

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

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

	Sex	Length	Diameter	Height	Whole weight	Shucked weight	\
0	M	0.455	0.365	0.095	0.5140	0.2245	
1	M	0.350	0.265	0.090	0.2255	0.0995	
2	F	0.530	0.420	0.135	0.6770	0.2565	
3	M	0.440	0.365	0.125	0.5160	0.2155	
4	I	0.330	0.255	0.080	0.2050	0.0895	
...
4172	F	0.565	0.450	0.165	0.8870	0.3700	
4173	M	0.590	0.440	0.135	0.9660	0.4390	
4174	M	0.600	0.475	0.205	1.1760	0.5255	
4175	F	0.625	0.485	0.150	1.0945	0.5310	
4176	M	0.710	0.555	0.195	1.9485	0.9455	

	Viscera weight	Shell weight	Rings
0	0.1010	0.1500	15
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	11
4173	0.2145	0.2605	10
4174	0.2875	0.3080	9
4175	0.2610	0.2960	10
4176	0.3765	0.4950	12

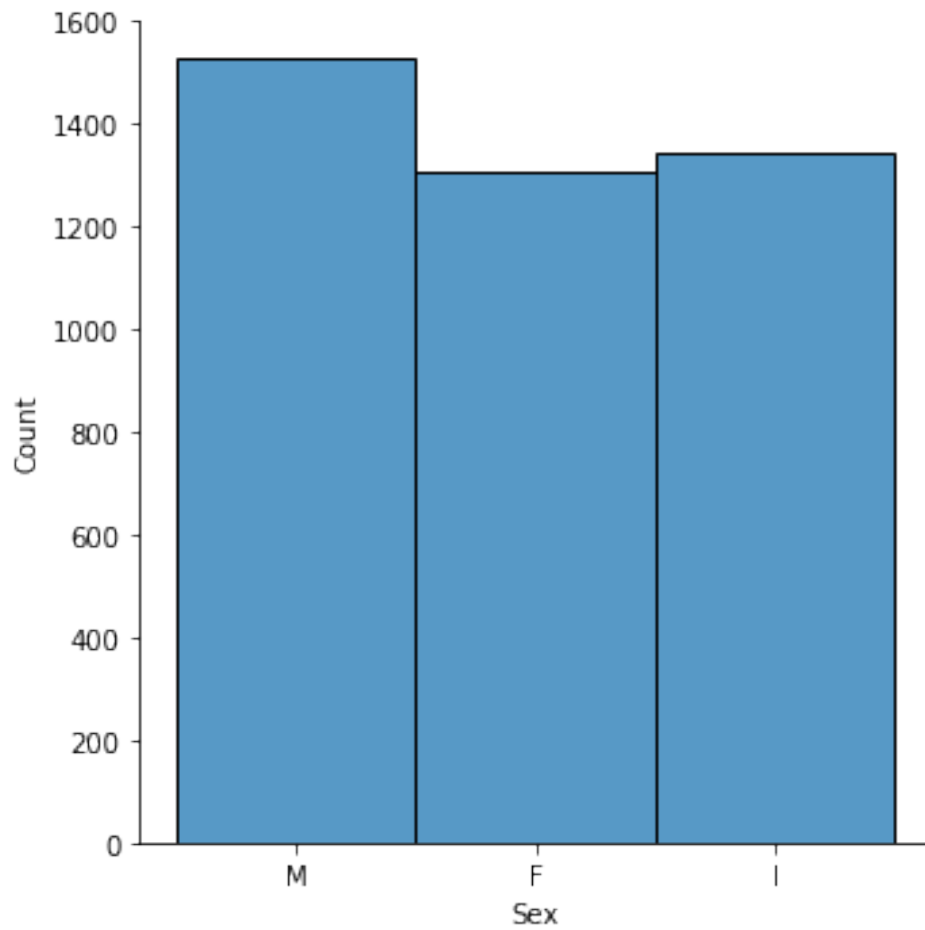
```
[4177 rows x 9 columns]
```

3.Visualizations

3.1 Univariate Analysis

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

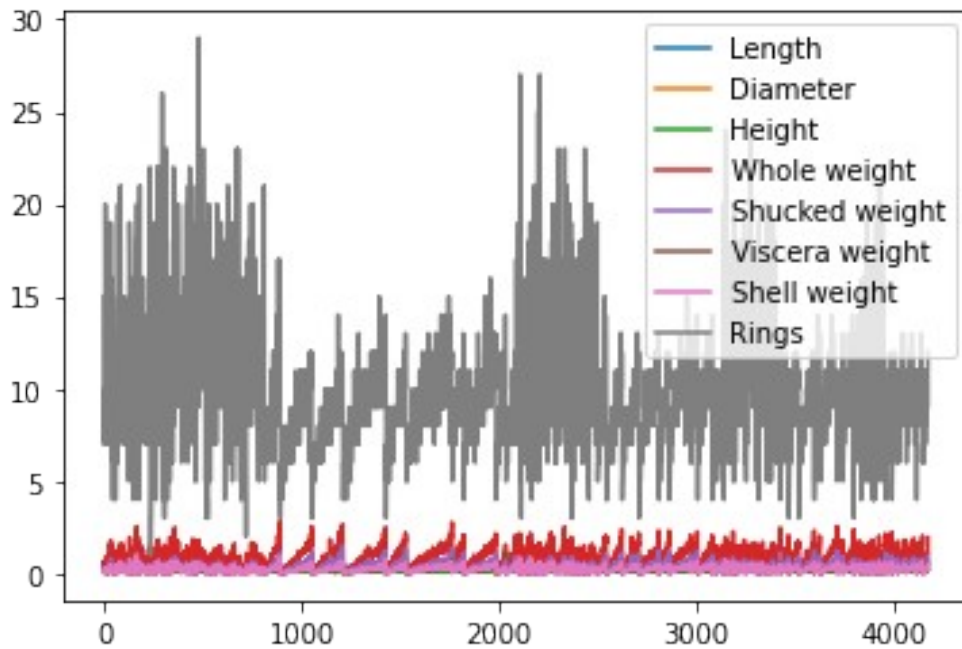
```
<seaborn.axisgrid.FacetGrid at 0x7fda18462c90>
```



3.2 Bi-Variate Analysis

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

```
<matplotlib.axes._subplots.AxesSubplot at 0x7fda155e3790>
```



3.3 Multi-Variate Analysis

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

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43:
FutureWarning: Pass the following variables as keyword args: x, y,
data. From version 0.12, the only valid positional argument will be
`data`, and passing other arguments without an explicit keyword will
result in an error or misinterpretation.
```

```
FutureWarning
```

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

4.Perform descriptive statistics on the dataset.

```
df.describe()
```

	Length	Diameter	Height	Whole weight	Shucked
weight \					
count	4177.000000	4177.000000	4177.000000	4177.000000	
mean	0.523992	0.407881	0.139516	0.828742	
std	0.120093	0.099240	0.041827	0.490389	
min	0.075000	0.055000	0.000000	0.002000	
25%	0.450000	0.350000	0.115000	0.441500	
50%	0.545000	0.425000	0.140000	0.799500	
75%	0.615000	0.480000	0.165000	1.153000	
max	0.815000	0.650000	1.130000	2.825500	

	Viscera weight	Shell weight	Rings
count	4177.000000	4177.000000	4177.000000
mean	0.180594	0.238831	9.933684
std	0.109614	0.139203	3.224169
min	0.000500	0.001500	1.000000
25%	0.093500	0.130000	8.000000
50%	0.171000	0.234000	9.000000
75%	0.253000	0.329000	11.000000
max	0.760000	1.005000	29.000000

5.Handle the Missing values

```
data=pd.read_csv("/content/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

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

```
0      <function median at 0x7fda32bd5cb0>
1                                           7
2                                           9
3                                          10
4                                           7
```

```
...
4172    <function median at 0x7fda32bd5cb0>
4173                                           10
4174                                           9
4175                                           10
4176    <function median at 0x7fda32bd5cb0>
Name: Rings, Length: 4177, dtype: object
```

7.Check for Categorical columns and perform encoding

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

	Diameter	Height	Whole weight	Shucked weight	Viscera weight	\
0	0.365	0.095	0.5140	0.2245	0.1010	
1	0.265	0.090	0.2255	0.0995	0.0485	
2	0.420	0.135	0.6770	0.2565	0.1415	
3	0.365	0.125	0.5160	0.2155	0.1140	
4	0.255	0.080	0.2050	0.0895	0.0395	

	Shell weight		Rings	Length_F
Length_I \	0.150	<function median at 0x7fda32bd5cb0>		0
0				
1	0.070		7	0
0				
2	0.210		9	1
0				
3	0.155		10	0
0				
4	0.055		7	0
1				

	Length_M	...	Sex_0.745	Sex_0.75	Sex_0.755	Sex_0.76	Sex_0.765
\							
0	1	...	0	0	0	0	0
1	1	...	0	0	0	0	0
2	0	...	0	0	0	0	0

```

3          1  ...          0          0          0          0          0
4          0  ...          0          0          0          0          0

```

```

      Sex_0.77  Sex_0.775  Sex_0.78  Sex_0.8  Sex_0.815
0           0           0           0           0           0
1           0           0           0           0           0
2           0           0           0           0           0
3           0           0           0           0           0
4           0           0           0           0           0

```

[5 rows x 144 columns]

8.Split the data into dependent and independent variables

8.1 Split the data into Independent variables.

```

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.

```

Y=df.iloc[:, -1].values
print(Y)

[<function median at 0x7fda32bd5cb0> 7 9 ... 9 10
 <function median at 0x7fda32bd5cb0>]

```

9.Scale the independent variables

```

import pandas as pd
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler()
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 0x7fda32bd5cb0>
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 0x7fda32bd5cb0>
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 0x7fda32bd5cb0>

[4177 rows x 9 columns]

10.Split the data into training and testing

```
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,)
```

```
(None, None)
```

11. Build the Model

```
test_size=0.33
seed=7
```

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

12. Train the model

```
X_train
```

	Length	Diameter	Height	Whole weight	Shucked weight	\
4131	0.682432	0.425	0.145	0.8300	0.3790	
3204	0.797297	0.530	0.185	1.3955	0.4560	
2622	0.844595	0.575	0.205	1.7975	0.7295	
2114	0.074324	0.095	0.035	0.0105	0.0050	
1422	0.871622	0.575	0.215	2.1730	0.9515	
...	
1372	0.729730	0.475	0.165	1.0230	0.4905	
919	0.452703	0.310	0.090	0.3335	0.1635	
2550	0.277027	0.220	0.080	0.1315	0.0660	
537	0.290541	0.230	0.075	0.1165	0.0430	
1220	0.344595	0.250	0.095	0.2085	0.1020	

	Viscera weight	Shell weight	
Rings			
4131	0.1605	0.2575	<function median at
0x7fda32bd5cb0>			
3204	0.3205	0.4900	<function median at
0x7fda32bd5cb0>			
2622	0.3935	0.5165	<function median at
0x7fda32bd5cb0>			
2114	0.0065	0.0035	
4			
1422	0.5640	0.5365	<function median at
0x7fda32bd5cb0>			
...
.			
1372	0.1955	0.3035	<function median at
0x7fda32bd5cb0>			
919	0.0610	0.0910	
6			
2550	0.0240	0.0300	
5			
537	0.0255	0.0400	
7			

```
1220          0.0395          0.0520
7
```

```
[2798 rows x 8 columns]
```

```
y_train
```

```
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
```

```
X_test
```

	Length	Diameter	Height	Whole weight	Shucked weight	\
1157	0.716216	0.470	0.165	1.1775	0.6110	
1125	0.641892	0.425	0.150	0.8315	0.4110	
2053	0.520270	0.345	0.110	0.4595	0.2350	
3591	0.777027	0.475	0.165	1.3875	0.5800	
455	0.675676	0.470	0.140	0.8375	0.3485	
...	
3150	0.783784	0.505	0.165	1.3670	0.5835	
3037	0.655405	0.450	0.145	0.8940	0.3885	
2050	0.506757	0.350	0.130	0.4655	0.2075	
1690	0.743243	0.500	0.170	1.0985	0.4645	
253	0.675676	0.460	0.185	1.0940	0.4485	

	Viscera weight	Shell weight
--	----------------	--------------

```
Rings
```

1157	0.2275	0.2920
------	--------	--------

```
9
```

1125	0.1765	0.2165
------	--------	--------

```
10
```

2053	0.0885	0.1160
------	--------	--------

```
7
```

3591	0.3485	0.3095
------	--------	--------

```
9
```

455	0.1735	0.2400	<function median at
-----	--------	--------	---------------------

```
0x7fda32bd5cb0>
```

```
...
```

```
...
```

```
...
```

```
..
```

```
.
```

3150	0.3515	0.3960	
10			
3037	0.2095	0.2640	
9			
2050	0.1045	0.1350	
8			
1690	0.2200	0.3540	
9			
253	0.2170	0.3450	<function median at 0x7fda32bd5cb0>

[1379 rows x 8 columns]

y_test

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

```
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
```