2000080110_ML Skill3

September 2, 2021

[7]:
```
import pandas as pd
import numpy as np
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.tree import plot_tree
data=pd.read_csv(r'E:\M&L excel\transfusion.csv')
print(data.info())
print("Null values in data are--",data.isna().sum().sum())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 748 entries, 0 to 747
Data columns (total 5 columns):
 #   Column                                  Non-Null Count  Dtype
---  ------                                  --------------  -----
 0   Recency (months)                        748 non-null    int64
 1   Frequency (times)                       748 non-null    int64
 2   Monetary (c.c. blood)                   748 non-null    int64
 3   Time (months)                           748 non-null    int64
 4   whether he/she donated blood in March 2007  748 non-null    int64
dtypes: int64(5)
memory usage: 29.3 KB
None
Null values in data are-- 0
```

[8]:
```
X=data.drop('whether he/she donated blood in March 2007',axis=1)
X.rename(columns={'Recency (months)':'R','Frequency (times)':'F','Monetary (c.c.
 ↪ blood)':'M','Time (months)':'T'},inplace=True)
X
y=data['whether he/she donated blood in March 2007']
y
```

[8]:
```
0      1
1      1
2      1
3      1
4      0
      ..
743    0
```

```
744    0
745    0
746    0
747    0
Name: whether he/she donated blood in March 2007, Length: 748, dtype: int64
```

[16]:
```
from sklearn import tree
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.
 ↪20,random_state=42)
classifier=DecisionTreeClassifier()
clf=classifier.fit(X_train,y_train)
y_pred=clf.predict(X_test)
from sklearn import metric
#y_pred
tree.plot_tree(clf)
```

```
Accuracy for testing: 0.6466666666666666
```

[16]:
```
[Text(186.69471318493152, 211.04470588235293, 'X[0] <= 6.5\ngini = 0.36\nsamples
= 598\nvalue = [457, 141]'),
 Text(90.7586044520548, 198.25411764705882, 'X[1] <= 4.5\ngini = 0.466\nsamples
= 297\nvalue = [187, 110]'),
 Text(26.944520547945206, 185.4635294117647, 'X[3] <= 2.5\ngini = 0.368\nsamples
= 140\nvalue = [106, 34]'),
 Text(14.905479452054795, 172.6729411764706, 'X[1] <= 1.5\ngini = 0.191\nsamples
= 28\nvalue = [25, 3]'),
 Text(12.612328767123287, 159.88235294117646, 'gini = 0.204\nsamples = 26\nvalue
= [23, 3]'),
 Text(17.198630136986303, 159.88235294117646, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(38.983561643835614, 172.6729411764706, 'X[3] <= 12.0\ngini = 0.4\nsamples
= 112\nvalue = [81, 31]'),
 Text(21.784931506849315, 159.88235294117646, 'X[0] <= 5.0\ngini =
0.477\nsamples = 56\nvalue = [34, 22]'),
 Text(19.491780821917807, 147.09176470588235, 'X[0] <= 3.5\ngini =
0.472\nsamples = 55\nvalue = [34, 21]'),
 Text(11.465753424657535, 134.30117647058825, 'X[3] <= 10.5\ngini = 0.5\nsamples
= 20\nvalue = [10, 10]'),
 Text(6.879452054794521, 121.51058823529411, 'X[0] <= 1.0\ngini = 0.444\nsamples
= 12\nvalue = [4, 8]'),
 Text(4.586301369863014, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [2, 0]'),
 Text(9.172602739726027, 108.72, 'X[3] <= 9.5\ngini = 0.32\nsamples = 10\nvalue
= [2, 8]'),
 Text(6.879452054794521, 95.92941176470588, 'X[2] <= 625.0\ngini =
0.219\nsamples = 8\nvalue = [1, 7]'),
 Text(4.586301369863014, 83.13882352941175, 'X[1] <= 1.5\ngini = 0.32\nsamples =
5\nvalue = [1, 4]'),
 Text(2.293150684931507, 70.34823529411764, 'gini = 0.0\nsamples = 1\nvalue =
```

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[0, 1]'),
 Text(6.879452054794521, 70.34823529411764, 'gini = 0.375\nsamples = 4\nvalue =
[1, 3]'),
 Text(9.172602739726027, 83.13882352941175, 'gini = 0.0\nsamples = 3\nvalue =
[0, 3]'),
 Text(11.465753424657535, 95.92941176470588, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(16.052054794520547, 121.51058823529411, 'X[1] <= 2.5\ngini =
0.375\nsamples = 8\nvalue = [6, 2]'),
 Text(13.758904109589041, 108.72, 'gini = 0.444\nsamples = 6\nvalue = [4, 2]'),
 Text(18.345205479452055, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [2, 0]'),
 Text(27.517808219178082, 134.30117647058825, 'X[2] <= 750.0\ngini =
0.431\nsamples = 35\nvalue = [24, 11]'),
 Text(25.224657534246575, 121.51058823529411, 'X[3] <= 6.5\ngini =
0.422\nsamples = 33\nvalue = [23, 10]'),
 Text(22.93150684931507, 108.72, 'X[1] <= 1.5\ngini = 0.412\nsamples = 31\nvalue
= [22, 9]'),
 Text(20.638356164383563, 95.92941176470588, 'gini = 0.413\nsamples = 24\nvalue
= [17, 7]'),
 Text(25.224657534246575, 95.92941176470588, 'gini = 0.408\nsamples = 7\nvalue =
[5, 2]'),
 Text(27.517808219178082, 108.72, 'gini = 0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(29.81095890410959, 121.51058823529411, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(24.078082191780823, 147.09176470588235, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(56.18219178082192, 159.88235294117646, 'X[0] <= 3.0\ngini = 0.27\nsamples
= 56\nvalue = [47, 9]'),
 Text(44.71643835616438, 147.09176470588235, 'X[3] <= 72.5\ngini = 0.17\nsamples
= 32\nvalue = [29, 3]'),
 Text(38.983561643835614, 134.30117647058825, 'X[3] <= 36.5\ngini =
0.124\nsamples = 30\nvalue = [28, 2]'),
 Text(34.397260273972606, 121.51058823529411, 'X[3] <= 15.0\ngini =
0.077\nsamples = 25\nvalue = [24, 1]'),
 Text(32.104109589041094, 108.72, 'X[1] <= 3.5\ngini = 0.278\nsamples = 6\nvalue
= [5, 1]'),
 Text(29.81095890410959, 95.92941176470588, 'gini = 0.0\nsamples = 4\nvalue =
[4, 0]'),
 Text(34.397260273972606, 95.92941176470588, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(36.69041095890411, 108.72, 'gini = 0.0\nsamples = 19\nvalue = [19, 0]'),
 Text(43.56986301369863, 121.51058823529411, 'X[3] <= 39.5\ngini = 0.32\nsamples
= 5\nvalue = [4, 1]'),
 Text(41.276712328767125, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(45.86301369863014, 108.72, 'gini = 0.0\nsamples = 4\nvalue = [4, 0]'),
 Text(50.44931506849315, 134.30117647058825, 'X[3] <= 76.0\ngini = 0.5\nsamples
= 2\nvalue = [1, 1]'),
```

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 Text(48.156164383561645, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(52.74246575342466, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(67.64794520547946, 147.09176470588235, 'X[1] <= 3.5\ngini = 0.375\nsamples
= 24\nvalue = [18, 6]'),
 Text(61.915068493150685, 134.30117647058825, 'X[3] <= 25.5\ngini =
0.278\nsamples = 18\nvalue = [15, 3]'),
 Text(57.32876712328767, 121.51058823529411, 'X[3] <= 20.5\ngini =
0.408\nsamples = 7\nvalue = [5, 2]'),
 Text(55.035616438356165, 108.72, 'X[3] <= 15.0\ngini = 0.278\nsamples =
6\nvalue = [5, 1]'),
 Text(52.74246575342466, 95.92941176470588, 'gini = 0.0\nsamples = 3\nvalue =
[3, 0]'),
 Text(57.32876712328767, 95.92941176470588, 'gini = 0.444\nsamples = 3\nvalue =
[2, 1]'),
 Text(59.62191780821918, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(66.5013698630137, 121.51058823529411, 'X[3] <= 48.5\ngini = 0.165\nsamples
= 11\nvalue = [10, 1]'),
 Text(64.20821917808219, 108.72, 'gini = 0.0\nsamples = 7\nvalue = [7, 0]'),
 Text(68.79452054794521, 108.72, 'X[3] <= 51.5\ngini = 0.375\nsamples = 4\nvalue
= [3, 1]'),
 Text(66.5013698630137, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue = [0,
1]'),
 Text(71.08767123287672, 95.92941176470588, 'gini = 0.0\nsamples = 3\nvalue =
[3, 0]'),
 Text(73.38082191780822, 134.30117647058825, 'X[3] <= 16.0\ngini = 0.5\nsamples
= 6\nvalue = [3, 3]'),
 Text(71.08767123287672, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(75.67397260273972, 121.51058823529411, 'X[3] <= 22.0\ngini = 0.48\nsamples
= 5\nvalue = [3, 2]'),
 Text(73.38082191780822, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(77.96712328767123, 108.72, 'X[3] <= 40.0\ngini = 0.5\nsamples = 4\nvalue =
[2, 2]'),
 Text(75.67397260273972, 95.92941176470588, 'X[3] <= 30.0\ngini = 0.444\nsamples
= 3\nvalue = [1, 2]'),
 Text(73.38082191780822, 83.13882352941175, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(77.96712328767123, 83.13882352941175, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(80.26027397260275, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(154.57268835616438, 185.4635294117647, 'X[3] <= 49.5\ngini =
0.499\nsamples = 157\nvalue = [81, 76]'),
 Text(122.82688356164384, 172.6729411764706, 'X[2] <= 1625.0\ngini =
0.48\nsamples = 100\nvalue = [40, 60]'),
```

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 Text(101.75856164383562, 159.88235294117646, 'X[3] <= 18.5\ngini = 0.5\nsamples
= 49\nvalue = [24, 25]'),
 Text(84.84657534246575, 147.09176470588235, 'X[3] <= 13.0\ngini =
0.391\nsamples = 15\nvalue = [4, 11]'),
 Text(82.55342465753425, 134.30117647058825, 'gini = 0.0\nsamples = 3\nvalue =
[0, 3]'),
 Text(87.13972602739726, 134.30117647058825, 'X[3] <= 14.5\ngini =
0.444\nsamples = 12\nvalue = [4, 8]'),
 Text(84.84657534246575, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(89.43287671232876, 121.51058823529411, 'X[2] <= 1375.0\ngini =
0.32\nsamples = 10\nvalue = [2, 8]'),
 Text(87.13972602739726, 108.72, 'X[0] <= 3.0\ngini = 0.444\nsamples = 6\nvalue
= [2, 4]'),
 Text(84.84657534246575, 95.92941176470588, 'gini = 0.5\nsamples = 4\nvalue =
[2, 2]'),
 Text(89.43287671232876, 95.92941176470588, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(91.72602739726028, 108.72, 'gini = 0.0\nsamples = 4\nvalue = [0, 4]'),
 Text(118.67054794520548, 147.09176470588235, 'X[3] <= 43.0\ngini =
0.484\nsamples = 34\nvalue = [20, 14]'),
 Text(111.21780821917808, 134.30117647058825, 'X[3] <= 40.0\ngini =
0.495\nsamples = 29\nvalue = [16, 13]'),
 Text(108.92465753424658, 121.51058823529411, 'X[0] <= 3.5\ngini =
0.483\nsamples = 27\nvalue = [16, 11]'),
 Text(96.31232876712329, 108.72, 'X[0] <= 2.5\ngini = 0.408\nsamples = 14\nvalue
= [10, 4]'),
 Text(94.01917808219179, 95.92941176470588, 'X[2] <= 1375.0\ngini =
0.463\nsamples = 11\nvalue = [7, 4]'),
 Text(87.13972602739726, 83.13882352941175, 'X[3] <= 29.5\ngini = 0.32\nsamples
= 5\nvalue = [4, 1]'),
 Text(84.84657534246575, 70.34823529411764, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(89.43287671232876, 70.34823529411764, 'X[3] <= 33.5\ngini = 0.444\nsamples
= 3\nvalue = [2, 1]'),
 Text(87.13972602739726, 57.557647058823534, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(91.72602739726028, 57.557647058823534, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(100.8986301369863, 83.13882352941175, 'X[3] <= 31.5\ngini = 0.5\nsamples =
6\nvalue = [3, 3]'),
 Text(98.6054794520548, 70.34823529411764, 'X[3] <= 24.0\ngini = 0.48\nsamples =
5\nvalue = [3, 2]'),
 Text(96.31232876712329, 57.557647058823534, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(100.8986301369863, 57.557647058823534, 'X[3] <= 27.0\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
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 Text(98.6054794520548, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(103.1917808219178, 44.767058823529396, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(103.1917808219178, 70.34823529411764, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(98.6054794520548, 95.92941176470588, 'gini = 0.0\nsamples = 3\nvalue = [3,
0]'),
 Text(121.53698630136986, 108.72, 'X[3] <= 38.5\ngini = 0.497\nsamples =
13\nvalue = [6, 7]'),
 Text(119.24383561643836, 95.92941176470588, 'X[0] <= 4.5\ngini = 0.486\nsamples
= 12\nvalue = [5, 7]'),
 Text(116.95068493150686, 83.13882352941175, 'X[3] <= 36.5\ngini =
0.463\nsamples = 11\nvalue = [4, 7]'),
 Text(114.65753424657534, 70.34823529411764, 'X[3] <= 33.5\ngini = 0.48\nsamples
= 10\nvalue = [4, 6]'),
 Text(110.07123287671233, 57.557647058823534, 'X[1] <= 5.5\ngini =
0.408\nsamples = 7\nvalue = [2, 5]'),
 Text(107.77808219178083, 44.767058823529396, 'X[3] <= 30.5\ngini =
0.48\nsamples = 5\nvalue = [2, 3]'),
 Text(105.48493150684932, 31.976470588235287, 'X[3] <= 27.0\ngini = 0.5\nsamples
= 4\nvalue = [2, 2]'),
 Text(103.1917808219178, 19.185882352941178, 'X[3] <= 24.5\ngini =
0.444\nsamples = 3\nvalue = [1, 2]'),
 Text(100.8986301369863, 6.39529411764704, 'gini = 0.5\nsamples = 2\nvalue = [1,
1]'),
 Text(105.48493150684932, 6.39529411764704, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(107.77808219178083, 19.185882352941178, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(110.07123287671233, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(112.36438356164383, 44.767058823529396, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(119.24383561643836, 57.557647058823534, 'X[2] <= 1375.0\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
 Text(116.95068493150686, 44.767058823529396, 'X[3] <= 34.5\ngini = 0.5\nsamples
= 2\nvalue = [1, 1]'),
 Text(114.65753424657534, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(119.24383561643836, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(121.53698630136986, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(119.24383561643836, 70.34823529411764, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(121.53698630136986, 83.13882352941175, 'gini = 0.0\nsamples = 1\nvalue =
```

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[1, 0]'),
 Text(123.83013698630137, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(113.51095890410959, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(126.12328767123287, 134.30117647058825, 'X[3] <= 46.5\ngini =
0.32\nsamples = 5\nvalue = [4, 1]'),
 Text(123.83013698630137, 121.51058823529411, 'gini = 0.0\nsamples = 3\nvalue =
[3, 0]'),
 Text(128.41643835616438, 121.51058823529411, 'X[2] <= 1375.0\ngini =
0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(126.12328767123287, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(130.70958904109588, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(143.89520547945204, 159.88235294117646, 'X[3] <= 25.5\ngini =
0.431\nsamples = 51\nvalue = [16, 35]'),
 Text(137.58904109589042, 147.09176470588235, 'X[3] <= 22.5\ngini =
0.48\nsamples = 5\nvalue = [3, 2]'),
 Text(135.29589041095892, 134.30117647058825, 'X[0] <= 3.0\ngini =
0.444\nsamples = 3\nvalue = [1, 2]'),
 Text(133.0027397260274, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(137.58904109589042, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(139.88219178082193, 134.30117647058825, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(150.2013698630137, 147.09176470588235, 'X[1] <= 8.5\ngini = 0.405\nsamples
= 46\nvalue = [13, 33]'),
 Text(144.46849315068494, 134.30117647058825, 'X[3] <= 30.0\ngini =
0.219\nsamples = 16\nvalue = [2, 14]'),
 Text(142.17534246575343, 121.51058823529411, 'X[3] <= 27.0\ngini =
0.444\nsamples = 6\nvalue = [2, 4]'),
 Text(139.88219178082193, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [0, 2]'),
 Text(144.46849315068494, 108.72, 'X[0] <= 3.0\ngini = 0.5\nsamples = 4\nvalue =
[2, 2]'),
 Text(142.17534246575343, 95.92941176470588, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(146.76164383561644, 95.92941176470588, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(146.76164383561644, 121.51058823529411, 'gini = 0.0\nsamples = 10\nvalue =
[0, 10]'),
 Text(155.93424657534246, 134.30117647058825, 'X[2] <= 2375.0\ngini =
0.464\nsamples = 30\nvalue = [11, 19]'),
 Text(151.34794520547945, 121.51058823529411, 'X[3] <= 32.0\ngini =
0.32\nsamples = 5\nvalue = [4, 1]'),
 Text(149.05479452054794, 108.72, 'gini = 0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(153.64109589041095, 108.72, 'gini = 0.0\nsamples = 3\nvalue = [3, 0]'),
 Text(160.5205479452055, 121.51058823529411, 'X[1] <= 14.5\ngini =
```

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0.403\nsamples = 25\nvalue = [7, 18]'),
 Text(158.22739726027396, 108.72, 'X[3] <= 48.5\ngini = 0.444\nsamples =
21\nvalue = [7, 14]'),
 Text(155.93424657534246, 95.92941176470588, 'X[2] <= 2625.0\ngini =
0.42\nsamples = 20\nvalue = [6, 14]'),
 Text(153.64109589041095, 83.13882352941175, 'gini = 0.0\nsamples = 5\nvalue =
[0, 5]'),
 Text(158.22739726027396, 83.13882352941175, 'X[0] <= 2.5\ngini = 0.48\nsamples
= 15\nvalue = [6, 9]'),
 Text(149.05479452054794, 70.34823529411764, 'X[2] <= 2875.0\ngini =
0.42\nsamples = 10\nvalue = [3, 7]'),
 Text(142.17534246575343, 57.557647058823534, 'X[3] <= 34.0\ngini =
0.48\nsamples = 5\nvalue = [2, 3]'),
 Text(139.88219178082193, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(144.46849315068494, 44.767058823529396, 'X[3] <= 43.5\ngini =
0.375\nsamples = 4\nvalue = [1, 3]'),
 Text(142.17534246575343, 31.976470588235287, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(146.76164383561644, 31.976470588235287, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(155.93424657534246, 57.557647058823534, 'X[0] <= 1.5\ngini = 0.32\nsamples
= 5\nvalue = [1, 4]'),
 Text(153.64109589041095, 44.767058823529396, 'X[3] <= 37.5\ngini = 0.5\nsamples
= 2\nvalue = [1, 1]'),
 Text(151.34794520547945, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(155.93424657534246, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(158.22739726027396, 44.767058823529396, 'gini = 0.0\nsamples = 3\nvalue =
[0, 3]'),
 Text(167.4, 70.34823529411764, 'X[1] <= 13.5\ngini = 0.48\nsamples = 5\nvalue =
[3, 2]'),
 Text(165.1068493150685, 57.557647058823534, 'X[2] <= 2875.0\ngini =
0.444\nsamples = 3\nvalue = [1, 2]'),
 Text(162.813698630137, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(167.4, 44.767058823529396, 'gini = 0.0\nsamples = 2\nvalue = [0, 2]'),
 Text(169.6931506849315, 57.557647058823534, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(160.5205479452055, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(162.813698630137, 108.72, 'gini = 0.0\nsamples = 4\nvalue = [0, 4]'),
 Text(186.31849315068493, 172.6729411764706, 'X[2] <= 4625.0\ngini =
0.404\nsamples = 57\nvalue = [41, 16]'),
 Text(175.42602739726027, 159.88235294117646, 'X[2] <= 2500.0\ngini =
0.287\nsamples = 46\nvalue = [38, 8]'),
```

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 Text(169.6931506849315, 147.09176470588235, 'X[0] <= 2.5\ngini = 0.087\nsamples
= 22\nvalue = [21, 1]'),
 Text(167.4, 134.30117647058825, 'X[3] <= 58.5\ngini = 0.198\nsamples = 9\nvalue
= [8, 1]'),
 Text(165.1068493150685, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(169.6931506849315, 121.51058823529411, 'gini = 0.0\nsamples = 8\nvalue =
[8, 0]'),
 Text(171.986301369863, 134.30117647058825, 'gini = 0.0\nsamples = 13\nvalue =
[13, 0]'),
 Text(181.15890410958903, 147.09176470588235, 'X[3] <= 80.0\ngini =
0.413\nsamples = 24\nvalue = [17, 7]'),
 Text(176.57260273972602, 134.30117647058825, 'X[0] <= 4.5\ngini = 0.5\nsamples
= 12\nvalue = [6, 6]'),
 Text(174.27945205479452, 121.51058823529411, 'X[3] <= 52.5\ngini =
0.48\nsamples = 10\nvalue = [4, 6]'),
 Text(171.986301369863, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(176.57260273972602, 108.72, 'X[3] <= 59.0\ngini = 0.444\nsamples =
9\nvalue = [3, 6]'),
 Text(174.27945205479452, 95.92941176470588, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(178.86575342465753, 95.92941176470588, 'X[3] <= 62.5\ngini = 0.49\nsamples
= 7\nvalue = [3, 4]'),
 Text(176.57260273972602, 83.13882352941175, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(181.15890410958903, 83.13882352941175, 'X[3] <= 78.5\ngini =
0.444\nsamples = 6\nvalue = [2, 4]'),
 Text(178.86575342465753, 70.34823529411764, 'X[3] <= 74.0\ngini = 0.48\nsamples
= 5\nvalue = [2, 3]'),
 Text(176.57260273972602, 57.557647058823534, 'X[1] <= 14.0\ngini =
0.375\nsamples = 4\nvalue = [1, 3]'),
 Text(174.27945205479452, 44.767058823529396, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(178.86575342465753, 44.767058823529396, 'X[3] <= 67.0\ngini = 0.5\nsamples
= 2\nvalue = [1, 1]'),
 Text(176.57260273972602, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(181.15890410958903, 31.976470588235287, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(181.15890410958903, 57.557647058823534, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(183.45205479452056, 70.34823529411764, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(178.86575342465753, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(185.74520547945207, 134.30117647058825, 'X[3] <= 96.5\ngini =
0.153\nsamples = 12\nvalue = [11, 1]'),
```

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 Text(183.45205479452056, 121.51058823529411, 'gini = 0.0\nsamples = 10\nvalue =
[10, 0]'),
 Text(188.03835616438357, 121.51058823529411, 'X[2] <= 3500.0\ngini =
0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(185.74520547945207, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(190.33150684931508, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(197.2109589041096, 159.88235294117646, 'X[1] <= 25.0\ngini =
0.397\nsamples = 11\nvalue = [3, 8]'),
 Text(192.62465753424658, 147.09176470588235, 'X[3] <= 73.0\ngini = 0.5\nsamples
= 4\nvalue = [2, 2]'),
 Text(190.33150684931508, 134.30117647058825, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(194.91780821917808, 134.30117647058825, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(201.7972602739726, 147.09176470588235, 'X[1] <= 43.5\ngini =
0.245\nsamples = 7\nvalue = [1, 6]'),
 Text(199.5041095890411, 134.30117647058825, 'gini = 0.0\nsamples = 4\nvalue =
[0, 4]'),
 Text(204.0904109589041, 134.30117647058825, 'X[1] <= 45.0\ngini =
0.444\nsamples = 3\nvalue = [1, 2]'),
 Text(201.7972602739726, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(206.3835616438356, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(282.63082191780825, 198.25411764705882, 'X[0] <= 13.5\ngini =
0.185\nsamples = 301\nvalue = [270, 31]'),
 Text(249.95342465753424, 185.4635294117647, 'X[3] <= 39.5\ngini =
0.265\nsamples = 102\nvalue = [86, 16]'),
 Text(237.34109589041097, 172.6729411764706, 'X[3] <= 16.5\ngini =
0.198\nsamples = 63\nvalue = [56, 7]'),
 Text(227.02191780821917, 159.88235294117646, 'X[1] <= 2.5\ngini =
0.312\nsamples = 31\nvalue = [25, 6]'),
 Text(217.84931506849315, 147.09176470588235, 'X[3] <= 15.0\ngini =
0.227\nsamples = 23\nvalue = [20, 3]'),
 Text(213.26301369863015, 134.30117647058825, 'X[0] <= 10.0\ngini =
0.188\nsamples = 19\nvalue = [17, 2]'),
 Text(210.96986301369864, 121.51058823529411, 'gini = 0.0\nsamples = 4\nvalue =
[4, 0]'),
 Text(215.55616438356165, 121.51058823529411, 'X[1] <= 1.5\ngini =
0.231\nsamples = 15\nvalue = [13, 2]'),
 Text(213.26301369863015, 108.72, 'gini = 0.26\nsamples = 13\nvalue = [11, 2]'),
 Text(217.84931506849315, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [2, 0]'),
 Text(222.43561643835616, 134.30117647058825, 'X[0] <= 8.5\ngini =
0.375\nsamples = 4\nvalue = [3, 1]'),
 Text(220.14246575342466, 121.51058823529411, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(224.72876712328767, 121.51058823529411, 'X[0] <= 10.0\ngini = 0.5\nsamples
```

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= 2\nvalue = [1, 1]'),
 Text(222.43561643835616, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(227.02191780821917, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(236.19452054794522, 147.09176470588235, 'X[0] <= 10.0\ngini =
0.469\nsamples = 8\nvalue = [5, 3]'),
 Text(233.9013698630137, 134.30117647058825, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(238.48767123287672, 134.30117647058825, 'X[2] <= 875.0\ngini =
0.5\nsamples = 6\nvalue = [3, 3]'),
 Text(236.19452054794522, 121.51058823529411, 'X[3] <= 14.5\ngini =
0.48\nsamples = 5\nvalue = [3, 2]'),
 Text(231.60821917808218, 108.72, 'X[0] <= 12.0\ngini = 0.5\nsamples = 2\nvalue
= [1, 1]'),
 Text(229.31506849315068, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(233.9013698630137, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(240.78082191780823, 108.72, 'X[0] <= 12.0\ngini = 0.444\nsamples =
3\nvalue = [2, 1]'),
 Text(238.48767123287672, 95.92941176470588, 'X[3] <= 15.5\ngini = 0.5\nsamples
= 2\nvalue = [1, 1]'),
 Text(236.19452054794522, 83.13882352941175, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(240.78082191780823, 83.13882352941175, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(243.07397260273973, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(240.78082191780823, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(247.66027397260274, 159.88235294117646, 'X[3] <= 36.0\ngini =
0.061\nsamples = 32\nvalue = [31, 1]'),
 Text(245.36712328767123, 147.09176470588235, 'gini = 0.0\nsamples = 25\nvalue =
[25, 0]'),
 Text(249.95342465753424, 147.09176470588235, 'X[3] <= 37.5\ngini =
0.245\nsamples = 7\nvalue = [6, 1]'),
 Text(247.66027397260274, 134.30117647058825, 'X[2] <= 1500.0\ngini =
0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(245.36712328767123, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(249.95342465753424, 121.51058823529411, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(252.24657534246575, 134.30117647058825, 'gini = 0.0\nsamples = 5\nvalue =
[5, 0]'),
 Text(262.56575342465754, 172.6729411764706, 'X[3] <= 41.5\ngini =
0.355\nsamples = 39\nvalue = [30, 9]'),
 Text(260.27260273972604, 159.88235294117646, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
```

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 Text(264.85890410958905, 159.88235294117646, 'X[3] <= 53.0\ngini =
0.307\nsamples = 37\nvalue = [30, 7]'),
 Text(259.12602739726026, 147.09176470588235, 'X[3] <= 48.5\ngini =
0.444\nsamples = 12\nvalue = [8, 4]'),
 Text(256.83287671232875, 134.30117647058825, 'gini = 0.0\nsamples = 6\nvalue =
[6, 0]'),
 Text(261.41917808219176, 134.30117647058825, 'X[2] <= 1625.0\ngini =
0.444\nsamples = 6\nvalue = [2, 4]'),
 Text(259.12602739726026, 121.51058823529411, 'X[0] <= 10.0\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
 Text(256.83287671232875, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(261.41917808219176, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [2, 0]'),
 Text(263.71232876712327, 121.51058823529411, 'gini = 0.0\nsamples = 3\nvalue =
[0, 3]'),
 Text(270.59178082191784, 147.09176470588235, 'X[3] <= 71.5\ngini =
0.211\nsamples = 25\nvalue = [22, 3]'),
 Text(268.2986301369863, 134.30117647058825, 'gini = 0.0\nsamples = 13\nvalue =
[13, 0]'),
 Text(272.88493150684934, 134.30117647058825, 'X[3] <= 73.5\ngini =
0.375\nsamples = 12\nvalue = [9, 3]'),
 Text(268.2986301369863, 121.51058823529411, 'X[1] <= 8.5\ngini = 0.444\nsamples
= 3\nvalue = [1, 2]'),
 Text(266.0054794520548, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [1, 0]'),
 Text(270.59178082191784, 108.72, 'gini = 0.0\nsamples = 2\nvalue = [0, 2]'),
 Text(277.47123287671235, 121.51058823529411, 'X[2] <= 4125.0\ngini =
0.198\nsamples = 9\nvalue = [8, 1]'),
 Text(275.17808219178085, 108.72, 'gini = 0.0\nsamples = 7\nvalue = [7, 0]'),
 Text(279.76438356164385, 108.72, 'X[2] <= 4875.0\ngini = 0.5\nsamples =
2\nvalue = [1, 1]'),
 Text(277.47123287671235, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(282.05753424657536, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(315.3082191780822, 185.4635294117647, 'X[1] <= 4.5\ngini = 0.139\nsamples
= 199\nvalue = [184, 15]'),
 Text(300.4027397260274, 172.6729411764706, 'X[3] <= 26.5\ngini = 0.095\nsamples
= 140\nvalue = [133, 7]'),
 Text(298.1095890410959, 159.88235294117646, 'X[3] <= 17.5\ngini =
0.153\nsamples = 84\nvalue = [77, 7]'),
 Text(295.8164383561644, 147.09176470588235, 'gini = 0.0\nsamples = 33\nvalue =
[33, 0]'),
 Text(300.4027397260274, 147.09176470588235, 'X[3] <= 22.5\ngini =
0.237\nsamples = 51\nvalue = [44, 7]'),
 Text(293.52328767123291, 134.30117647058825, 'X[0] <= 15.0\ngini =
0.351\nsamples = 22\nvalue = [17, 5]'),
 Text(286.64383561643837, 121.51058823529411, 'X[2] <= 625.0\ngini =
0.444\nsamples = 3\nvalue = [1, 2]'),
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 Text(284.35068493150686, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(288.93698630136987, 108.72, 'X[3] <= 20.0\ngini = 0.5\nsamples = 2\nvalue
= [1, 1]'),
 Text(286.64383561643837, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(291.2301369863014, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(300.4027397260274, 121.51058823529411, 'X[0] <= 21.5\ngini =
0.266\nsamples = 19\nvalue = [16, 3]'),
 Text(298.1095890410959, 108.72, 'X[2] <= 375.0\ngini = 0.198\nsamples =
18\nvalue = [16, 2]'),
 Text(295.8164383561644, 95.92941176470588, 'gini = 0.133\nsamples = 14\nvalue =
[13, 1]'),
 Text(300.4027397260274, 95.92941176470588, 'X[0] <= 18.5\ngini = 0.375\nsamples
= 4\nvalue = [3, 1]'),
 Text(298.1095890410959, 83.13882352941175, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(302.6958904109589, 83.13882352941175, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(302.6958904109589, 108.72, 'gini = 0.0\nsamples = 1\nvalue = [0, 1]'),
 Text(307.2821917808219, 134.30117647058825, 'X[0] <= 19.5\ngini =
0.128\nsamples = 29\nvalue = [27, 2]'),
 Text(304.9890410958904, 121.51058823529411, 'gini = 0.0\nsamples = 8\nvalue =
[8, 0]'),
 Text(309.5753424657534, 121.51058823529411, 'X[2] <= 625.0\ngini =
0.172\nsamples = 21\nvalue = [19, 2]'),
 Text(307.2821917808219, 108.72, 'X[2] <= 375.0\ngini = 0.1\nsamples = 19\nvalue
= [18, 1]'),
 Text(304.9890410958904, 95.92941176470588, 'gini = 0.153\nsamples = 12\nvalue =
[11, 1]'),
 Text(309.5753424657534, 95.92941176470588, 'gini = 0.0\nsamples = 7\nvalue =
[7, 0]'),
 Text(311.8684931506849, 108.72, 'gini = 0.5\nsamples = 2\nvalue = [1, 1]'),
 Text(302.6958904109589, 159.88235294117646, 'gini = 0.0\nsamples = 56\nvalue =
[56, 0]'),
 Text(330.213698630137, 172.6729411764706, 'X[0] <= 25.5\ngini = 0.234\nsamples
= 59\nvalue = [51, 8]'),
 Text(327.9205479452055, 159.88235294117646, 'X[0] <= 20.5\ngini =
0.212\nsamples = 58\nvalue = [51, 7]'),
 Text(325.627397260274, 147.09176470588235, 'X[0] <= 16.5\ngini = 0.278\nsamples
= 42\nvalue = [35, 7]'),
 Text(323.3342465753425, 134.30117647058825, 'X[1] <= 9.0\ngini = 0.219\nsamples
= 40\nvalue = [35, 5]'),
 Text(321.041095890411, 121.51058823529411, 'X[3] <= 84.0\ngini = 0.293\nsamples
= 28\nvalue = [23, 5]'),
 Text(316.4547945205479, 108.72, 'X[3] <= 57.0\ngini = 0.26\nsamples = 26\nvalue
= [22, 4]'),
```

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 Text(314.1616438356164, 95.92941176470588, 'X[3] <= 34.5\ngini = 0.332\nsamples
= 19\nvalue = [15, 4]'),
 Text(308.4287671232877, 83.13882352941175, 'X[2] <= 1375.0\ngini =
0.198\nsamples = 9\nvalue = [8, 1]'),
 Text(306.1356164383562, 70.34823529411764, 'X[3] <= 27.0\ngini = 0.32\nsamples
= 5\nvalue = [4, 1]'),
 Text(303.8424657534247, 57.557647058823534, 'gini = 0.0\nsamples = 2\nvalue =
[2, 0]'),
 Text(308.4287671232877, 57.557647058823534, 'X[3] <= 30.5\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
 Text(306.1356164383562, 44.767058823529396, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(310.7219178082192, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(310.7219178082192, 70.34823529411764, 'gini = 0.0\nsamples = 4\nvalue =
[4, 0]'),
 Text(319.8945205479452, 83.13882352941175, 'X[0] <= 15.0\ngini = 0.42\nsamples
= 10\nvalue = [7, 3]'),
 Text(315.3082191780822, 70.34823529411764, 'X[3] <= 48.5\ngini = 0.278\nsamples
= 6\nvalue = [5, 1]'),
 Text(313.0150684931507, 57.557647058823534, 'gini = 0.0\nsamples = 3\nvalue =
[3, 0]'),
 Text(317.6013698630137, 57.557647058823534, 'X[2] <= 1625.0\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
 Text(315.3082191780822, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(319.8945205479452, 44.767058823529396, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(324.4808219178082, 70.34823529411764, 'X[1] <= 5.5\ngini = 0.5\nsamples =
4\nvalue = [2, 2]'),
 Text(322.1876712328767, 57.557647058823534, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(326.7739726027397, 57.557647058823534, 'X[3] <= 42.5\ngini =
0.444\nsamples = 3\nvalue = [2, 1]'),
 Text(324.4808219178082, 44.767058823529396, 'gini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(329.0671232876712, 44.767058823529396, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(318.7479452054795, 95.92941176470588, 'gini = 0.0\nsamples = 7\nvalue =
[7, 0]'),
 Text(325.627397260274, 108.72, 'X[3] <= 90.0\ngini = 0.5\nsamples = 2\nvalue =
[1, 1]'),
 Text(323.3342465753425, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]'),
 Text(327.9205479452055, 95.92941176470588, 'gini = 0.0\nsamples = 1\nvalue =
[1, 0]'),
 Text(325.627397260274, 121.51058823529411, 'gini = 0.0\nsamples = 12\nvalue =
```
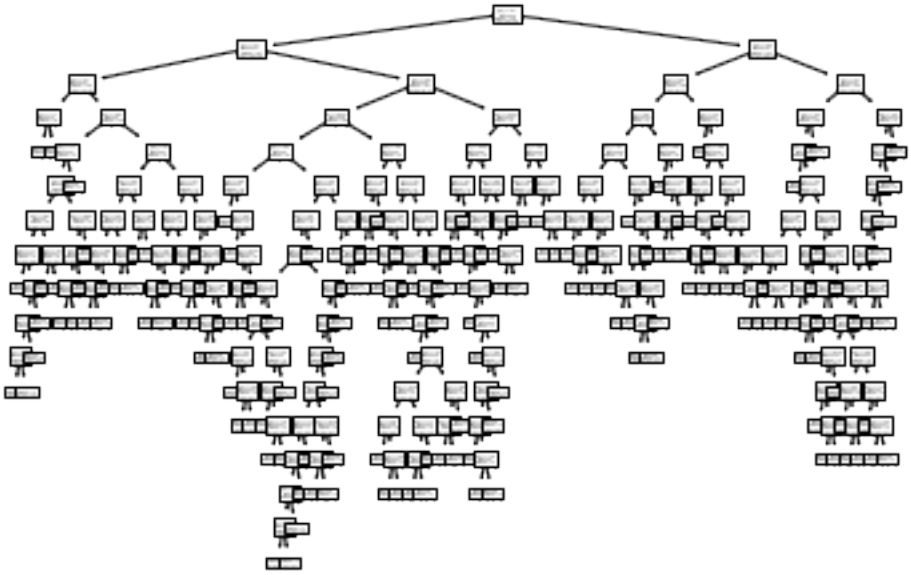

```
[12, 0]'),
 Text(327.9205479452055, 134.30117647058825, 'gini = 0.0\nsamples = 2\nvalue =
[0, 2]'),
 Text(330.213698630137, 147.09176470588235, 'gini = 0.0\nsamples = 16\nvalue =
[16, 0]'),
 Text(332.5068493150685, 159.88235294117646, 'gini = 0.0\nsamples = 1\nvalue =
[0, 1]')]
```



[20]:
```
print("Accuracy for testing:",metrics.accuracy_score(y_test, y_pred))
ytrain_pred=clf.predict(X_train)
print("Accuracy for training:",metrics.accuracy_score(y_train, ytrain_pred))
```

```
Accuracy for testing: 0.6466666666666666
Accuracy for training: 0.9381270903010034
```

[18]:
```
#get more optimal tree
clf1 = DecisionTreeClassifier(criterion="entropy", max_depth=3)
clf1 = clf1.fit(X_train,y_train)
y_pred1 = clf1.predict(X_test)
print("Accuracy for testing after reducing depth:",metrics.
 ↪accuracy_score(y_test, y_pred1))
```

```
Accuracy for testing after reducing depth: 0.7866666666666666
```

[19]:
```
tree.plot_tree(clf1)
```

[19]:
```
[Text(167.4, 190.26, 'X[0] <= 6.5\nentropy = 0.788\nsamples = 598\nvalue = [457,
141]'),
```

```
 Text(83.7, 135.9, 'X[1] <= 4.5\nentropy = 0.951\nsamples = 297\nvalue = [187,
110]'),
 Text(41.85, 81.53999999999999, 'X[3] <= 2.5\nentropy = 0.8\nsamples =
140\nvalue = [106, 34]'),
 Text(20.925, 27.180000000000007, 'entropy = 0.491\nsamples = 28\nvalue = [25,
3]'),
 Text(62.775000000000006, 27.180000000000007, 'entropy = 0.851\nsamples =
112\nvalue = [81, 31]'),
 Text(125.55000000000001, 81.53999999999999, 'X[3] <= 49.5\nentropy =
0.999\nsamples = 157\nvalue = [81, 76]'),
 Text(104.625, 27.180000000000007, 'entropy = 0.971\nsamples = 100\nvalue = [40,
60]'),
 Text(146.475, 27.180000000000007, 'entropy = 0.856\nsamples = 57\nvalue = [41,
16]'),
 Text(251.10000000000002, 135.9, 'X[0] <= 13.5\nentropy = 0.478\nsamples =
301\nvalue = [270, 31]'),
 Text(209.25, 81.53999999999999, 'X[3] <= 39.5\nentropy = 0.627\nsamples =
102\nvalue = [86, 16]'),
 Text(188.32500000000002, 27.180000000000007, 'entropy = 0.503\nsamples =
63\nvalue = [56, 7]'),
 Text(230.175, 27.180000000000007, 'entropy = 0.779\nsamples = 39\nvalue = [30,
9]'),
 Text(292.95, 81.53999999999999, 'X[3] <= 17.5\nentropy = 0.386\nsamples =
199\nvalue = [184, 15]'),
 Text(272.02500000000003, 27.180000000000007, 'entropy = 0.0\nsamples =
34\nvalue = [34, 0]'),
 Text(313.875, 27.180000000000007, 'entropy = 0.439\nsamples = 165\nvalue =
[150, 15]')]
```