In [41]:
```
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression as LR
from sklearn.model_selection import train_test_split as TTS
from sklearn.tree import DecisionTreeRegressor as DR , plot_tree as PT
from sklearn.ensemble import RandomForestRegressor as RF
from sklearn.metrics import mean_squared_error as MSE, mean_absolute_error as
import numpy as np
```

In [4]:
```
df=pd.read_csv('D:\Intern\Cognifyz Intern\Dataset .csv')
```

In [7]:
```
df.head(3)
```

Out[7]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitud
0	6317637	Le Petit Souffle	162	Makati City	Third Floor, Century City Mall, Kalayaan Avenu...	Century City Mall, Poblacion, Makati City	Century City Mall, Poblacion, Makati City, Mak...	121.0275
1	6304287	Izakaya Kikufuji	162	Makati City	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...	Little Tokyo, Legaspi Village, Makati City	Little Tokyo, Legaspi Village, Makati City, Ma...	121.0141
2	6300002	Heat - Edsa Shangri-La	162	Mandaluyong City	Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...	Edsa Shangri-La, Ortigas, Mandaluyong City	Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...	121.0568

3 rows × 21 columns

In [5]:
```
df.describe()
```

Out[5]:

	Restaurant ID	Country Code	Longitude	Latitude	Average Cost for two	Price range	Aggr
count	9.551000e+03	9551.000000	9551.000000	9551.000000	9551.000000	9551.000000	9551.0
mean	9.051128e+06	18.365616	64.126574	25.854381	1199.210763	1.804837	2.6
std	8.791521e+06	56.750546	41.467058	11.007935	16121.183073	0.905609	1.5
min	5.300000e+01	1.000000	-157.948486	-41.330428	0.000000	1.000000	0.0
25%	3.019625e+05	1.000000	77.081343	28.478713	250.000000	1.000000	2.5
50%	6.004089e+06	1.000000	77.191964	28.570469	400.000000	2.000000	3.2
75%	1.835229e+07	1.000000	77.282006	28.642758	700.000000	2.000000	3.7
max	1.850065e+07	216.000000	174.832089	55.976980	800000.000000	4.000000	4.9

In [6]:
```
df.info()
```

```
 3   City                  9551 non-null   object
 4   Address               9551 non-null   object
 5   Locality              9551 non-null   object
 6   Locality Verbose      9551 non-null   object
 7   Longitude             9551 non-null   float64
 8   Latitude              9551 non-null   float64
 9   Cuisines              9542 non-null   object
 10  Average Cost for two  9551 non-null   int64
 11  Currency              9551 non-null   object
 12  Has Table booking     9551 non-null   object
 13  Has Online delivery   9551 non-null   object
 14  Is delivering now     9551 non-null   object
 15  Switch to order menu  9551 non-null   object
 16  Price range           9551 non-null   int64
 17  Aggregate rating      9551 non-null   float64
 18  Rating color          9551 non-null   object
 19  Rating text           9551 non-null   object
 20  Votes                 9551 non-null   int64
dtypes: float64(3), int64(5), object(13)
memory usage: 1.5+ MB
```

Split into Feature and Target

In [8]:
```
x=df[['Country Code','Average Cost for two','Price range','Votes']]
y=df['Aggregate rating']
```

Split into train Test data

In [9]:
```
x_train,x_test,y_train,y_test=TTS(x,y,test_size=0.3,random_state=203)
```

Fit in the Model-(Linear Regression)

In [11]:
```
lm=LR()
lm.fit(x_train,y_train)
```

Out[11]:
```
LinearRegression()
```
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
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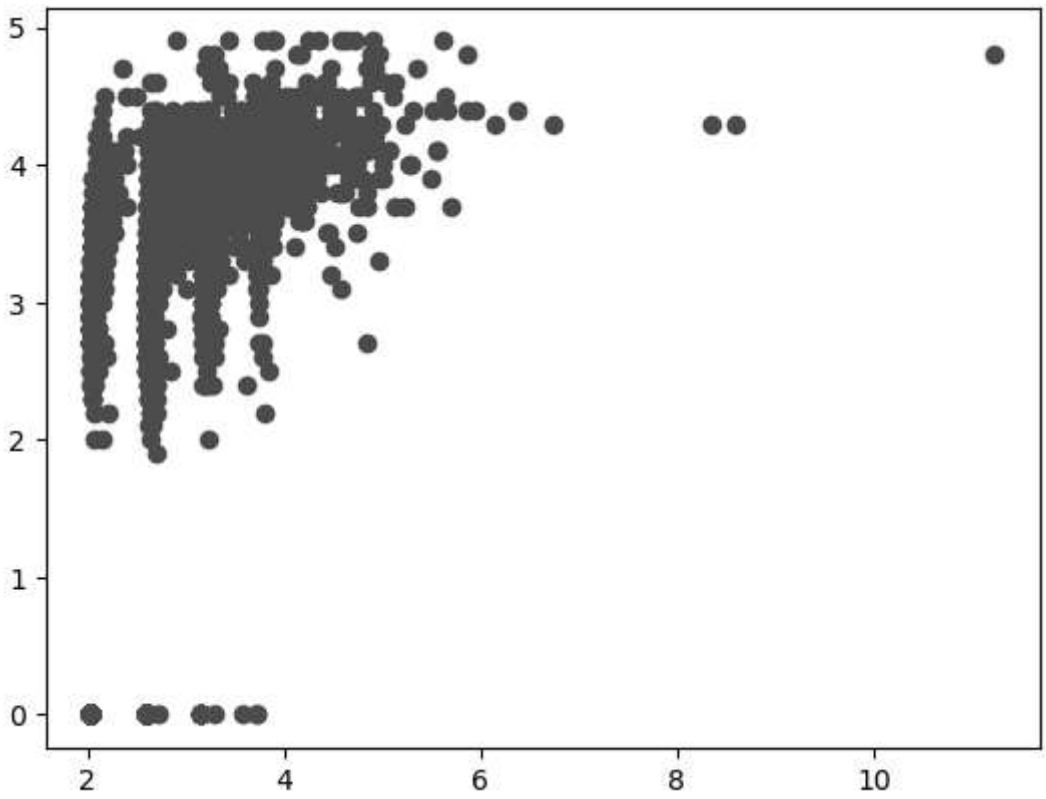
In [19]:
```
y_pred=lm.predict(x_test)
```

In [20]:
```
mse=MSE(y_pred,y_test)
print(f"Mean Squared Error is : {mse}")
mae=MAE(y_pred,y_test)
print(f"Mean Absoulte Error is : {mae}")
r2=RS(y_pred,y_test)
print(f"R2 Score is : {r2}")
```

```
Mean Squared Error is : 1.7492919932102107
Mean Absoulte Error is : 1.0953288581603926
R2 Score is : -1.825475037117438
```

In [59]:
```
plt.scatter(y_pred,y_test,c='red')
```

Out[59]:
```
<matplotlib.collections.PathCollection at 0x29b0f70a6d0>
```



In [23]:
```
print(y_pred)
```

```
[2.61310323 2.06504124 2.15843283 ... 2.66425065 2.03803603 2.63226449]
```

In [26]:
```
new_data=np.array([[162,16000,2,3500]])
predict=lm.predict(new_data)
print(f"Predicted Aggregate rating of the Restaurant is :{predict}")
```

```
Predicted Aggregate rating of the Restaurant is :[5.75168948]

C:\Users\nikhil\anaconda3\Lib\site-packages\sklearn\base.py:464: UserWarning:
X does not have valid feature names, but LinearRegression was fitted with fea
ture names
  warnings.warn(
```

Predict Using Decision Tree

In [29]:
```
dm=DR(max_depth=5)
dm.fit(x_train,y_train)
```

Out[29]:
```
DecisionTreeRegressor(max_depth=5)
```

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In [30]:
```
dr_y_pred=dm.predict(x_test)
```

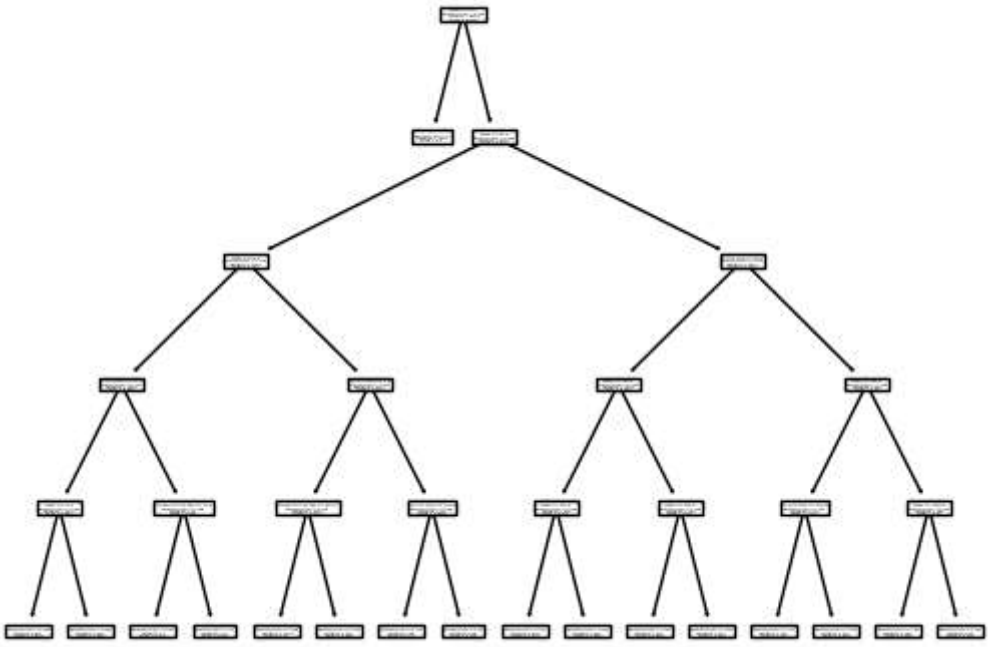
In [31]:
```
dr_mse=MSE(dr_y_pred,y_test)
print(f"Mean Squared Error is :{dr_mse}")
```

```
Mean Squared Error is :0.11432877538614103
```

In [34]:
```
PT(dm, feature_names=list(x))
```

Out[34]:
```
[Text(0.46875, 0.9166666666666666, 'Votes <= 3.5\nsquared_error = 2.288\nsamp
les = 6685\nvalue = 2.678'),
 Text(0.4375, 0.75, 'squared_error = 0.0\nsamples = 1485\nvalue = 0.0'),
 Text(0.5, 0.75, 'Votes <= 94.5\nsquared_error = 0.308\nsamples = 5200\nvalue
= 3.443'),
 Text(0.25, 0.5833333333333334, 'Votes <= 20.5\nsquared_error = 0.174\nsample
s = 3135\nvalue = 3.187'),
 Text(0.125, 0.4166666666666667, 'Country Code <= 22.0\nsquared_error = 0.067
\nsamples = 1381\nvalue = 3.028'),
 Text(0.0625, 0.25, 'Votes <= 11.5\nsquared_error = 0.052\nsamples = 1347\nva
lue = 3.012'),
 Text(0.03125, 0.08333333333333333, 'squared_error = 0.028\nsamples = 821\nva
lue = 2.964'),
 Text(0.09375, 0.08333333333333333, 'squared_error = 0.081\nsamples = 526\nva
lue = 3.086'),
 Text(0.1875, 0.25, 'Average Cost for two <= 27.5\nsquared_error = 0.255\nsam
ples = 34\nvalue = 3.659'),
 Text(0.15625, 0.08333333333333333, 'squared_error = 0.093\nsamples = 7\nvalu
e = 3.086'),
 Text(0.21875, 0.08333333333333333, 'squared_error = 0.19\nsamples = 27\nvalu
e = 3.807'),
 Text(0.375, 0.4166666666666667, 'Country Code <= 7.5\nsquared_error = 0.222
\nsamples = 1754\nvalue = 3.313'),
 Text(0.3125, 0.25, 'Average Cost for two <= 825.0\nsquared_error = 0.203\nsa
mples = 1630\nvalue = 3.275'),
 Text(0.28125, 0.08333333333333333, 'squared_error = 0.188\nsamples = 1370\nv
alue = 3.24'),
 Text(0.34375, 0.08333333333333333, 'squared_error = 0.243\nsamples = 260\nva
lue = 3.456'),
 Text(0.4375, 0.25, 'Country Code <= 175.0\nsquared_error = 0.195\nsamples =
124\nvalue = 3.818'),
 Text(0.40625, 0.08333333333333333, 'squared_error = 0.173\nsamples = 29\nval
ue = 4.241'),
 Text(0.46875, 0.08333333333333333, 'squared_error = 0.13\nsamples = 95\nvalu
e = 3.688'),
 Text(0.75, 0.5833333333333334, 'Country Code <= 25.5\nsquared_error = 0.261
\nsamples = 2065\nvalue = 3.832'),
 Text(0.625, 0.4166666666666667, 'Votes <= 263.5\nsquared_error = 0.238\nsamp
les = 1603\nvalue = 3.723'),
 Text(0.5625, 0.25, 'Votes <= 142.5\nsquared_error = 0.248\nsamples = 900\nva
lue = 3.571'),
 Text(0.53125, 0.08333333333333333, 'squared_error = 0.257\nsamples = 399\nva
lue = 3.471'),
 Text(0.59375, 0.08333333333333333, 'squared_error = 0.226\nsamples = 501\nva
lue = 3.651'),
 Text(0.6875, 0.25, 'Votes <= 626.5\nsquared_error = 0.159\nsamples = 703\nva
lue = 3.917'),
 Text(0.65625, 0.08333333333333333, 'squared_error = 0.144\nsamples = 431\nva
lue = 3.828'),
 Text(0.71875, 0.08333333333333333, 'squared_error = 0.151\nsamples = 272\nva
lue = 4.057'),
 Text(0.875, 0.4166666666666667, 'Votes <= 402.5\nsquared_error = 0.156\nsamp
les = 462\nvalue = 4.21'),
 Text(0.8125, 0.25, 'Country Code <= 215.5\nsquared_error = 0.151\nsamples =
277\nvalue = 4.077'),
 Text(0.78125, 0.08333333333333333, 'squared_error = 0.173\nsamples = 135\nva
lue = 4.217'),
```

```
 Text(0.84375, 0.08333333333333333, 'squared_error = 0.093\nsamples = 142\nva
lue = 3.944'),
 Text(0.9375, 0.25, 'Votes <= 1229.5\nsquared_error = 0.096\nsamples = 185\nv
alue = 4.41'),
 Text(0.90625, 0.08333333333333333, 'squared_error = 0.091\nsamples = 152\nva
lue = 4.359'),
 Text(0.96875, 0.08333333333333333, 'squared_error = 0.052\nsamples = 33\nval
ue = 4.645')]
```



Predict Using Random Forest

In [40]:
```
rf=RF(n_estimators=100)
rf.fit(x_train,y_train)
```

Out[40]:
```
RandomForestRegressor()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
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In [42]:
```
rf_y_pred=rf.predict(x_test)
```

In [43]:
```
rf_mse=MSE(rf_y_pred,y_test)
print(f"Mean squared error is : {rf_mse}")
```

```
Mean squared error is : 0.13753745563138678
```

In [47]:
```
importances = rf.feature_importances_
```

In [48]:
```
sorted_indices = np.argsort(importances)[::-1]
```

In [58]:
```
for f in range(x_train.shape[1]):
    if f <= len(sorted_indices) - 1:
        print("%d. %s (%f)" % (f + 1, x_train.columns[sorted_indices[f]], impo
    else:
        print(f"Index {f} is out of bounds (less data than expected)")
```

```
1. Votes (0.972883)
2. Average Cost for two (0.014861)
3. Country Code (0.009859)
4. Price range (0.002397)
```

In [ ]:
```

```