ASSIGNMENT 3

Abalone Age Prediction

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns

import warnings
warnings.filterwarnings("ignore")
```

Download the dataset

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

```
<IPython.core.display.HTML object>
```

```
Saving abalone.csv to abalone.csv
```

Load the dataset into the tool

```
# importing the dataset

df = pd.read_csv('abalone.csv')
```

```
df.head()
```

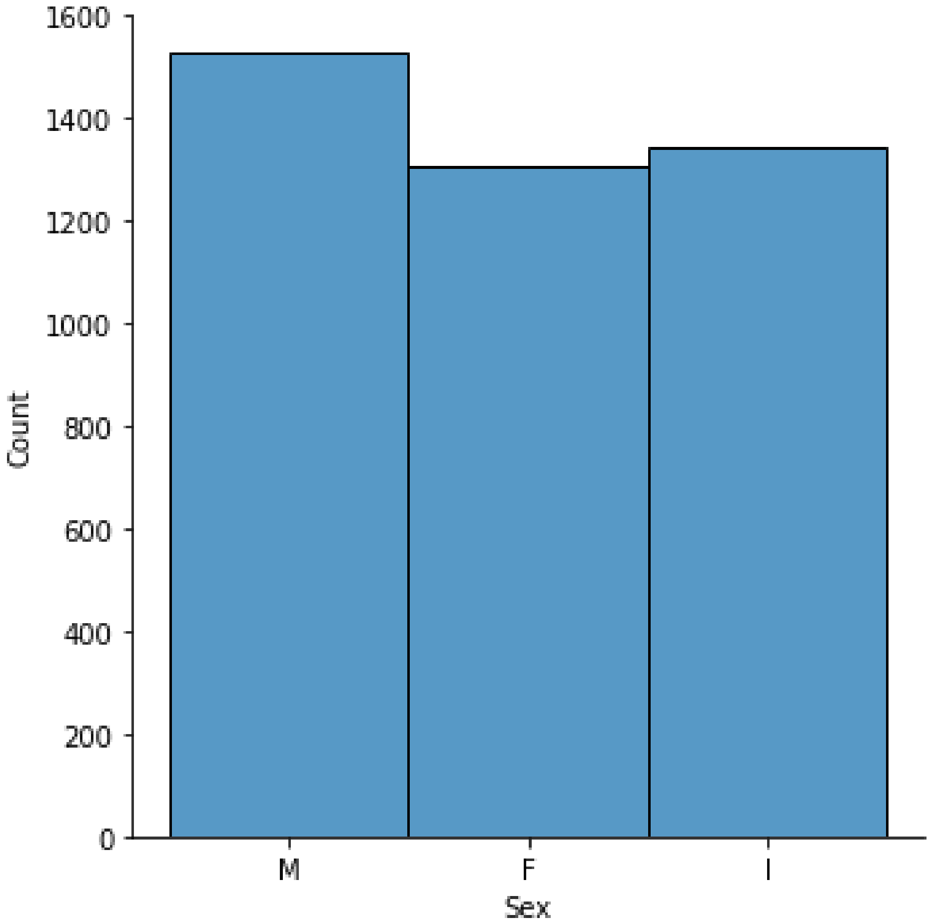
```
  Sex  Length  Diameter  Height  Whole weight  Shucked weight  Viscera
weight  \
0   M   0.455     0.365   0.095        0.5140          0.2245
0.1010
1   M   0.350     0.265   0.090        0.2255          0.0995
0.0485
2   F   0.530     0.420   0.135        0.6770          0.2565
0.1415
3   M   0.440     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
```

Perform Below Visualizations :

Univariate Analysis

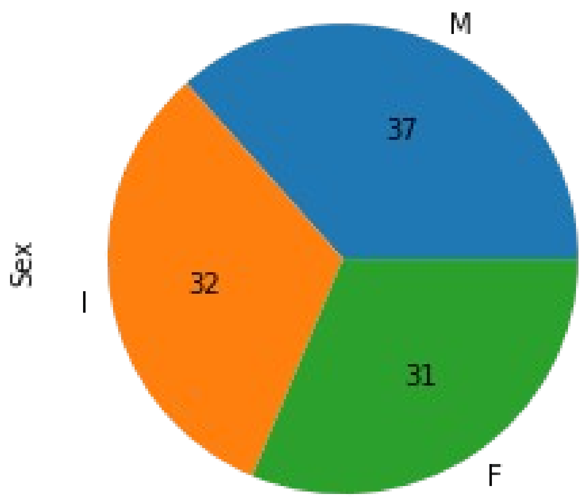
```
sns.displot(df["Sex"])
```

<seaborn.axisgrid.FacetGrid at 0x7f95f329f910>




```
df['Sex'].value_counts().plot(kind='pie',autopct='%.0f')
```

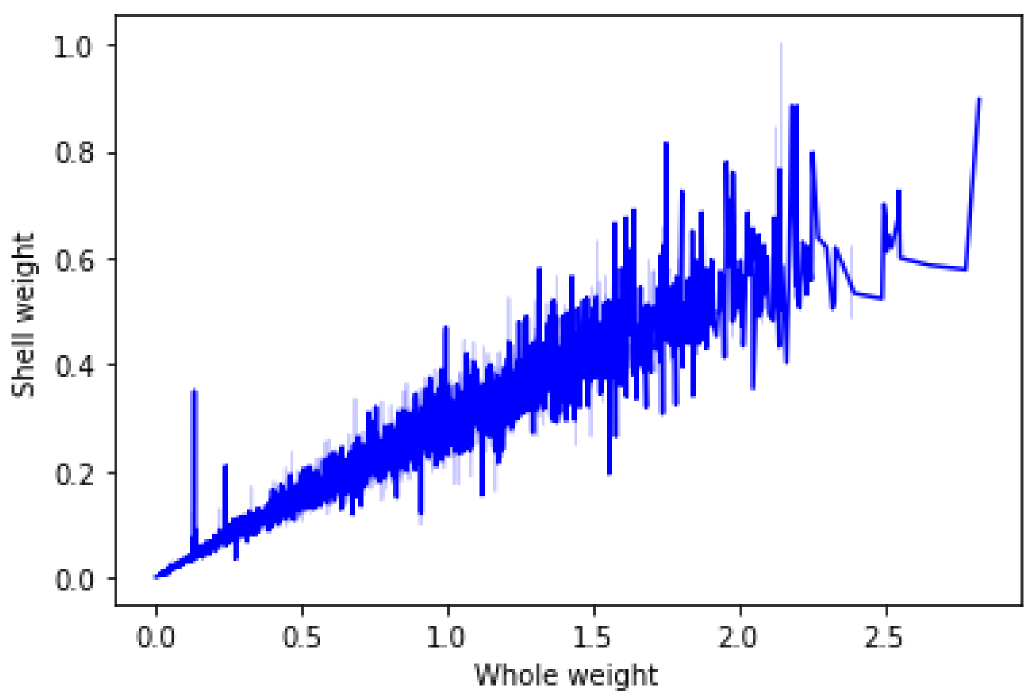
<matplotlib.axes._subplots.AxesSubplot at 0x7f95f32cd190>



Bi-Variate Analysis

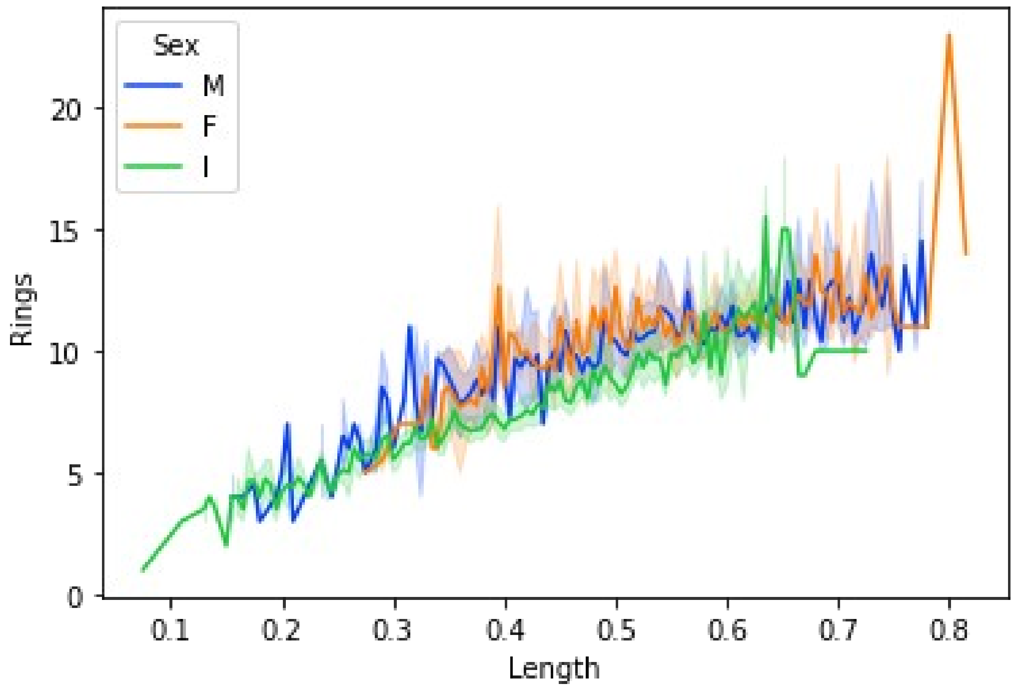
```
sns.lineplot(x=df['Whole weight'],y=df['Shell weight'],color='blue')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f95f31bfa10>
```



Multi-Variate Analysis

```
sns.lineplot(x='Length',y='Rings',data=df,palette='bright',hue='Sex');
```



Perform descriptive statistics on the dataset

```
df.sum()
```

```
Sex               MMFMIIFFMFFMMFFMIFMMMIFFFFFMMMMFMFFMFFFMFFIIII...
Length                                                     2188.715
Diameter                                                    1703.72
Height                                                       582.76
Whole weight                                               3461.656
Shucked weight                                             1501.078
Viscera weight                                             754.3395
Shell weight                                               997.5965
Rings                                                         41493
dtype: object
```

```
df.mean()
```

```
Length            0.523992
Diameter          0.407881
Height            0.139516
Whole weight      0.828742
Shucked weight    0.359367
Viscera weight    0.180594
Shell weight      0.238831
Rings             9.933684
dtype: float64
```

```
df.median()
```

```
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
Rings             9.0000
dtype: float64
```

```
df.mode()
```

```
   Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
0    M   0.550      0.45    0.15        0.2225           0.175   
1  NaN   0.625       NaN     NaN           NaN             NaN   

   Viscera weight  Shell weight  Rings  
0          0.1715         0.275    9.0  
1             NaN           NaN    NaN  
```

```
df.std()
```

```
Length            0.120093
Diameter          0.099240
Height            0.041827
Whole weight      0.490389
Shucked weight    0.221963
Viscera weight    0.109614
Shell weight      0.139203
Rings             3.224169
dtype: float64
```

```
df.min()
```

```
Sex                    F
Length             0.075
Diameter           0.055
Height               0.0
Whole weight       0.002
Shucked weight     0.001
Viscera weight    0.0005
Shell weight      0.0015
Rings                  1
dtype: object
```

```
df.max()
```

```
Sex                    M
Length             0.815
Diameter            0.65
Height              1.13
Whole weight      2.8255
```

```
Shucked weight     1.488
Viscera weight      0.76
Shell weight       1.005
Rings                 29
dtype: object
```

```
df.count()
```

```
Sex               4177
Length            4177
Diameter          4177
Height            4177
Whole weight      4177
Shucked weight    4177
Viscera weight    4177
Shell weight      4177
Rings             4177
dtype: int64
```

Check for Missing values and deal with them

```
df.isnull().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
```

Find the outliers and replace them outliers

```
qnt  =  df.quantile(q = (0.25,0.75))
iqr = qnt.loc[0.75] - qnt.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
```

```python
lower = qnt.loc[0.25] - 1.5*iqr
upper = qnt.loc[0.75] + 1.5 * iqr
```

```python
lower
```

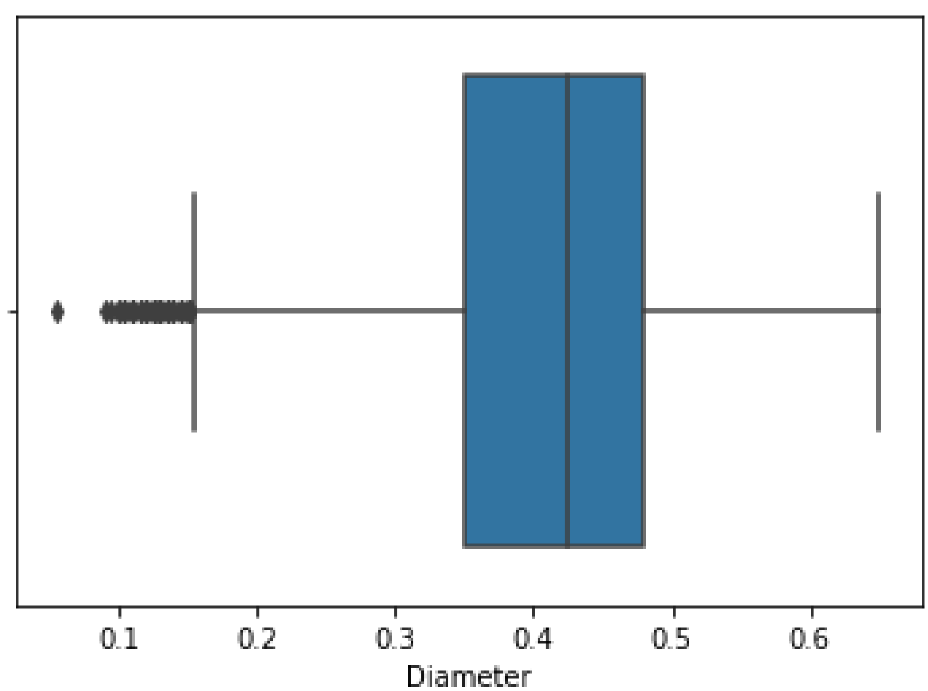
```
Length             0.20250
Diameter           0.15500
Height             0.04000
Whole weight      -0.62575
Shucked weight    -0.28800
Viscera weight    -0.14575
Shell weight      -0.16850
Rings              3.50000
dtype: float64
```

```python
upper
```

```
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
```

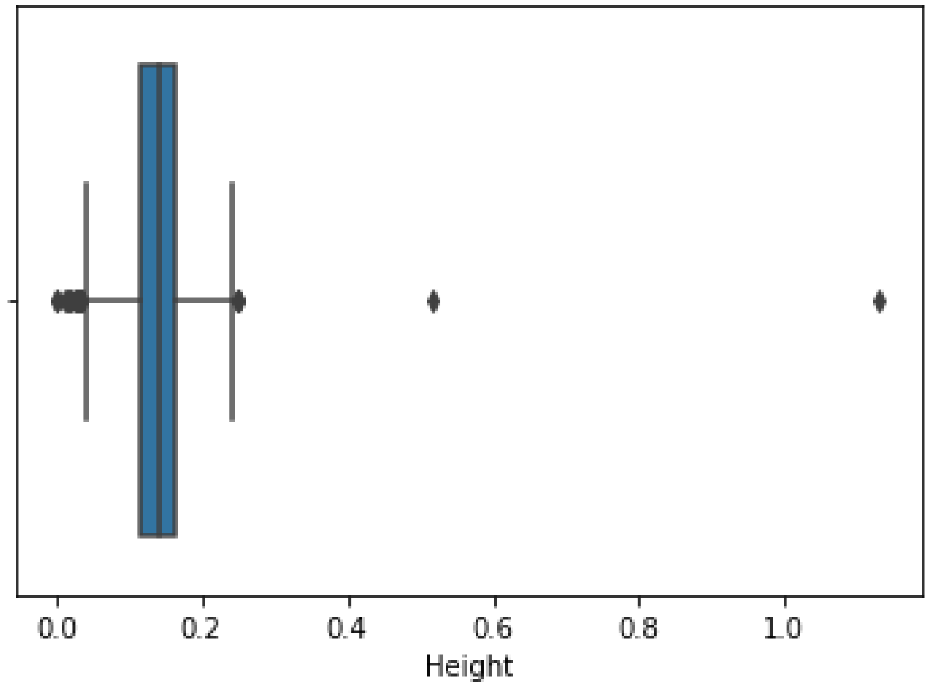
```python
sns.boxplot(df["Diameter"])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f95f2e7fed0>
```



```
sns.boxplot(df["Height"])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f95f30f2a10>
```



Check for Categorical columns and perform encoding

```
df.dtypes
```

```
Sex                  object
Length              float64
Diameter            float64
Height              float64
Whole weight        float64
Shucked weight      float64
Viscera weight      float64
Shell weight        float64
Rings                 int64
dtype: object
```

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

```
df.head()
```

```
   Sex  Length  Diameter  Height  Whole weight  Shucked weight  \
0    1   0.455     0.365   0.095        0.5140          0.2245
1    1   0.350     0.265   0.090        0.2255          0.0995
2    0   0.530     0.420   0.135        0.6770          0.2565
3    1   0.440     0.365   0.125        0.5160          0.2155
4    2   0.330     0.255   0.080        0.2050          0.0895
```

```
   Viscera weight  Shell weight  Rings
0          0.1010         0.150     15
1          0.0485         0.070      7
2          0.1415         0.210      9
3          0.1140         0.155     10
4          0.0395         0.055      7
```

Split the data into dependent and independent variables

```
x= df.iloc[:,:-1].values
y= df.iloc[:,3].values
```

```
x
```

```
array([[1.    , 0.455 , 0.365 , ..., 0.2245, 0.101 , 0.15  ],
       [1.    , 0.35  , 0.265 , ..., 0.0995, 0.0485, 0.07  ],
       [0.    , 0.53  , 0.42  , ..., 0.2565, 0.1415, 0.21  ],
       ...,
       [1.    , 0.6   , 0.475 , ..., 0.5255, 0.2875, 0.308 ],
       [0.    , 0.625 , 0.485 , ..., 0.531 , 0.261 , 0.296 ],
       [1.    , 0.71  , 0.555 , ..., 0.9455, 0.3765, 0.495 ]])
```

```
y
```

```
array([0.095, 0.09 , 0.135, ..., 0.205, 0.15 , 0.195])
```

Scale the independent variables

```
from sklearn.preprocessing import StandardScaler
rings = df[["Rings","Diameter"]]
scaler = StandardScaler()
scaler.fit(rings)
```

```
StandardScaler()
```

Split the data into training and testing

```
from sklearn.datasets import make_blobs

from sklearn.model_selection import train_test_split

x, y = make_blobs(n_samples=100)

x_train, x_test, y_train, y_test = train_test_split(x, y,
test_size=0.5)
print(x_train.shape, x_test.shape, y_train.shape, y_test.shape)
```

```
(500, 2) (500, 2) (500,) (500,)
```

Build the Model

```
from sklearn.neighbors import KNeighborsClassifier
knn = KNeighborsClassifier(n_neighbors= 3)
```

```
knn.fit(x_train,y_train)

KNeighborsClassifier(n_neighbors=3)

a = knn.predict(x_test)

a

array([2, 0, 0, 2, 2, 1, 1, 2, 0, 1, 1, 0, 0, 0, 0, 1, 0, 2, 2, 1, 1,
2,
       0, 2, 0, 0, 2, 1, 1, 2, 0, 1, 2, 0, 1, 2, 1, 1, 2, 2, 2, 1, 2,
1,
       1, 1, 1, 2, 2, 2, 0, 1, 1, 1, 0, 2, 2, 1, 2, 0, 1, 1, 1, 1, 0,
1,
       2, 1, 2, 2, 2, 2, 1, 0, 0, 0, 0, 2, 2, 1, 2, 1, 0, 0, 2, 0, 0,
1,
       2, 1, 2, 0, 2, 2, 1, 0, 2, 0, 2, 1, 0, 1, 1, 1, 0, 0, 0, 1, 0,
2,
       2, 1, 0, 0, 1, 2, 0, 1, 2, 1, 0, 0, 2, 0, 0, 2, 1, 2, 2, 2, 0,
0,
       2, 1, 1, 2, 1, 2, 1, 0, 2, 2, 2, 0, 2, 0, 1, 0, 1, 2, 2, 2, 2,
0,
       2, 1, 0, 2, 2, 0, 2, 1, 2, 1, 0, 0, 0, 0, 1, 0, 0, 0, 2, 1, 0,
0,
       2, 0, 2, 2, 2, 2, 2, 1, 2, 0, 2, 2, 2, 0, 0, 0, 2, 0, 2, 0, 2,
1,
       2, 1, 2, 0, 1, 0, 1, 0, 1, 2, 1, 2, 2, 2, 1, 0, 1, 0, 2, 0, 0,
1,
       1, 0, 2, 2, 1, 1, 1, 2, 0, 1, 1, 2, 1, 2, 2, 1, 2, 2, 1, 1, 0,
1,
       0, 0, 1, 0, 1, 2, 1, 1, 1, 1, 2, 0, 2, 2, 1, 0, 0, 1, 0, 2, 0,
1,
       0, 2, 1, 1, 0, 0, 0, 2, 1, 1, 2, 1, 2, 1, 1, 2, 1, 1, 1, 2, 0,
2,
       0, 2, 0, 2, 2, 1, 2, 2, 0, 2, 1, 1, 2, 0, 1, 0, 0, 1, 1, 1, 0,
0,
       2, 1, 0, 0, 1, 2, 0, 2, 0, 1, 0, 1, 0, 2, 0, 0, 2, 1, 2, 2, 0,
1,
       0, 0, 0, 1, 1, 2, 1, 1, 2, 2, 2, 2, 2, 0, 1, 0, 0, 2, 2, 1, 0,
2,
       0, 1, 0, 0, 0, 0, 2, 0, 1, 0, 1, 1, 0, 1, 2, 0, 2, 0, 2, 0, 0,
2,
       2, 0, 2, 0, 1, 0, 2, 1, 1, 1, 2, 1, 0, 0, 0, 0, 0, 2, 1, 2, 0,
2,
       2, 1, 2, 0, 1, 0, 0, 0, 1, 1, 2, 1, 1, 2, 1, 0, 2, 0, 2, 0, 2,
1,
       2, 2, 0, 0, 0, 2, 1, 1, 0, 0, 0, 1, 0, 1, 2, 2, 0, 1, 1, 0, 2,
1,
       2, 0, 2, 1, 0, 1, 2, 1, 0, 2, 2, 0, 2, 2, 0, 0, 2, 0, 0, 0, 1,
0,
       0, 2, 1, 1, 2, 2, 1, 0, 1, 1, 2, 0, 1, 1, 1, 2, 2, 2, 2, 1, 0,
```

```
1,
       2, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 2, 0])
```

```
from sklearn.metrics import accuracy_score,confusion_matrix
```

```
print("Accuracy score",accuracy_score(y_test,a))
```

```
Accuracy score 0.984
```

```
confusion_matrix(y_test,a)
```

```
array([[167,   0,   2],
       [  0, 158,   0],
       [  6,   0, 167]])
```