

ASSIGNMENT - 4

Dataset:

<https://drive.google.com/file/d/1sIv7x7CE0zAPAt0Uv6pbO2ST2LVp5u/view>

Loading the dataset:

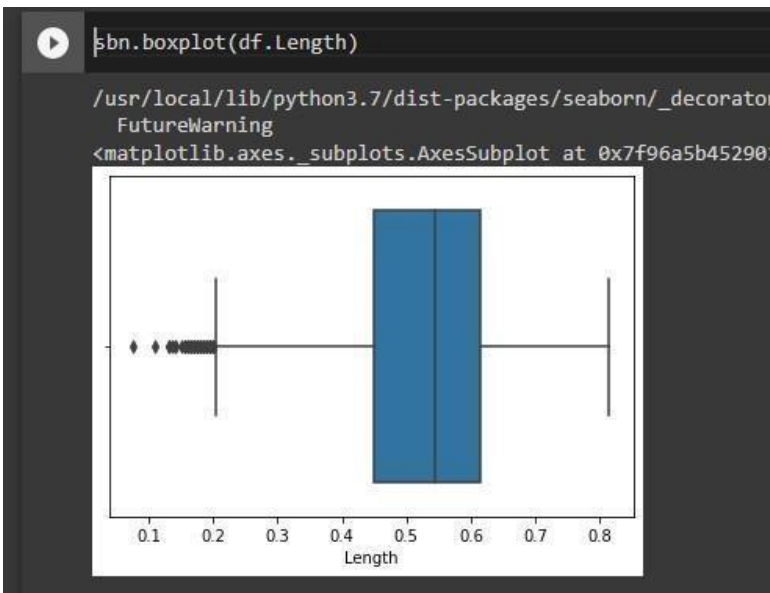
```
[1] import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

[84] df=pd.read_csv("abalone.csv")
df.head()
```

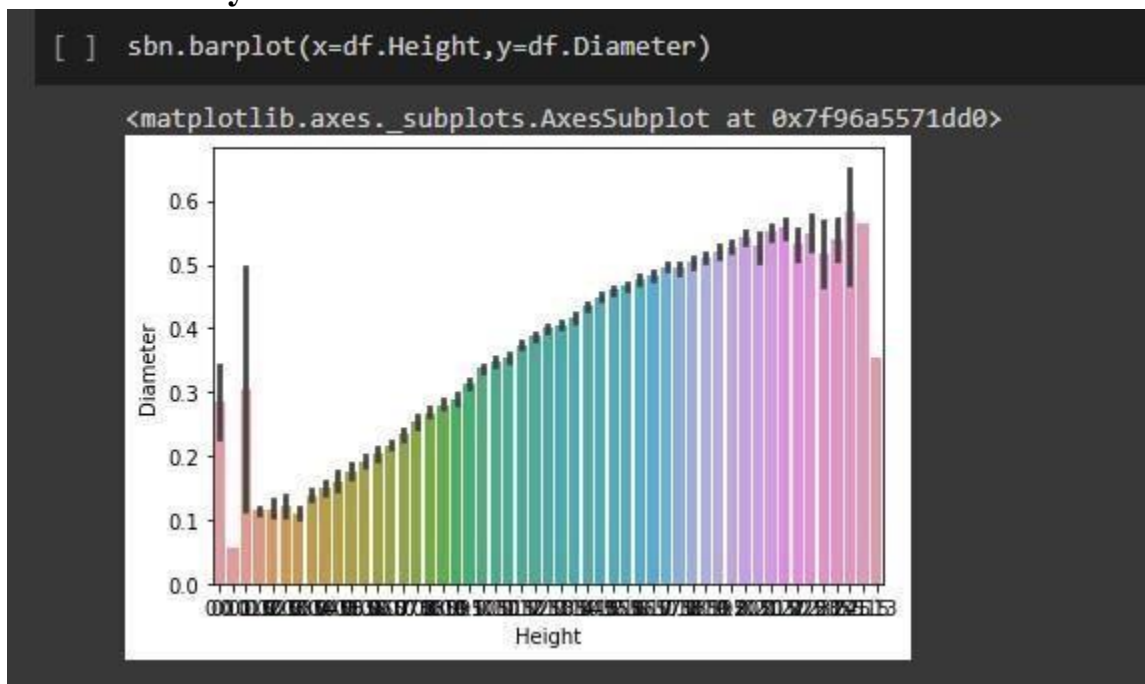
	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

Perform Below Visualizations.

• Univariate Analysis



Bi-Variate Analysis

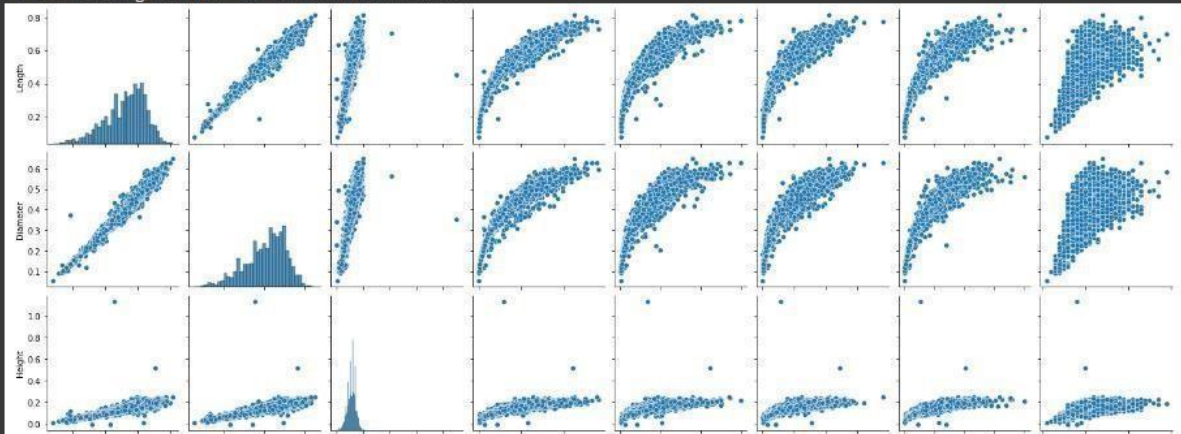


Multi-Variate Analysis



```
sbn.pairplot(df)
```

```
<seaborn.axisgrid.PairGrid at 0x7f96a5b8d050>
```



Perform descriptive analytics on the dataset

```
[ ] df['Height'].mean()
```

```
0.13951639932966242
```

```
[ ] df['Diameter'].median()
```

```
0.425
```

```
[ ] df['Length'].mode()
```

```
0    0.550
```

```
1    0.625
```

```
dtype: float64
```

```
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.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

Check for Missing values and deal with them.

```
df.isna().any()

Sex          False
Length       False
Diameter     False
Height       False
Whole weight False
Shucked weight False
Viscera weight False
Shell weight False
Rings        False
dtype: bool
```

Find the outliers and replace them outliers

```
[3] q1=df.Rings.quantile(0.25)
     q3=df.Rings.quantile(0.75)
     iqr=q3-q1

[4] print(iqr)

3.0

df=df[~((df.Rings<(q1-1.5*iqr))|(df.Rings>(q3+1.5*iqr)))]
```

Check for Categorical columns and perform encoding.

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

/usr/local/lib/python3.7/dist-packages/pandas/core/generic.py:6619: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#
    return self._update_inplace(result)

df.head()
```

	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	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330	0.255	0.080	0.2050	0.0895	0.0395	0.055	7

Split the data into dependent and independent variables.

```
✓ 0s x=df.iloc[:, :-1].values
✓ 0s [50] y=df.iloc[:, -1].values
```

Scale the independent variables

```
[39] from sklearn.preprocessing import StandardScaler
std=StandardScaler()
x=std.fit_transform(x)
x

array([[ -0.03822742, -0.55104264, -0.40422906, ..., -0.58564588,
        -0.69758868, -0.60447624],
       [ -0.03822742, -1.4332      , -1.42309849, ..., -1.14600915,
        -1.17989471, -1.21362086],
       [ -1.2907376 ,  0.07906976,  0.15614912, ..., -0.44219288,
        -0.32552403, -0.14761778],
       ...,
       [ -0.03822742,  0.66717467,  0.71652731, ...,  0.76370889,
         1.01574608,  0.59858438],
       [ -1.2907376 ,  0.87721213,  0.81841425, ...,  0.78836487,
         0.77229637,  0.50721269],
       [ -0.03822742,  1.59133952,  1.53162285, ...,  2.64652949,
         1.83336964,  2.02245992]])
```


Split the data into training and testing

```
[60] from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=42)
```

```
[61] x_train
```

```
array([[0.    , 0.695 , 0.53  , ..., 0.75  , 0.4195, 0.6095],
       [0.    , 0.525 , 0.41  , ..., 0.4065, 0.198 , 0.177 ],
       [1.    , 0.64  , 0.485 , ..., 0.456 , 0.2245, 0.2835],
       ...,
       [0.    , 0.595 , 0.47  , ..., 0.4515, 0.178 , 0.155 ],
       [1.    , 0.555 , 0.46  , ..., 0.3345, 0.1935, 0.275 ],
       [2.    , 0.36  , 0.27  , ..., 0.097 , 0.0405, 0.065 ]])
```

```
[62] y_train
```

```
array([14,  8,  9, ..., 11, 10,  6])
```

```
[63] x_test
```

```
array([[1.    , 0.7   , 0.565 , ..., 0.895 , 0.3355, 0.446 ],
       [0.    , 0.735 , 0.6    , ..., 1.1335, 0.44  , 0.6   ],
       [0.    , 0.61  , 0.495 , ..., 0.3705, 0.3135, 0.33  ],
       ...,
       [0.    , 0.66  , 0.53  , ..., 0.493 , 0.245 , 0.49  ],
       [1.    , 0.555 , 0.435 , ..., 0.341 , 0.1645, 0.214 ],
       [1.    , 0.505 , 0.39  , ..., 0.2595, 0.18  , 0.19  ]])
```

```
[64] y_test
```

```
array([ 9, 11, 12, 15,  9,  7,  9,  9,  9, 11, 10,  9,  7, 11,  8, 12, 10,
        10,  8,  8,  6,  5, 10,  9,  9, 15,  9, 10, 13,  6, 10,  7, 11,  9,
        10, 11, 11, 10,  9,  9,  7,  7, 14,  9, 15, 10,  9,  9,  4,  8, 11,
         5,  9, 15,  9, 11, 11,  8, 13,  9, 11, 11, 10,  9, 12, 15, 11,  8,
         9,  7, 11, 14,  6, 13, 10,  8, 10,  8,  5,  6, 10, 10, 12,  8, 11,
        11, 12, 10,  6, 13, 10,  8,  8,  7, 10, 10,  4,  8, 10,  7,  5,  8,
        13,  6,  9, 11,  7, 11,  9, 11, 10,  9, 10, 13,  8, 11,  9, 15, 13,
         6, 10,  8, 11,  6, 11, 10, 10, 10,  7, 14, 11,  8,  9, 10, 15,  9,
         9, 11, 15,  8, 10,  8, 15, 10, 14, 12,  9, 10, 14,  9, 10,  5,  7,
        10, 11, 13,  9,  9, 13,  7, 11,  9, 10, 10, 13,  8,  9,  8,  9,  7,
         7,  8, 11,  8,  4, 11,  7,  9,  8, 11, 10, 10, 14,  6,  6,  4, 11,
        10,  8,  7,  6, 12, 12, 11, 13, 11, 10, 10, 12,  5, 11, 13,  9, 12,
        10, 10, 11, 10,  9,  8, 11, 14, 11,  9,  6,  7,  9,  7,  6, 11,  9,
        11,  7, 14,  8, 10, 13, 15,  5,  7,  9,  5, 11,  4, 10, 10, 12, 11,
        13,  5, 10,  9,  9,  9, 12,  9,  9,  8, 11, 11, 10,  7, 11,  8, 11,
         9,  6,  8, 13,  9,  9, 11, 10, 11, 10,  4, 15, 13,  9,  9, 11, 11,
        11, 11, 11, 12, 12,  5,  9,  9, 11,  8,  6, 10,  9, 11,  9,  7,  7,
        10, 12,  8, 11,  9, 12, 11,  8, 11, 10, 12,  9,  9, 10,  9,  9, 15,
         4, 14,  9,  7, 10, 11,  5,  9,  8,  8,  8, 10, 12, 13, 12, 11, 10,
        15,  9,  9,  9,  9, 13,  6,  8, 11, 11, 11, 11,  9,  8,  9, 10,  7,  9,
         5,  8, 12, 11,  9,  8,  9, 10, 11,  7,  6,  4, 12,  9,  6,  7,  8,
        13, 12, 12, 10, 14, 10, 12,  9,  9, 13,  9, 10, 13,  8, 15,  8, 10,
        13,  5, 10,  6,  8,  9, 12, 14, 10, 14, 11, 10,  9,  9, 10, 11,  8,
        12, 11, 10,  5, 11, 11, 15, 14, 13, 12,  7, 11, 10, 13,  9,  6, 15,
```

Build the Model

```
from sklearn.ensemble import RandomForestRegressor model =  
RandomForestRegressor(n_estimators = 1000, oob_score =  
True,n_jobs=1,min_samples_split = 6, min_samples_leaf= 4, max_features = 'sqrt', max_depth=  
120, bootstrap=True)
```

```
from sklearn.ensemble import RandomForestRegressor  
model = RandomForestRegressor(n_estimators = 1000, oob_score = True,n_jobs=-1,min_samples_split = 6, min_samples_lea
```

Train the Model

```
model.fit(x_train,y_train)  
  
RandomForestRegressor(max_depth=120, max_features='sqrt', min_samples_leaf=4,  
min_samples_split=6, n_estimators=1000, n_jobs=-1,  
oob_score=True)
```

Test the Model

```
predictions=model.predict(x_test)  
predictions  
  
9.23052686, 6.76527568, 6.27337663, 9.7808718 , 10.46575533,  
10.39856318, 9.92302597, 7.03874443, 9.28506128, 4.8144354 ,  
8.51898345, 9.44591446, 10.50450779, 10.28790825, 10.1401078 ,  
7.95223754, 5.30119942, 9.96964081, 6.82311145, 6.29814986,  
8.68373737, 8.21113623, 10.6245237 , 10.77857176, 11.17060581,  
9.16360497, 10.28201394, 6.6367132 , 10.49952107, 8.41476732,  
9.11490296, 10.11751273, 8.49518805, 4.88652692, 10.28148647,  
10.94575126, 11.71629647, 9.46380019, 9.44207265, 10.21271332,  
9.14684877, 9.86565957, 8.92327854, 10.88901169, 10.58669074,  
8.954949 , 12.25015427, 10.70193653, 11.64170245, 8.81236519,  
8.06411968, 5.5665906 , 8.73177525, 11.59118191, 10.65204263,  
9.18393415, 11.58186427, 6.54125027, 10.43332356, 6.94692004,  
11.27852383, 9.31304977, 8.40214749, 6.02948651, 12.03950182,  
6.58799368, 11.31287941, 11.37077235, 4.7255203 , 11.15012629,  
10.0408263 , 7.73944001, 6.9423391 , 4.90132305, 10.40211536,  
10.04235146, 6.96710608, 11.05620166, 11.35397795, 10.22259343,  
11.63211032, 9.39309664, 8.88237849, 10.83092528, 6.6303001 ,  
11.52583068, 10.787237 , 9.93738872, 11.74766958, 10.45900969,  
7.60619186, 9.82836881, 9.69601129, 10.5296791 , 9.20391431,  
9.00121742, 9.79719374, 10.45730253, 8.39235724, 7.41134463,
```

Measure the performance using Metrics.

✓
0a [93] from sklearn.metrics import r2_score
acc=r2_score(y_test,predictions)
acc

0.5902139902351261