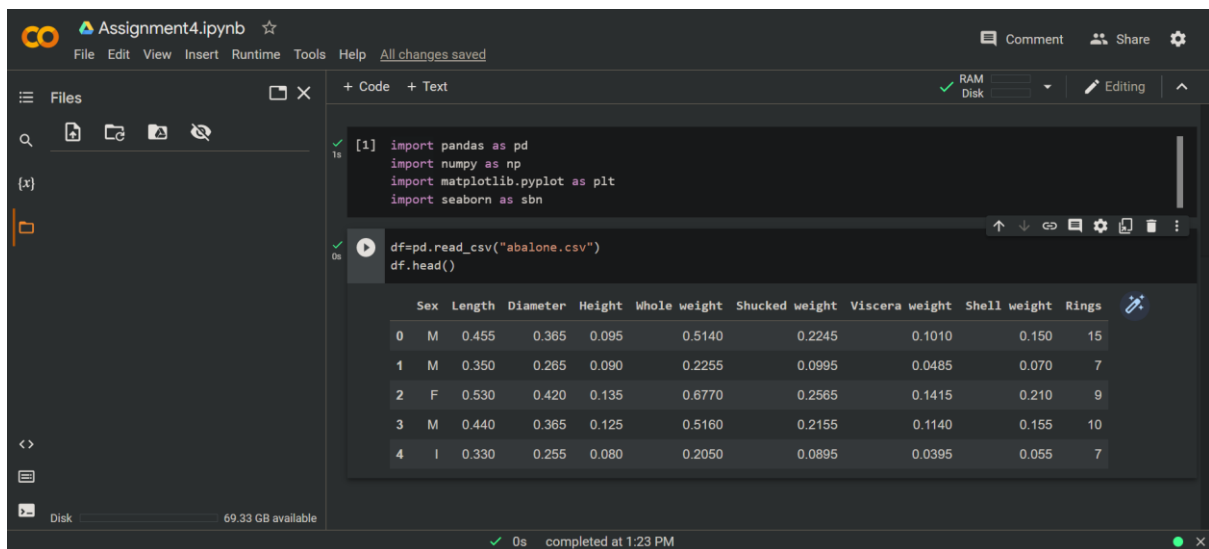


Assignment Date	15 October 2022
Student Name	Liju Daniel M
Student Roll Number	727719EUCS073
Maximum Marks	2 Marks

ASSIGNMENT - 4

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

Loading the dataset:



The screenshot shows a Jupyter Notebook interface with the file 'Assignment4.ipynb' open. The code cell contains the following Python code:

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

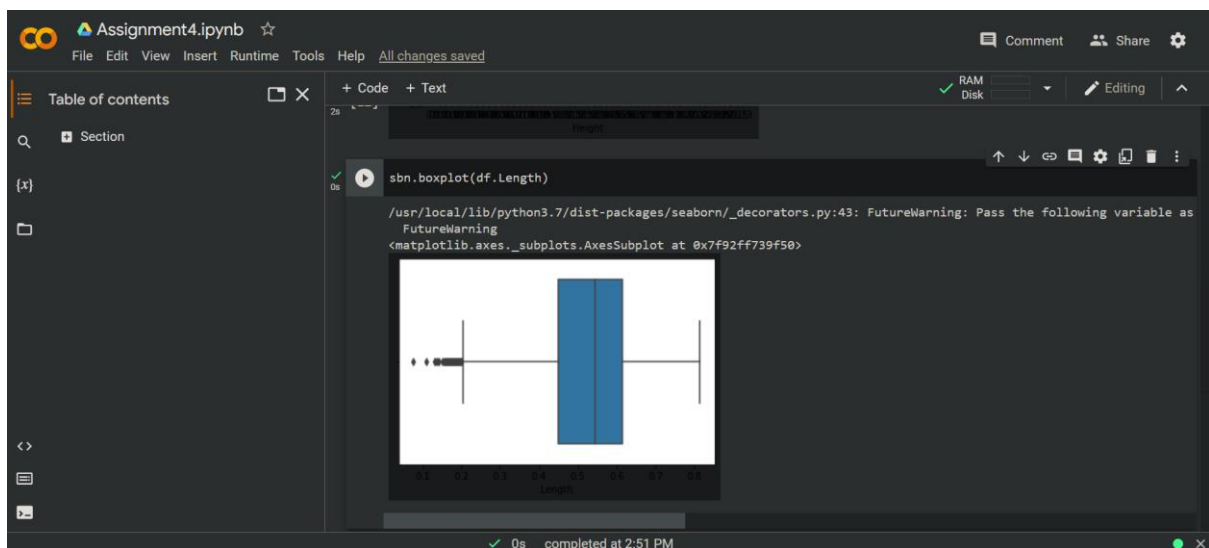
df=pd.read_csv("abalone.csv")
df.head()
```

The output of the code is a preview of the first five rows of the 'abalone.csv' dataset:

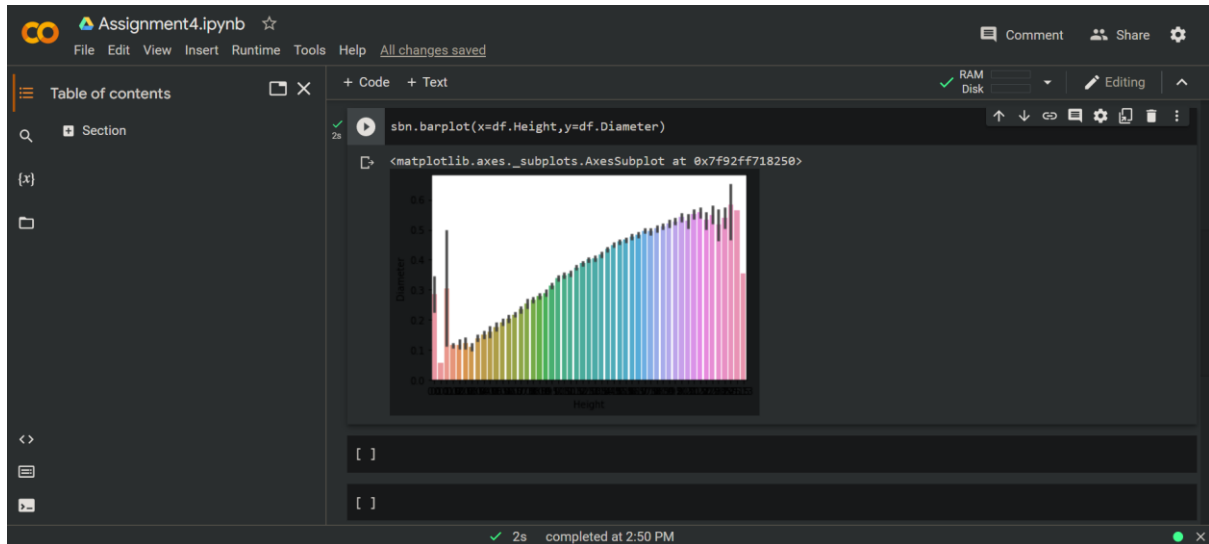
	Sex	Length	Diameter	Height	Whole weight	Shucked weight	Viscera weight	Shell weight	Rings
0	M	0.455	0.365	0.095	0.5140	0.2245	0.1010	0.150	15
1	M	0.350	0.265	0.090	0.2255	0.0995	0.0485	0.070	7
2	F	0.530	0.420	0.135	0.6770	0.2565	0.1415	0.210	9
3	M	0.440	0.365	0.125	0.5160	0.2155	0.1140	0.155	10
4	I	0.330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

Perform Below Visualizations:

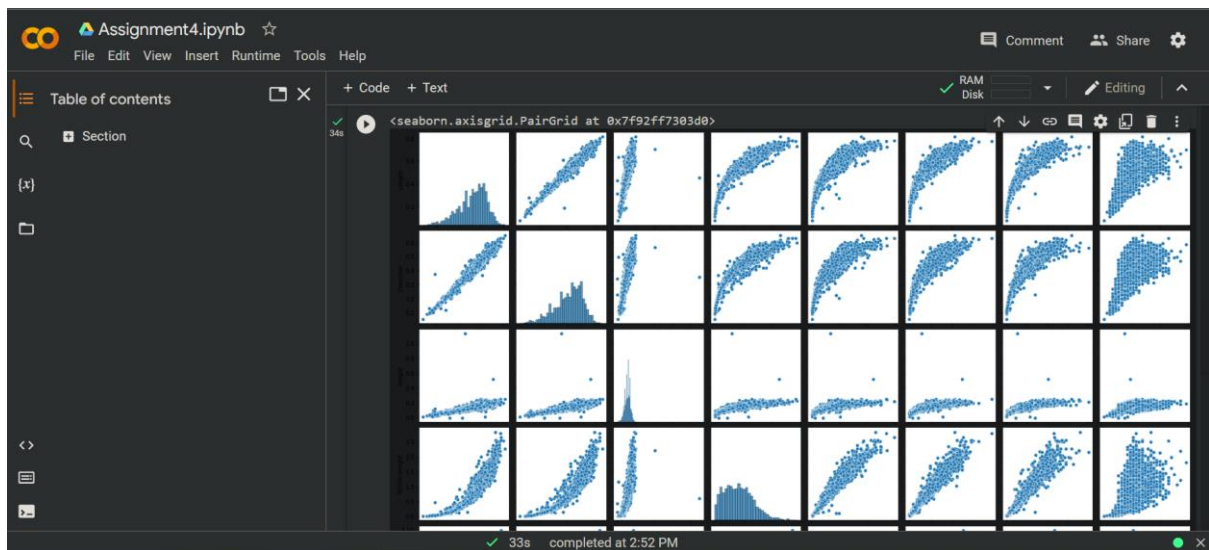
Univariate Analysis



Bi-Variate Analysis



Multi-Variate Analysis



Perform descriptive analytics on the dataset

Assignment4.ipynb

File Edit View Insert Runtime Tools Help Saving...

Table of contents

Section

[x]

<>

+ Code + Text

RAM Disk

Editing

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

0    0.550
1    0.625
dtype: float64

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

0.13951639932966242

[20] df.count()

Sex          4177
Length       4177
Diameter     4177
Height       4177
Whole weight 4177
Shucked weight 4177
Viscera weight 4177
Shell weight 4177
Rings        4177
dtype: int64
```

0s completed at 2:56 PM

Assignment4.ipynb

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Table of contents

Section

[x]

<>

+ Code + Text

RAM Disk

Editing

```
Rings          4177
dtype: int64

[23] df['Shell weight'].sum()

997.5964999999999

[24] df['Rings'].product()

0

[25] df['Whole weight'].max()

2.8255
```

0s completed at 2:59 PM

Check for Missing values and deal with them, Find the outliers and replace them outliers

Assignment4.ipynb

File Edit View Insert Runtime Tools Help Saving...

Table of contents

Section

[x]

<>

+ Code + Text

RAM Disk

Editing

```
[27] df.isna().any()

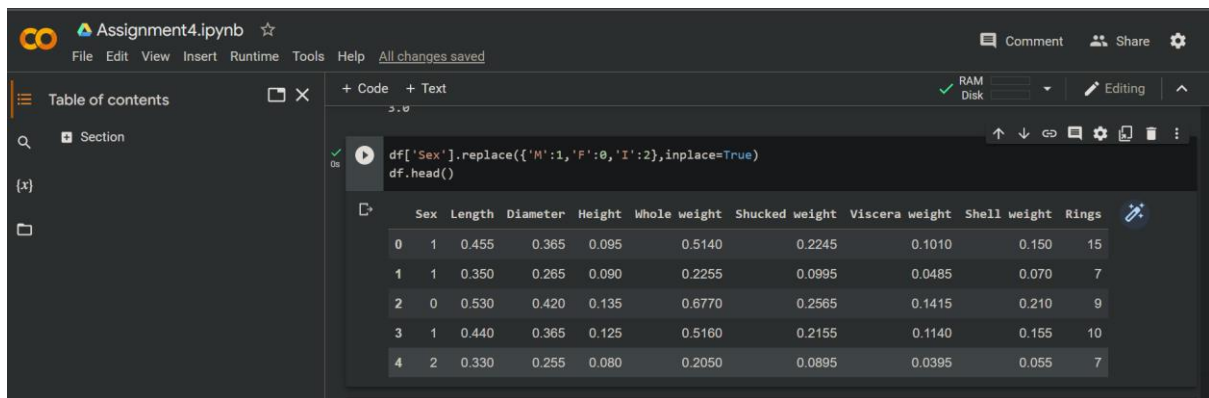
Sex          False
Length       False
Diameter     False
Height       False
Whole weight False
Shucked weight False
Viscera weight False
Shell weight False
Rings        False
dtype: bool

qu1=df.Rings.quantile(0.25)
qu3=df.Rings.quantile(0.75)
qr=qu3-qu1
print(qr)

3.0
```

0s completed at 3:01 PM

Check for Categorical columns and perform encoding



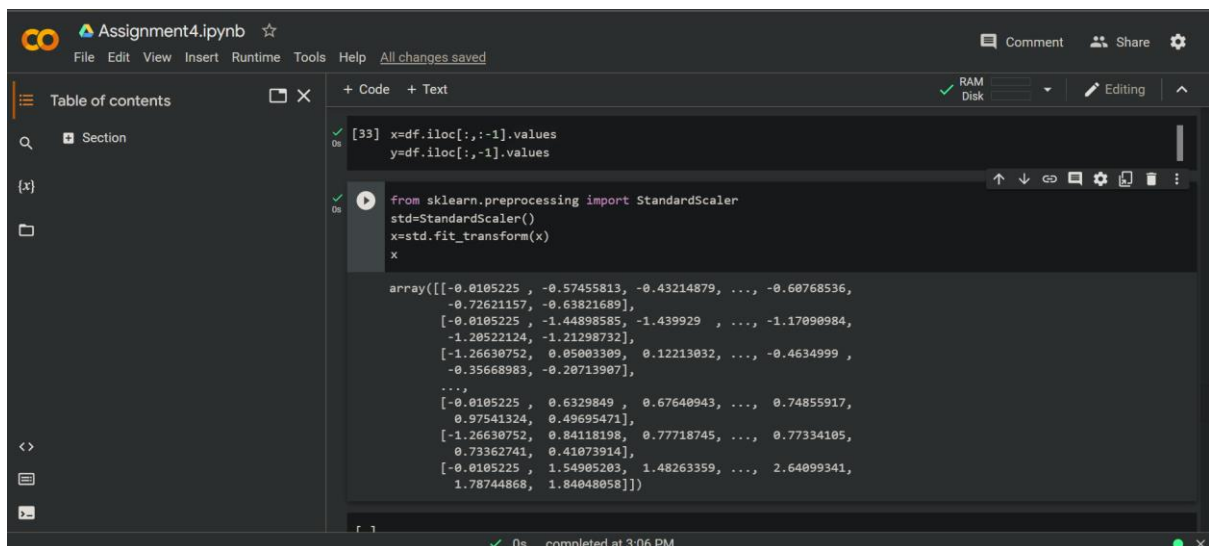
The screenshot shows a Jupyter Notebook interface with a code cell containing the following Python code:

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

Below the code, the first five rows of the DataFrame are displayed as a table:

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

Split the data into dependent and independent variables, Scale the independent variables



The screenshot shows a Jupyter Notebook interface with two code cells. The first cell contains:

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

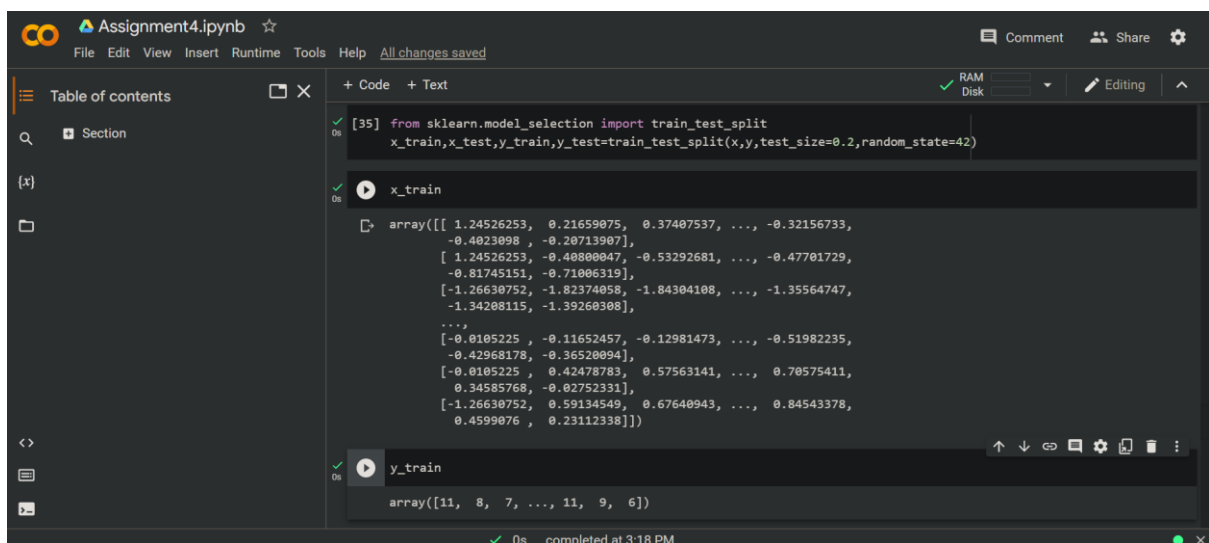
The second cell contains:

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

The output of the second cell is a NumPy array representing the scaled features:

```
array([[ -0.0105225 , -0.57455813, -0.43214879, ..., -0.60768536,
        -0.72621157, -0.63821689],
       [ -0.0105225 , -1.44898585, -1.439929 , ..., -1.17090984,
        -1.28522124, -1.21298732],
       [ -1.26630752,  0.05003309,  0.12213032, ..., -0.4634999 ,
        -0.35668983, -0.20713907],
       ...,
       [ -0.0105225 ,  0.6329849 ,  0.67640943, ...,  0.74855917,
        0.97541324,  0.49695471],
       [ -1.26630752,  0.84118198,  0.77718745, ...,  0.77334105,
        0.73362741,  0.41073914],
       [ -0.0105225 ,  1.54905203,  1.48263359, ...,  2.64099341,
        1.78744868,  1.84048058]])
```

Split the data into training and testing



The screenshot shows a Jupyter Notebook interface with two code cells. The first cell contains:

```
[35] 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)
```

The second cell contains:

```
x_train
```

The output of the second cell is a NumPy array representing the training features:

```
array([[ 1.24526253,  0.21659075,  0.37407537, ..., -0.32156733,
        -0.4023098 , -0.20713907],
       [ 1.24526253, -0.40800047, -0.53292681, ..., -0.47701729,
        -0.81745151, -0.71006319],
       [ -1.26630752, -1.82374058, -1.84304108, ..., -1.35564747,
        -1.34208115, -1.39260308],
       ...,
       [ -0.0105225 , -0.11652457, -0.12981473, ..., -0.51982235,
        -0.42968178, -0.36520094],
       [ -0.0105225 ,  0.42478783,  0.57563141, ...,  0.70575411,
        0.34585768, -0.02752331],
       [ -1.26630752,  0.59134549,  0.67640943, ...,  0.84543378,
        0.4599076 ,  0.23112338]])
```

The third cell contains:

```
y_train
```

The output of the third cell is a NumPy array representing the training target values:

```
array([11,  8,  7, ..., 11,  9,  6])
```

Assignment4.ipynb ☆

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Section

[x]

[38] x_test

```
array([[ -0.0105225,  0.67462432,  0.47485339, ...,  0.27770351,
         1.10314916,  0.61909342],
       [ -0.0105225,  0.54970607,  0.32368636, ...,  0.12450645,
         0.3139237,   0.04432299],
       [ -1.26630752,  0.29986958,  0.37407537, ..., -0.2449688,
         0.40660164,  0.69093973],
       ...,
       [ 1.24526253,  0.17495134,  0.22290834, ..., -0.0309435,
        -0.20614393, -0.22150833],
       [ 1.24526253, -0.4912793, -0.53292681, ..., -0.47025859,
        -0.81288951, -0.39393946],
       [ 1.24526253, -1.3240676, -1.33915098, ..., -1.17766853,
        -1.30558517, -1.17706417]])
```

Assignment4.ipynb ☆

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Table of contents

Section

[x]

[39] y_test

```
array([ 9,  8, 16,  9, 14, 11,  7,  6,  7, 10, 22,  7, 15,  9,  8, 18, 11,
        14, 13,  9, 20, 12, 12, 11, 10,  7, 11,  8,  9, 10,  9, 10,  6, 10,
         8,  9,  5,  3,  6,  6, 12, 12, 18,  8, 12, 13, 10, 10, 18,  4,  6,
        22,  8,  5,  7, 10, 15, 21, 10,  9, 10, 13, 11,  7,  9, 11,  4,  5,
         7,  9, 10, 11, 10,  7,  9, 12, 23, 14, 15,  9, 15, 13, 10,  6,  7,
        13,  9, 10, 19, 10, 10,  9, 11, 11, 10, 10,  6, 15,  7,  7, 15, 11,
        11, 13,  7,  9, 10,  8,  9, 14, 18,  8, 13,  9, 12,  5,  9, 12, 11,
        13, 11, 10,  8, 14,  9, 20,  9,  9,  9, 10,  9,  9, 10,  5,  8,  8,
        10, 10,  5, 12,  8, 11,  7,  8, 10, 15, 10, 14, 10, 10, 10,  8, 11,
        11,  8, 11, 12,  7,  8,  6,  9,  6, 10, 12,  7, 10, 17, 11,  8,  8,
        10, 12,  9,  8,  8,  7,  9, 11,  9, 10, 13,  7,  8,  8,  7, 10,  8,
        11,  9,  5,  9,  8, 16, 13, 11, 17, 10, 11, 12,  9,  8, 17, 11, 12,
         9, 12, 11,  9,  8, 10,  5,  9, 12,  6,  8, 11, 11,  7,  9, 12, 13,
         9, 12, 11,  9,  8,  7, 13,  9, 12,  5, 10, 10, 12,  7, 10, 10,  7,
         4, 10,  8, 11, 10,  9, 10,  8,  9,  7,  7,  6,  7,  9,  9,  7, 15,
        11,  9,  5, 12, 14, 19, 16,  9,  9,  7,  6,  7, 14, 12,  6,  9,  8,
         6, 12,  8, 18, 10, 16,  9,  6, 15,  9, 13,  8,  5,  9, 10,  5, 10,
        10, 11,  4, 15,  9, 15,  8,  5, 14,  7, 11, 10, 10,  7, 10,  9, 10,
        18,  8,  6,  5,  8,  6,  7, 14, 12, 10,  5, 23,  9,  9, 12,  7,  8,
         8, 13,  6, 13, 17,  7,  8,  8,  7,  7,  9, 14, 10,  9, 13,  8, 10,
        10,  9, 10,  9,  8,  8, 10, 13, 10,  9,  8, 10,  8, 11, 10,  3,  7,
         6,  3,  8,  8, 13, 15,  6, 14,  8,  9, 12,  8,  8, 15, 11,  9,  6,
        10, 13, 13,  7,  7,  9,  9,  8,  7, 10, 11,  5, 10, 12,  8,  7,  9,
         6,  8, 13,  7,  7, 10, 11, 23,  9, 11, 10,  8,  8,  7,  7, 10,  9,
```

Build the Model, Train the Model

Assignment4.ipynb ☆

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[x]

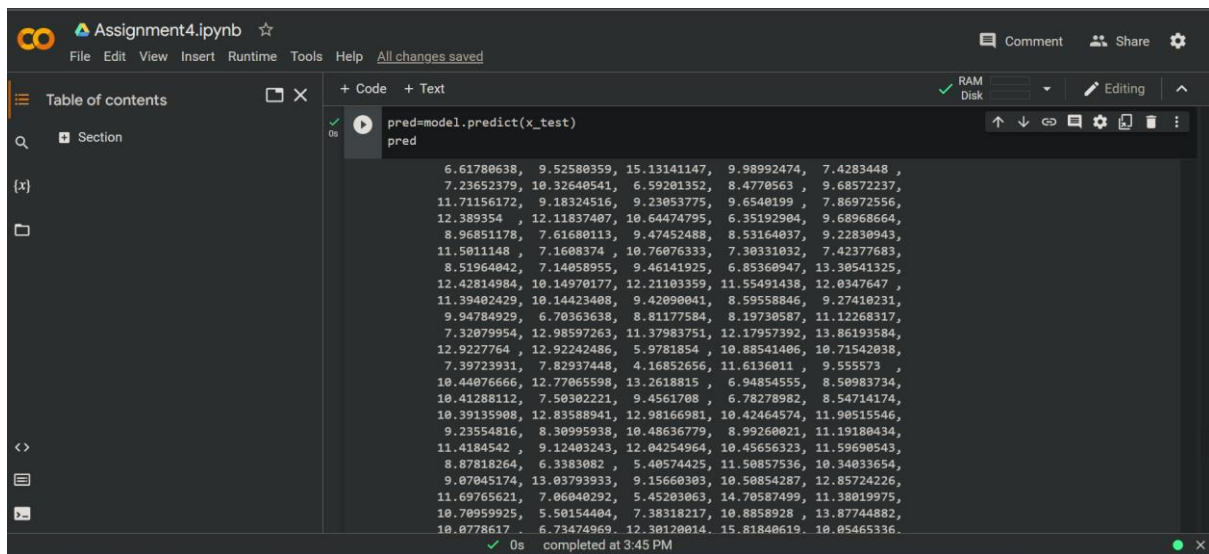
[40] from sklearn.ensemble import RandomForestRegressor

```
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)
```

[41] 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

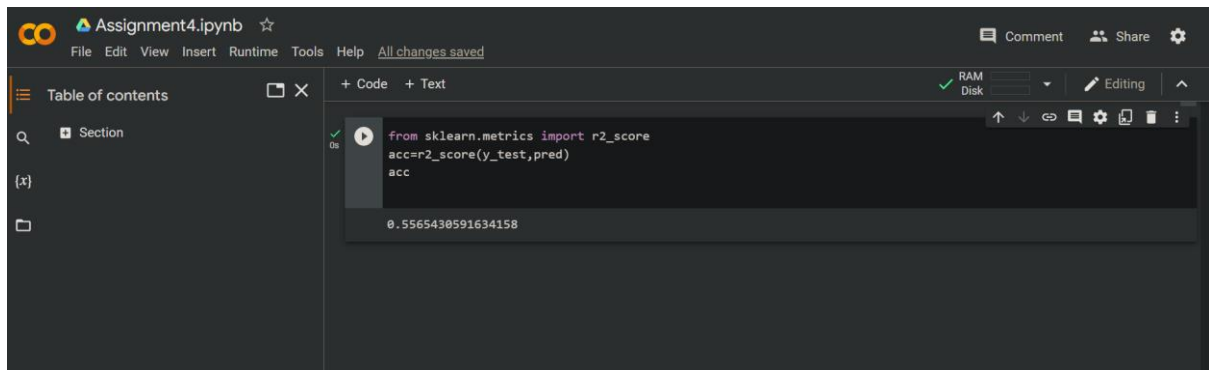


A screenshot of a Jupyter Notebook titled "Assignment4.ipynb". The interface includes a top menu bar with "File", "Edit", "View", "Insert", "Runtime", "Tools", and "Help". Below the menu is a "Table of contents" sidebar on the left. The main code cell contains the following Python code:

```
pred=model.predict(x_test)
pred
```

The output of the code is a large array of 50 numerical values, representing the model's predictions for the test set. The values are displayed in a single line, separated by commas. The status bar at the bottom indicates "0s completed at 3:45 PM".

Measure the performance using Metrics



A screenshot of a Jupyter Notebook titled "Assignment4.ipynb". The interface includes a top menu bar with "File", "Edit", "View", "Insert", "Runtime", "Tools", and "Help". Below the menu is a "Table of contents" sidebar on the left. The main code cell contains the following Python code:

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

The output of the code is a single numerical value, 0.5565430591634158, representing the R-squared score. The status bar at the bottom indicates "0s".