg= LinearRegression()
reg.fit(X_train, y_train)
```

```
Out[154]: LinearRegression()
```

12. Train the Model.

```
In [155… y_pred = reg.predict(X_test)
```

13. Test the Model and
14. Measure the Performance using Metrics

```
In [156… from sklearn import metrics

In [157… print('Mean absolute error(MAE): {}'.format(metrics.mean_absolute_error(y_test, y_pred
         print('Mean squared error(MSE): {}'.format(metrics.mean_squared_error(y_test, y_pred)
         print("Intercept: {}".format(reg.intercept_))
         print('R2 Score: {}'.format(metrics.r2_score(y_test, y_pred)))

         Mean absolute error(MAE): 0.035513348487061835
         Mean squared error(MSE): 0.0027850443765074177
         Intercept: -0.02261289768697705
         R2 Score: 0.9420641022563094
```