

## ASSIGNMENT - 4

Assignment Date	25 October 2022
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Student Roll Number	822719104012
Maximum Marks	2 Marks

**Dataset:** <https://drive.google.com/file/d/1sIv-7x7CE0zAPAt0Uv-6pbO2ST2LVp5u/view>

**Loading the dataset:**

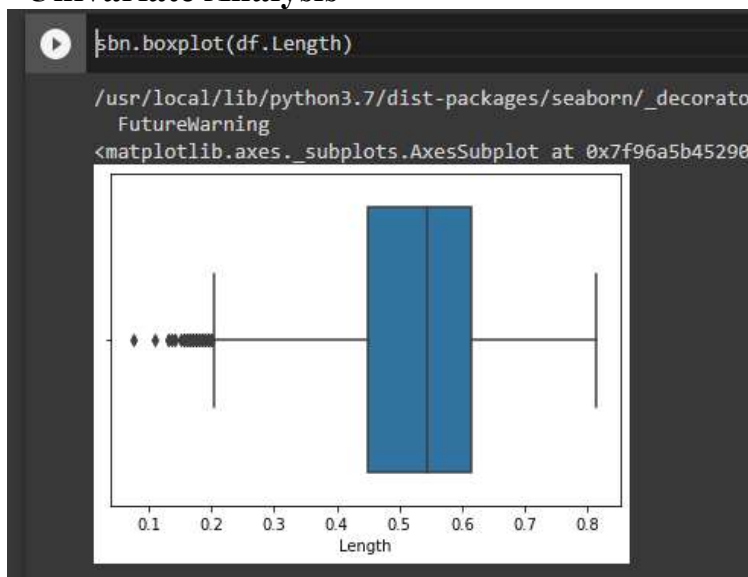
```
[1] import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sbn
```

```
[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.**

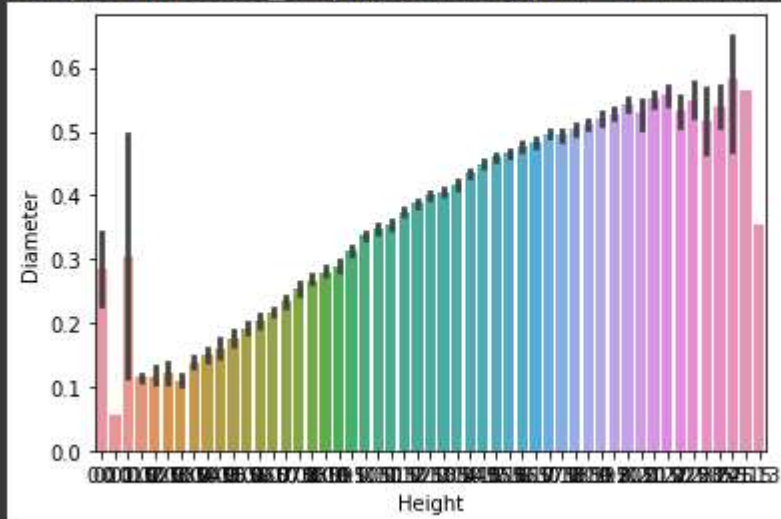
**Univariate Analysis**



## Bi-Variate Analysis

```
[ ] sbn.barplot(x=df.Height,y=df.Diameter)
```

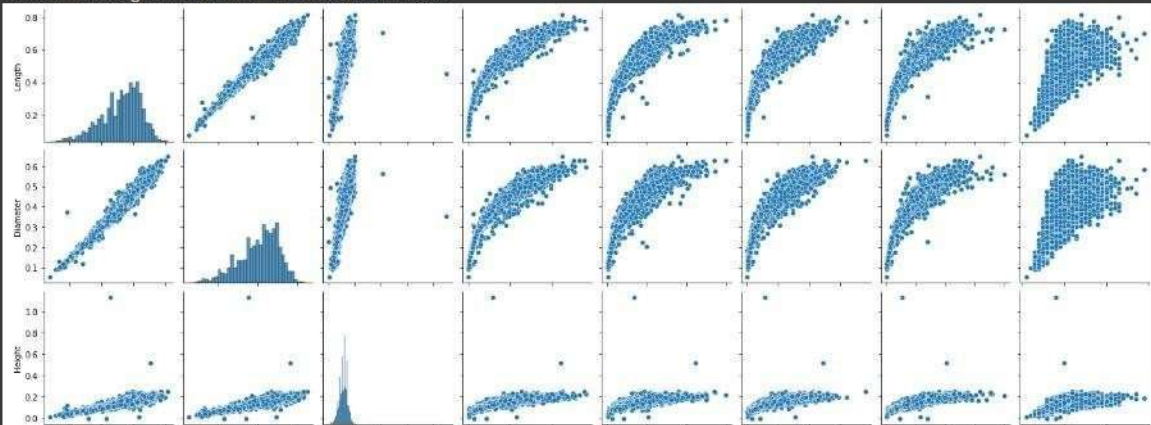
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f96a5571dd0>
```



## 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#](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
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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,  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_leaf=4, max_features = 'sqrt', max_depth= 120, bootstrap=True)
```

## 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.

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

```
0.5902139902351261
```