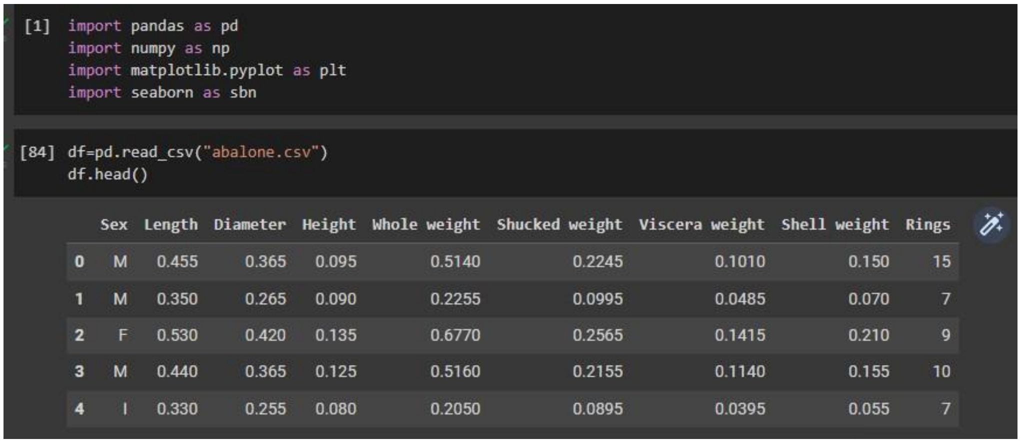
ASSIGNMENT - 4

Assignment Date	15 October 2022
Student Name	SAKTHIVEL M
Student Roll Number	720719104141
Maximum Marks	2 Marks

Dataset: https://drive.google.com/file/d/1sIv-7x7CE0zAPAt0Uv6pbO2ST2LVp5u/view

Loading the dataset:



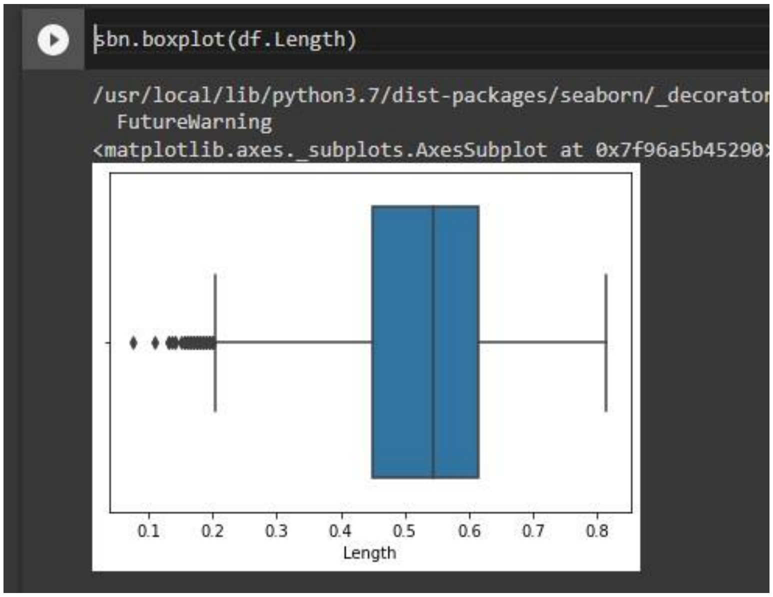
```
[1]  import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sbn
```

```
[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.

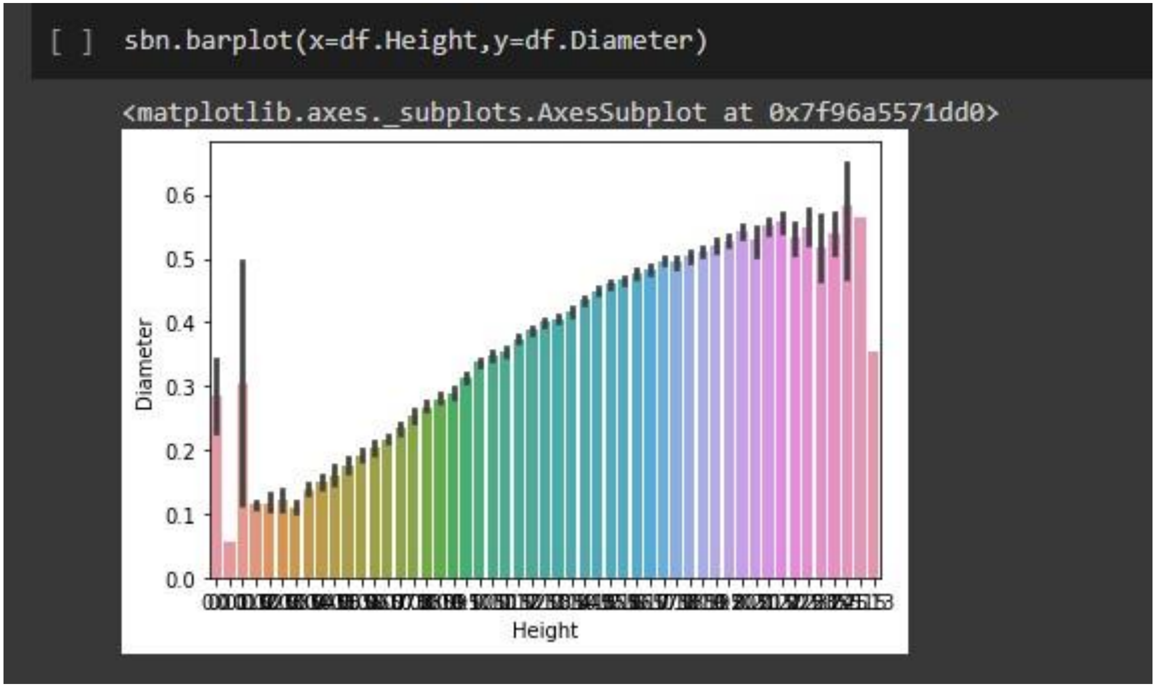
· Univariate Analysis



```
sbn.boxplot(df.Length)
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorator
  FutureWarning
<matplotlib.axes._subplots.AxesSubplot at 0x7f96a5b45290>
```

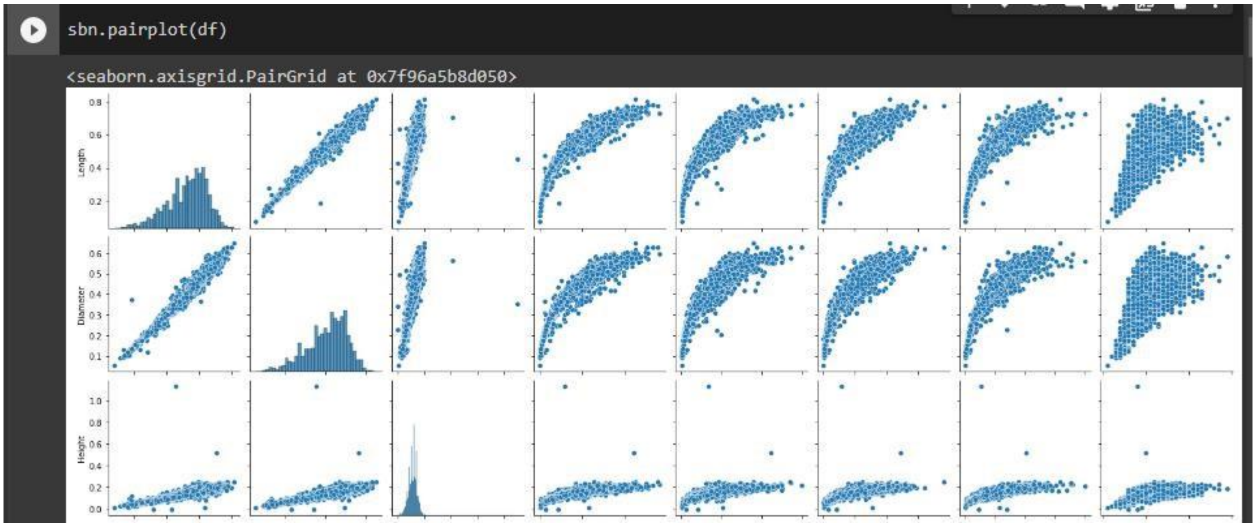
Bi-Variate Analysis



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

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

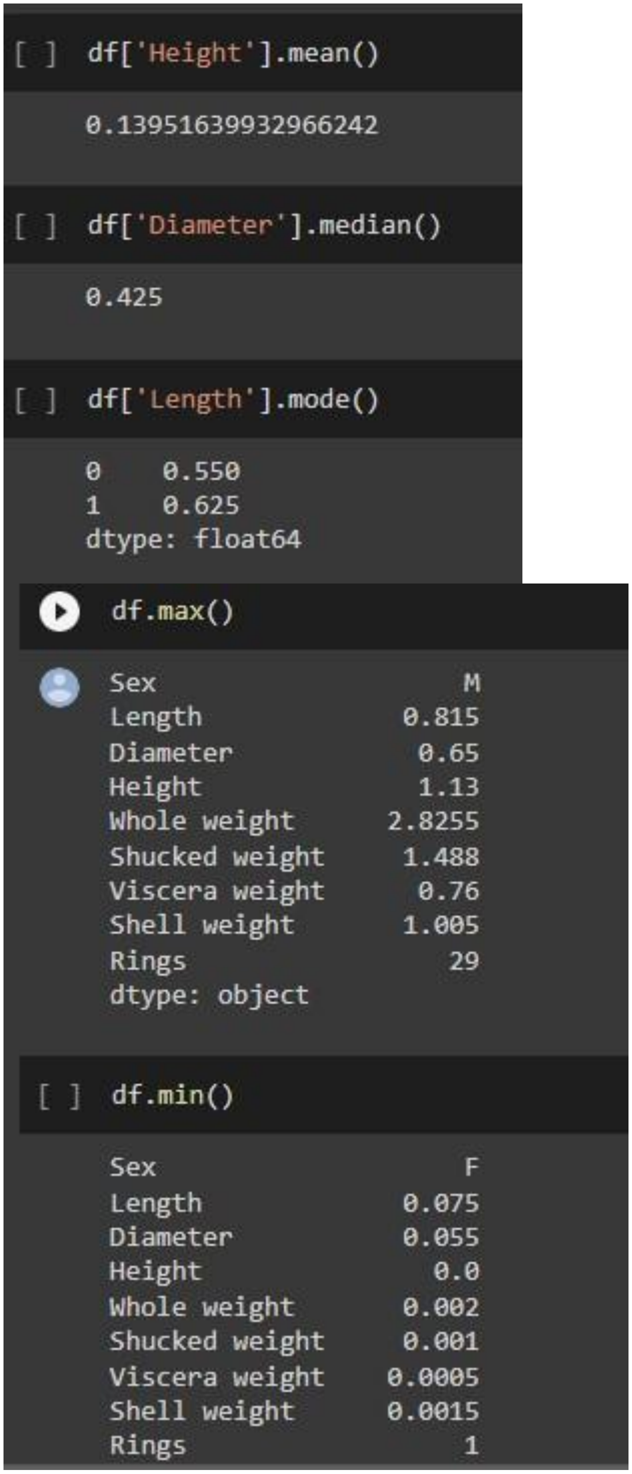
Multi-Variate Analysis



```
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
```

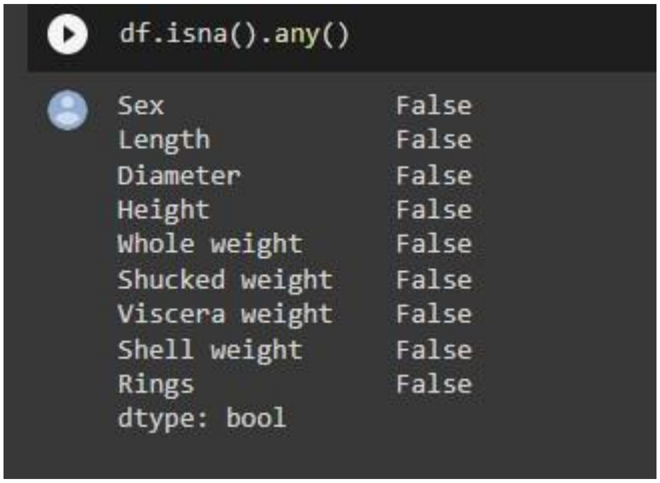
```
df.max()

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
```

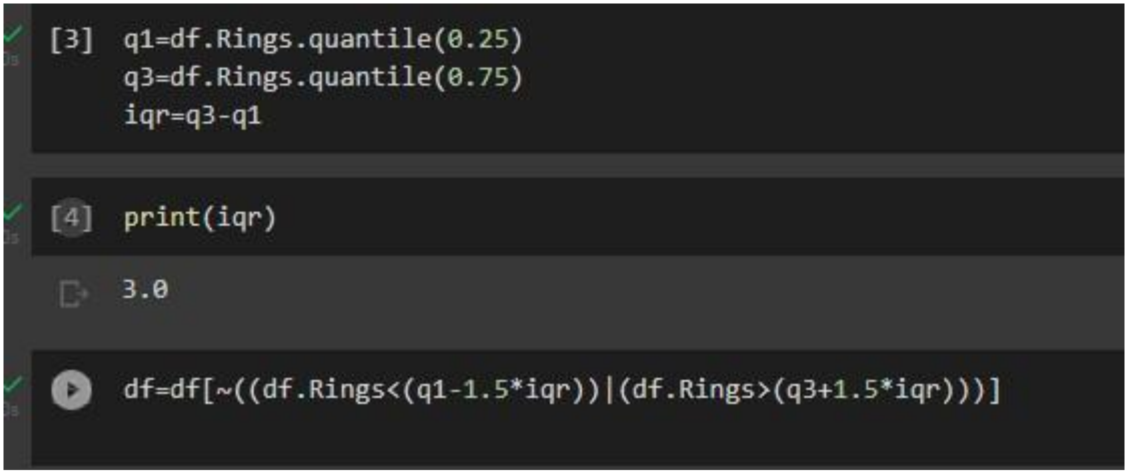
Check for Missing values and deal with them.



```
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



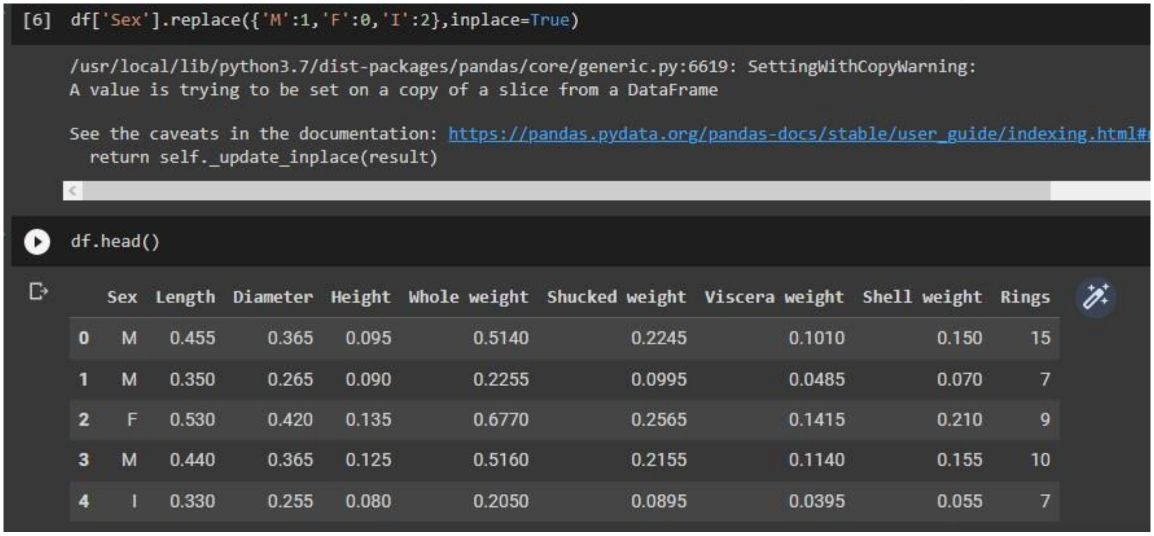
```
[3] q1=df.Rings.quantile(0.25)
    q3=df.Rings.quantile(0.75)
    iqr=q3-q1
```

```
[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)
```

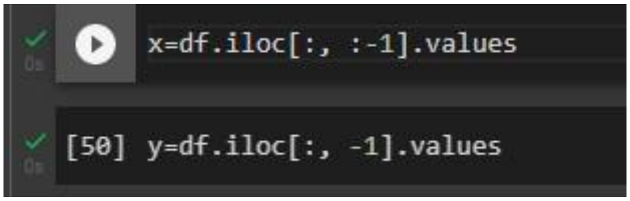
```
/usr/local/lib/python3.7/dist-packages/pandas/core/generic.py:6619: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
  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

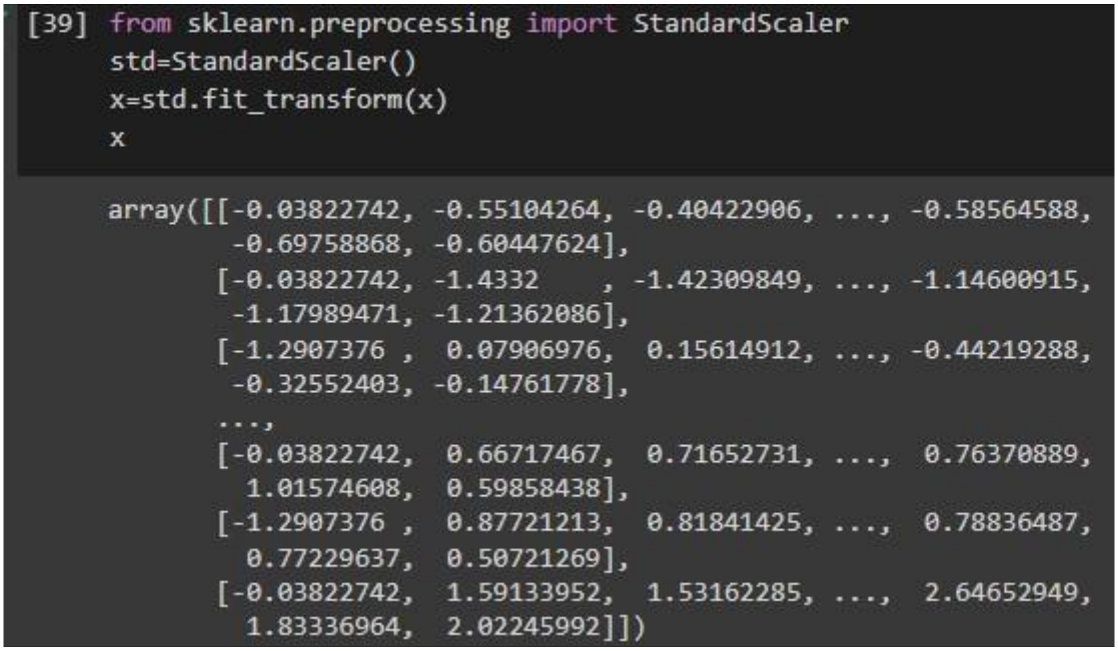
Split the data into dependent and independent variables.



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

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

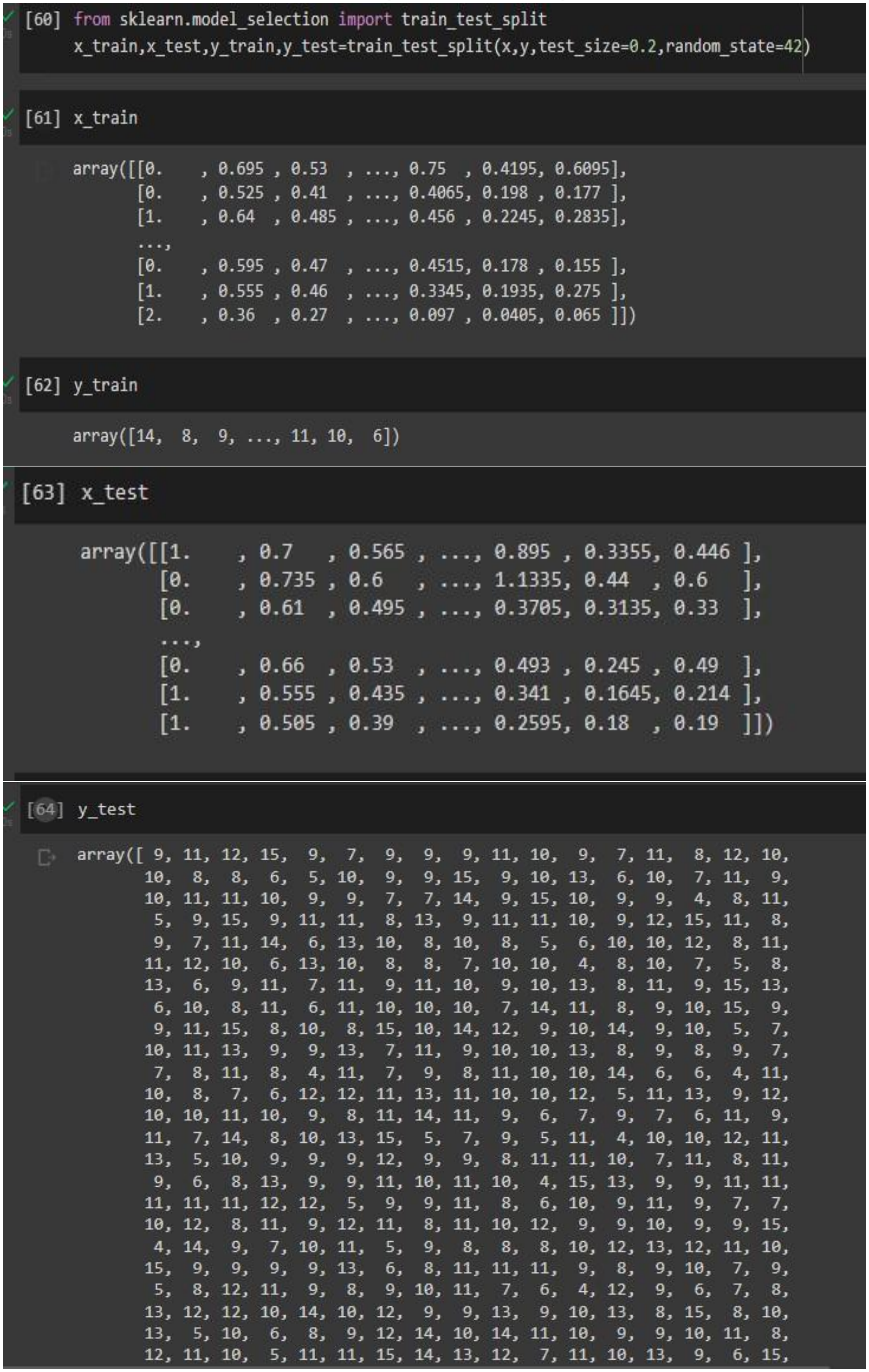
Scale the independent variables



```
[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
```

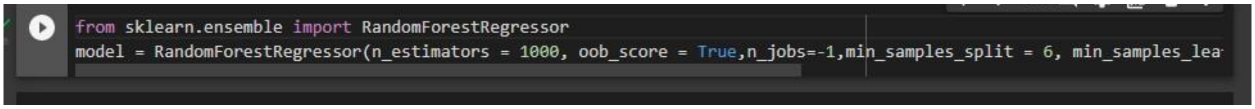
```
array([[1.    , 0.7   , 0.565 , ..., 0.895 , 0.3355, 0.446 ],
       [0.    , 0.735 , 0.6   , ..., 1.1335, 0.44  , 0.6   ],
       [0.    , 0.61  , 0.495 , ..., 0.3705, 0.3135, 0.33  ],
       ...,
       [0.    , 0.66  , 0.53  , ..., 0.493 , 0.245 , 0.49  ],
       [1.    , 0.555 , 0.435 , ..., 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,
```

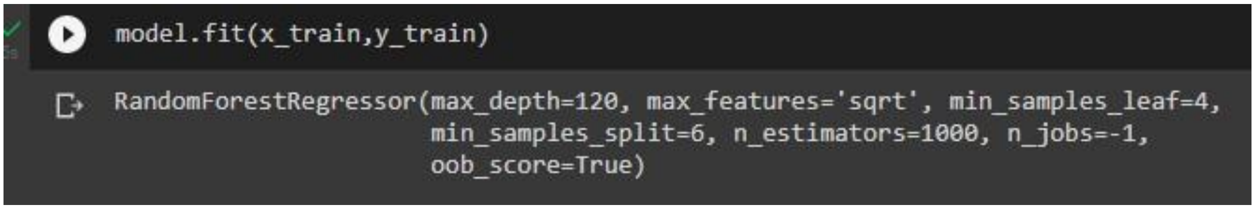
Build the Model

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_lea
```

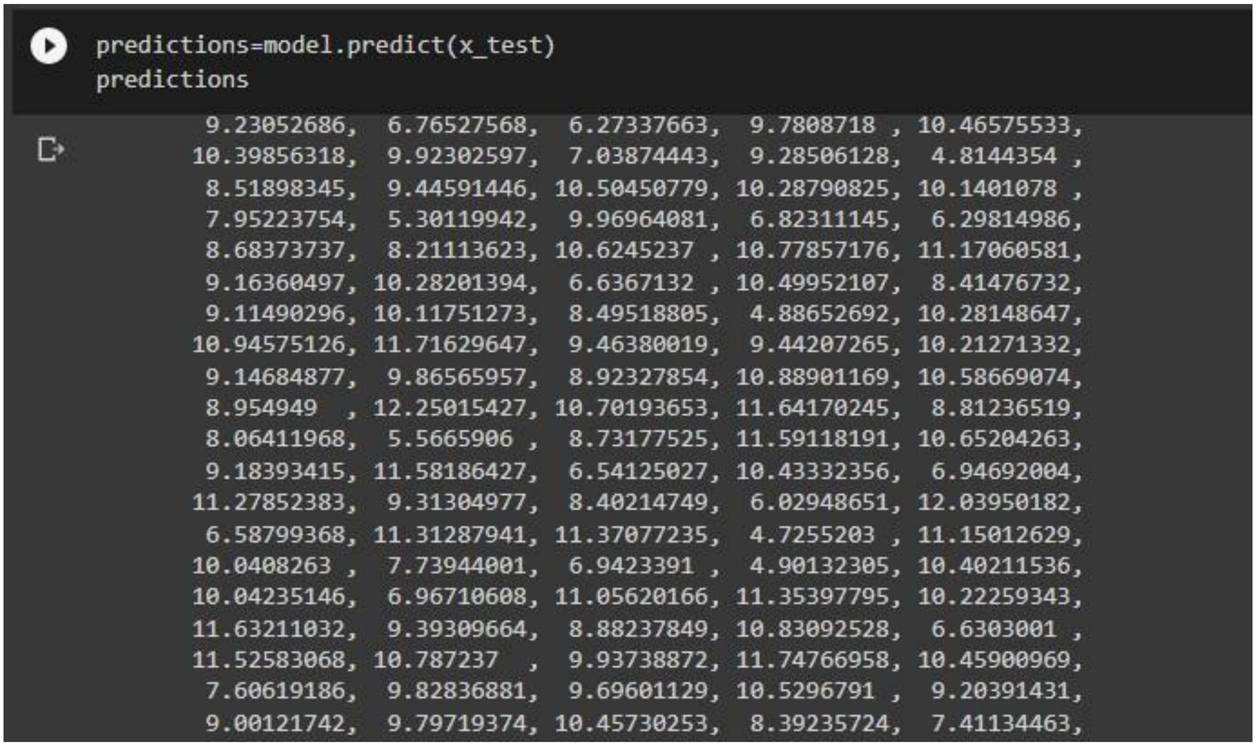
Train the Model



```
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)
```

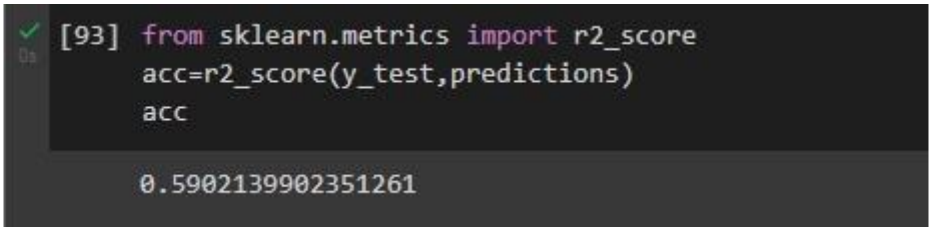
Test the Model



```
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.



```
from sklearn.metrics import r2_score
acc=r2_score(y_test,predictions)
acc
```

```
0.5902139902351261
```