ASSIGNMENT 3 M.SNEHA

1.Importing Required Package

```
import pandas as pd

import seaborn as sns

import numpy as np

from matplotlib import pyplot as plt

%matplotlib inline
```

2.Loading the Dataset

In [3]:

```
df=pd.read_csv("C:\\Users\\Sandhya Jayaraman\\Downloads\\abalone.csv")

df
```

	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	0.1500	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.0700	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.2100	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.1550	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.0550	7
...	...	...	...	...	...	...	...	...	...
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

4177 rows × 9 columns

3.Visualizations

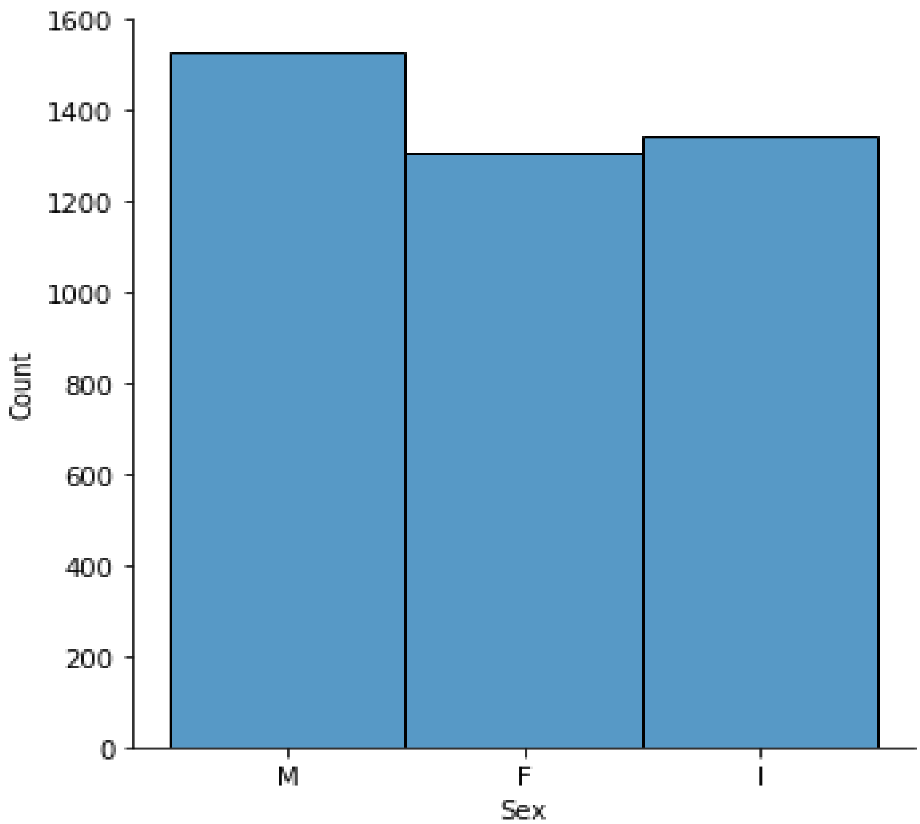
3.1 Univariate Analysis

In [4]:

```
sns.displot(df.Sex)
```

Out[4]:

```
<seaborn.axisgrid.FacetGrid at 0x1ca06fdfd48>
```



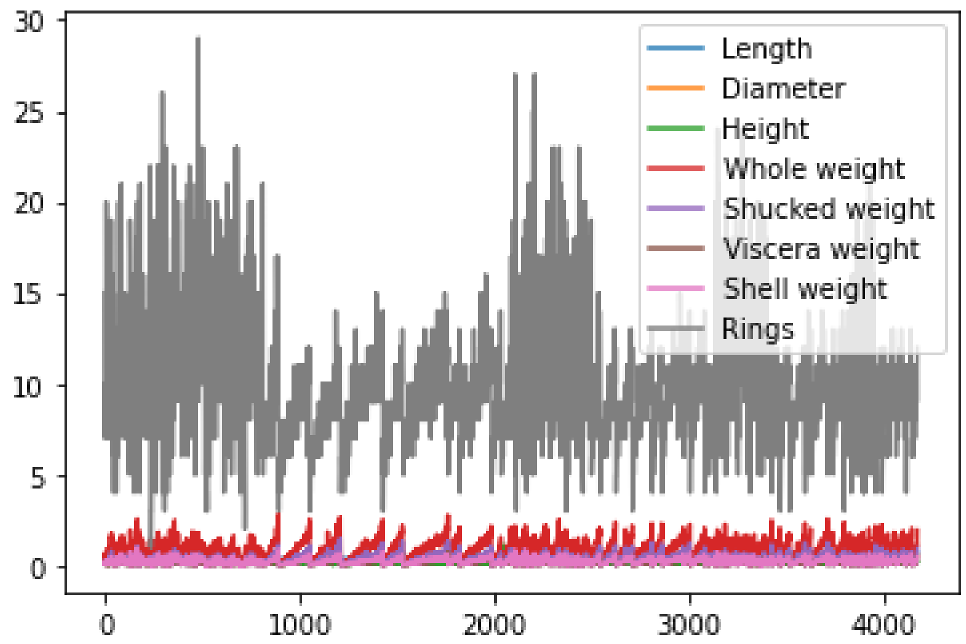
3.2 Bi-Variate Analysis

In [5]:

```
df.plot.line()
```

Out[5]:

```
<AxesSubplot:>
```

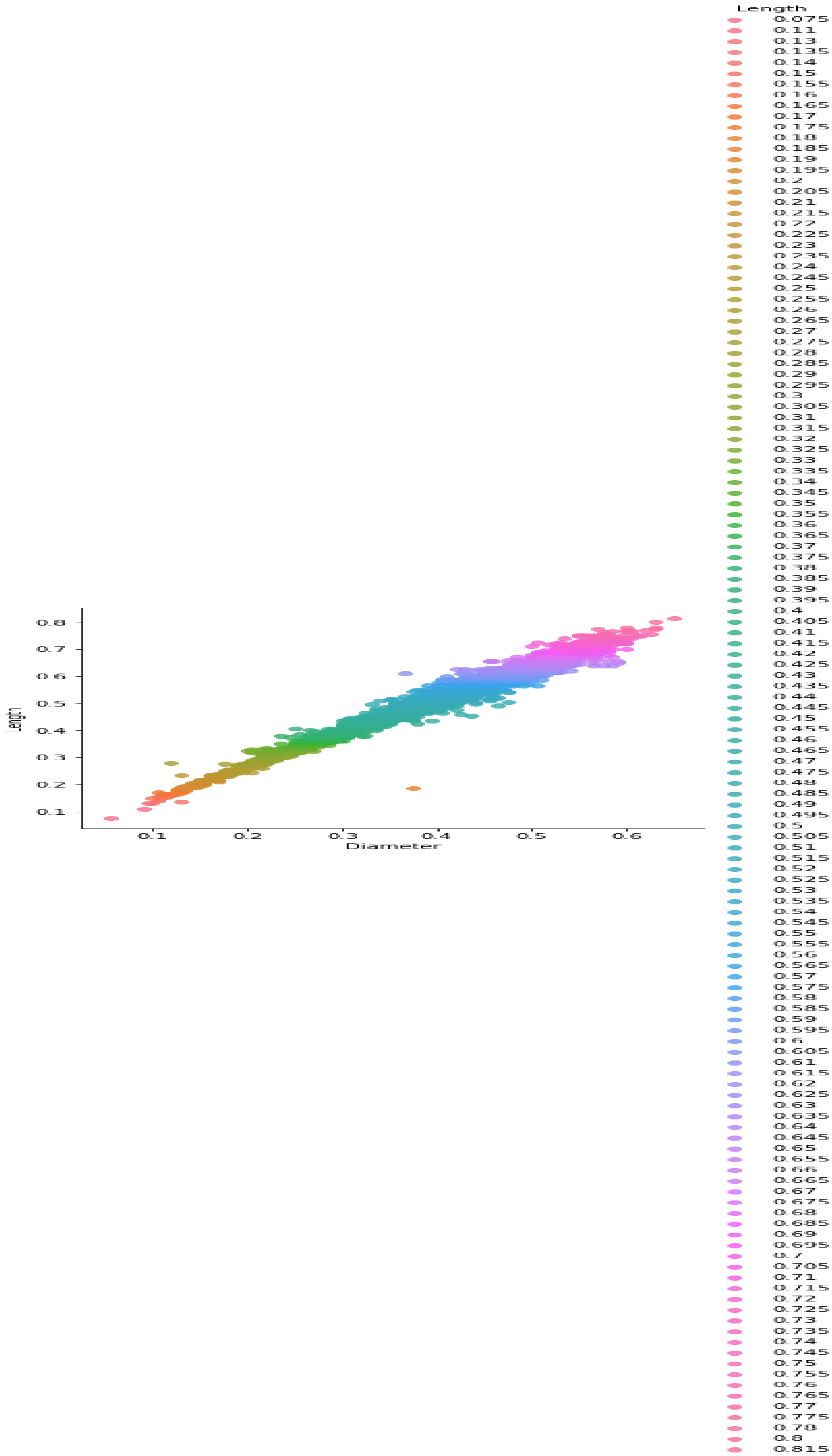


3.3 Multi-Variate Analysis

In [6]:

```
sns.lmplot("Diameter","Length",df,hue="Length",fit_reg=False);
```

```
c:\users\sandhya jayaraman\appdata\local\programs\python\python37\lib\site-
packages\seaborn\_decorators.py:43: FutureWarning: Pass the following varia
bles as keyword args: x, y, data. From version 0.12, the only valid positio
nal argument will be `data`, and passing other arguments without an explici
t keyword will result in an error or misinterpretation.
  FutureWarning
```



Length
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.1
0.2
0.3
0.4
0.5
0.6
Diameter
Length
0.075
0.11
0.13
0.135
0.14
0.15
0.155
0.16
0.165
0.17
0.175
0.18
0.185
0.19
0.195
0.2
0.205
0.21
0.215
0.22
0.225
0.23
0.235
0.24
0.245
0.25
0.255
0.26
0.265
0.27
0.275
0.28
0.285
0.29
0.295
0.3
0.305
0.31
0.315
0.32
0.325
0.33
0.335
0.34
0.345
0.35
0.355
0.36
0.365
0.37
0.375
0.38
0.385
0.39
0.395
0.4
0.405
0.41
0.415
0.42
0.425
0.43
0.435
0.44
0.445
0.45
0.455
0.46
0.465
0.47
0.475
0.48
0.485
0.49
0.495
0.5
0.505
0.51
0.515
0.52
0.525
0.53
0.535
0.54
0.545
0.55
0.555
0.56
0.565
0.57
0.575
0.58
0.585
0.59
0.595
0.6
0.605
0.61
0.615
0.62
0.625
0.63
0.635
0.64
0.645
0.65
0.655
0.66
0.665
0.67
0.675
0.68
0.685
0.69
0.695
0.7
0.705
0.71
0.715
0.72
0.725
0.73
0.735
0.74
0.745
0.75
0.755
0.76
0.765
0.77
0.775
0.78
0.8
0.815

4.Perform descriptive statistics on the dataset.

In [7]:

```
df.describe()
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
Count	4177.000000	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	9.933684
Std	0.120093	0.099240	0.041827	0.490389	0.221963	0.109614	0.139203	3.224169
Min	0.075000	0.055000	0.000000	0.002000	0.001000	0.000500	0.001500	1.000000
25%	0.450000	0.350000	0.115000	0.441500	0.186000	0.093500	0.130000	8.000000
50%	0.545000	0.425000	0.140000	0.799500	0.336000	0.171000	0.234000	9.000000
75%	0.615000	0.480000	0.165000	1.153000	0.502000	0.253000	0.329000	11.000000
max	0.815000	0.650000	1.130000	2.825500	1.488000	0.760000	1.005000	29.000000

5.Handle the Missing values.

In [9]:

```
data=pd.read_csv("C:\\Users\\Sandhya Jayaraman\\Downloads\\abalone.csv")

pd.isnull(data["Sex"])

0        False

1        False

2        False

3        False
```

```
4       False
        ...
4172    False
4173    False
4174    False
4175    False
4176    False
Name: Sex, Length: 4177, dtype: bool
```

6.Find the outliers and replace the outliers

In [10]:

```
df["Rings"]=np.where(df["Rings"]>10,np.median,df["Rings"])
df["Rings"]
```

Out[10]:

```
0       <function median at 0x000001CA73E62048>
1                                             7
2                                             9
3                                            10
4                                             7
                          ...
4172    <function median at 0x000001CA73E62048>
4173                                         10
4174                                          9
4175                                         10
4176    <function median at 0x000001CA73E62048>
Name: Rings, Length: 4177, dtype: object
```

7.Check for Categorical columns and perform encoding

In [11]:

```
pd.get_dummies(df,columns=["Sex","Length"],prefix=["Length","Sex"]).head()
```

	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings	Length_F	Length_I	Length_M	...	Sex_0.745	Sex_0.75	Sex_0.755	Sex_0.76	Sex_0.765	Sex_0.77	Sex_0.775	Sex_0.78	Sex_0.8	Sex_0.815
0	0.365	0.095	0.5140	0.2245	0.1010	0.150	<function median at 0x000001CA73E62048>	0	0	1	...	0	0	0	0	0	0	0	0	0	0
1	0.265	0.090	0.2255	0.0995	0.0485	0.070	7	0	0	1	...	0	0	0	0	0	0	0	0	0	0
2	0.420	0.135	0.6770	0.2565	0.1415	0.210	9	1	0	0	...	0	0	0	0	0	0	0	0	0	0
3	0.365	0.125	0.51	0.21	0.11	0.1	10	0	0	1	...	0	0	0	0	0	0	0	0	0	0

			60	55	40	55															
4	0.255	0.080	0.2050	0.0895	0.0395	0.055	7	0	1	0	...	0	0	0	0	0	0	0	0	0	0

5 rows × 144 columns

8.Split the data into dependent and independent variables

8.1 Split the data into Independent variables.

In [12]:

```
X=df.iloc[:,:-2].values

print(X)
```

```
[['M' 0.455 0.365 ... 0.514 0.2245 0.101]

 ['M' 0.35 0.265 ... 0.2255 0.0995 0.0485]

 ['F' 0.53 0.42 ... 0.677 0.2565 0.1415]

 ...

 ['M' 0.6 0.475 ... 1.176 0.5255 0.2875]

 ['F' 0.625 0.485 ... 1.0945 0.531 0.261]

 ['M' 0.71 0.555 ... 1.9485 0.9455 0.3765]]
```

8.2 Split the data into Dependent variables.

In [13]:

```
Y=df.iloc[:,-1].values

print(Y)

[<function median at 0x000001CA73E62048> 7 9 ... 9 10

 <function median at 0x000001CA73E62048>]
```

9.Scale the independen tvariables

In [14]:

```
import pandas as pd

from sklearn.preprocessing import MinMaxScaler

scaler=MinMaxScaler()
```

In [15]:

```
df[["Length"]]=scaler.fit_transform(df[["Length"]])

print(df)

      Sex    Length  Diameter  Height  Whole weight  Shucked weight  \

0       M  0.513514     0.365   0.095        0.5140          0.2245

1       M  0.371622     0.265   0.090        0.2255          0.0995

2       F  0.614865     0.420   0.135        0.6770          0.2565

3       M  0.493243     0.365   0.125        0.5160          0.2155

4       I  0.344595     0.255   0.080        0.2050          0.0895

...   ..       ...       ...     ...           ...             ...

4172    F  0.662162     0.450   0.165        0.8870          0.3700

4173    M  0.695946     0.440   0.135        0.9660          0.4390

4174    M  0.709459     0.475   0.205        1.1760          0.5255

4175    F  0.743243     0.485   0.150        1.0945          0.5310

4176    M  0.858108     0.555   0.195        1.9485          0.9455

Viscera weight  Shell weight                                    Rings

0             0.1010        0.1500  <function median at 0x000001CA73E62048>
```

```
1               0.0485         0.0700                                      7
2               0.1415         0.2100                                      9
3               0.1140         0.1550                                     10
4               0.0395         0.0550                                      7
...                ...            ...                                    ...
4172            0.2390         0.2490  <function median at 0x000001CA73E62048>
4173            0.2145         0.2605                                     10
4174            0.2875         0.3080                                      9
4175            0.2610         0.2960                                     10
4176            0.3765         0.4950  <function median at 0x000001CA73E62048>

[4177 rows x 9 columns]
```

10.Split the data into training and testing

In [16]:

```
from sklearn.model_selection import train_test_split
train_size=0.8
X=df.drop(columns=['Sex']).copy()
y=df['Sex']
X_train,X_rem,y_train,y_rem=train_test_split(X,y,train_size=0.8)
test_size=0.5
X_valid,X_test,y_valid,y_test=train_test_split(X_rem,y_rem,test_size=0.5)
print(X_train.shape),print(y_train.shape)
print(X_valid.shape),print(y_valid.shape)
print(X_test.shape),print(y_test.shape)
```

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

```
(418, 8)

(418,)

(418, 8)

(418,)
```

Out[16]:

```
(None, None)
```

11.Build the Model

In [18]:

```
test_size=0.33

seed=7

X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=test_size,rand
om_state=seed)
```

12.Train the model

In [19]:

```
X_train
```

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
4131	0.682432	0.425	0.145	0.8300	0.3790	0.1605	0.2575	<function median at 0x000001CA73E62048>
3204	0.797297	0.530	0.185	1.3955	0.4560	0.3205	0.4900	<function median at 0x000001CA73E62048>
2622	0.844595	0.575	0.205	1.7975	0.7295	0.3935	0.5165	<function median at 0x000001CA73E62048>
2114	0.074324	0.095	0.035	0.0105	0.0050	0.0065	0.0035	4

1422	0.871622	0.575	0.215	2.1730	0.9515	0.5640	0.5365	<function median at 0x000001CA73E62048>
...	...	...	...	...	...	...	...	...
1372	0.729730	0.475	0.165	1.0230	0.4905	0.1955	0.3035	<function median at 0x000001CA73E62048>
919	0.452703	0.310	0.090	0.3335	0.1635	0.0610	0.0910	6
2550	0.277027	0.220	0.080	0.1315	0.0660	0.0240	0.0300	5
537	0.290541	0.230	0.075	0.1165	0.0430	0.0255	0.0400	7
1220	0.344595	0.250	0.095	0.2085	0.1020	0.0395	0.0520	7

2798 rows × 8 columns

```
y_train
```

Out[20]:

```
4131    I
3204    F
2622    F
2114    I
1422    M
        ..
1372    F
919     I
2550    I
537     M
1220    I
Name: Sex, Length: 2798, dtype: object
```

13.Test the model

In [21]:

```
X_test
```

Out[21]:

	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
1157	0.716216	0.470	0.165	1.1775	0.6110	0.2275	0.2920	9
1125	0.641892	0.425	0.150	0.8315	0.4110	0.1765	0.2165	10
2053	0.520270	0.345	0.110	0.4595	0.2350	0.0885	0.1160	7
3591	0.777027	0.475	0.165	1.3875	0.5800	0.3485	0.3095	9
455	0.675676	0.470	0.140	0.8375	0.3485	0.1735	0.2400	<function median at 0x000001CA73E62048>
...	...	...	...	...	...	...	...	...
3150	0.783784	0.505	0.165	1.3670	0.5835	0.3515	0.3960	10
3037	0.655405	0.450	0.145	0.8940	0.3885	0.2095	0.2640	9
2050	0.506757	0.350	0.130	0.4655	0.2075	0.1045	0.1350	8
1690	0.743243	0.500	0.170	1.0985	0.4645	0.2200	0.3540	9
253	0.675676	0.460	0.185	1.0940	0.4485	0.2170	0.3450	<function median at 0x000001CA73E62048>

1379 rows × 8 columns

```
y_test
```

Out[22]:

```
1157    F
1125    M
2053    M
3591    F
455     M
       ..
3150    F
3037    M
2050    M
1690    M
253     F
Name: Sex, Length: 1379, dtype: object
```

14.Measure the performance using Metrics

In [23]:

```
from sklearn.metrics import r2_score
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error
X_train=[5,-1,2,10]
y_test=[3.5,-0.9,2,9.9]
print('RSquared=',r2_score(X_train,y_test))
print('MAE=',mean_absolute_error(X_train,y_test))
print('MSE=',mean_squared_error(X_train,y_test))
RSquared= 0.9656060606060606
MAE= 0.42499999999999993
MSE= 0.5674999999999999
```

In [ ]: