COM S 573 Lab 2 Eliska Kloberdanz (810999205)

I this lab I learned decision tree classifiers and performed 5-fold cross-validation on two different datasets using Python’s sklearn library.

<u>Data sets description and missing values:</u>

<u>congressional voting records data set</u>

The first data set was a congressional voting records data set, which contains votes of republican and democrat U.S. House Representatives on 16 key issues. Therefore, there are two classes: republican and democrat and 16 attributes that take on binary values yes (1) or no (0). There are also some missing data in this dataset. In particular, there are 16 observations (rows) that contain some missing values. There are various options how to handle missing data. Wen can either drop the observations that contain missing values from the dataset, or we can impute the values. In the case of the congressional voting dataset, there are 435 observations in total and only 16 (3.7%) of them contain missing data. Since the number of rows with missing data is very small compared to the total dataset I decided to simply drop those rows from the dataset.

<u>breast cancer data set</u>

The second dataset was a breast cancer data set, which contains numerical attributes and two classes: malignant and benign. The dataset has 699 rows in total out of which 203 rows contain missing data. That represents 29%, which is a lot and dropping them would significantly reduce the amount of training data, which in turn could have a negative effect on performance of the classifier. This is why I decided to impute the missing data using sklearn’s SimpleImputer and choosing a the “most_frequent” strategy.

<u>5-fold cross-validation and 95% confidence interval:</u>

5-fold cross-validation divides a dataset into 5 datasets of equal size and applies the learning algorithm 5 times. From the 5 datasets each time the learning algorithm is applied, a different dataset is held out as a test data set and the other 4 as the training dataset.

The 95% confidence interval was computed using the z score and standard deviation as according to (Mitchell, 1997).

z at 95% confidence interval = 1.96

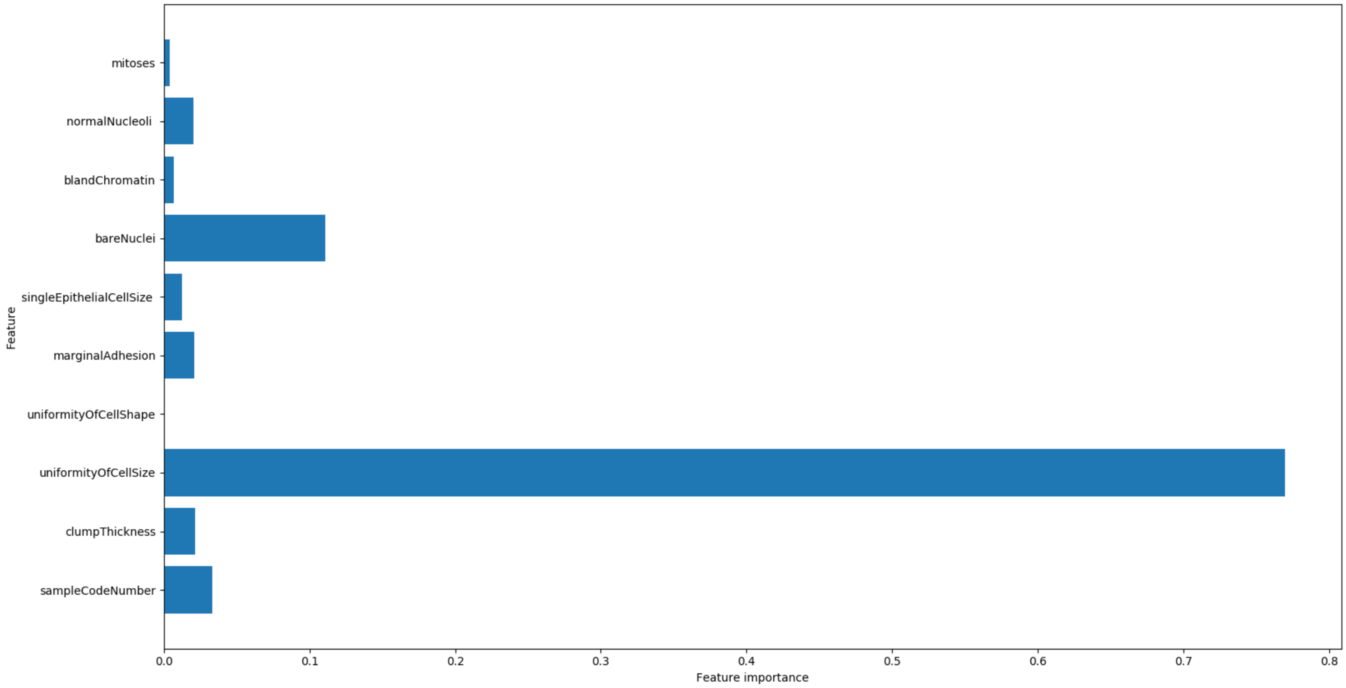
standard deviation of accuracy (h) = $\sqrt{\frac{accuracy(h)*(1-accuaracy(h))}{n}}$

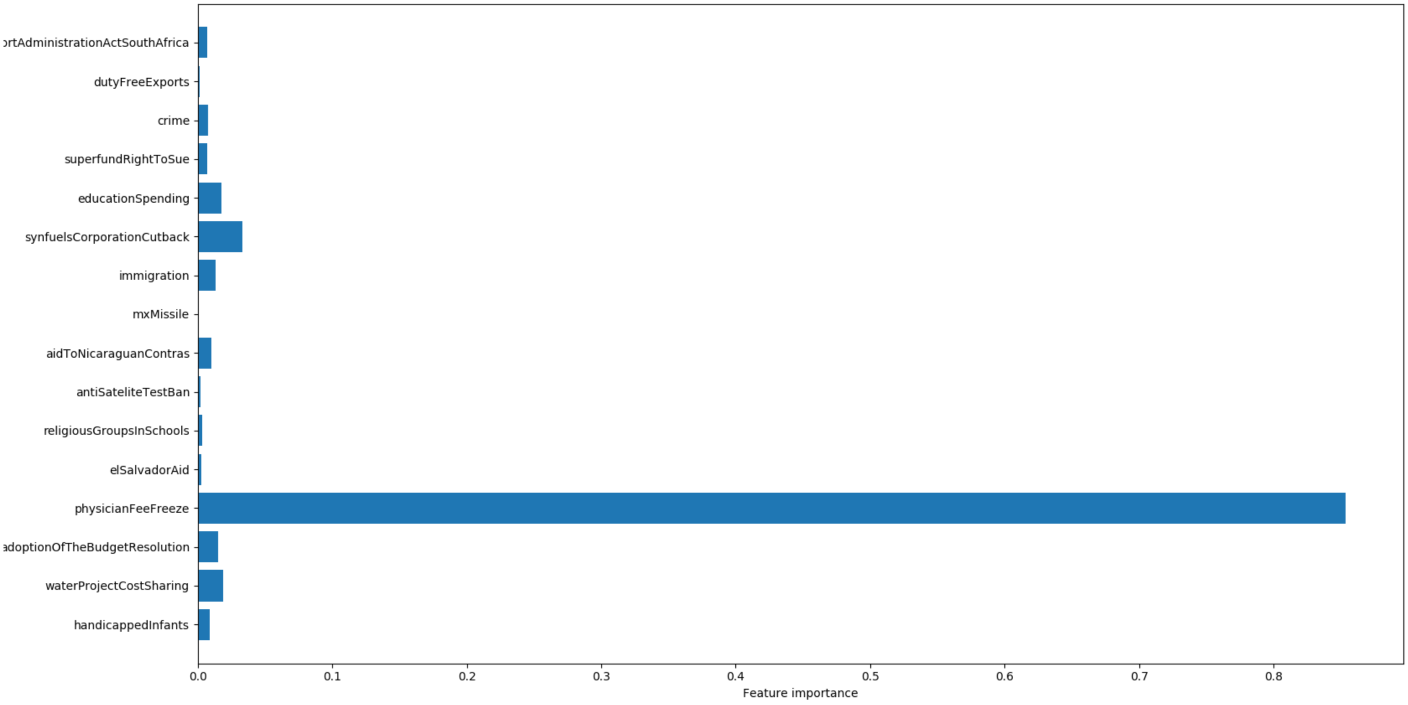
95% confidence interval = accuracy(h) +/- (z * standard deviation)

<u>TASK 1:</u>

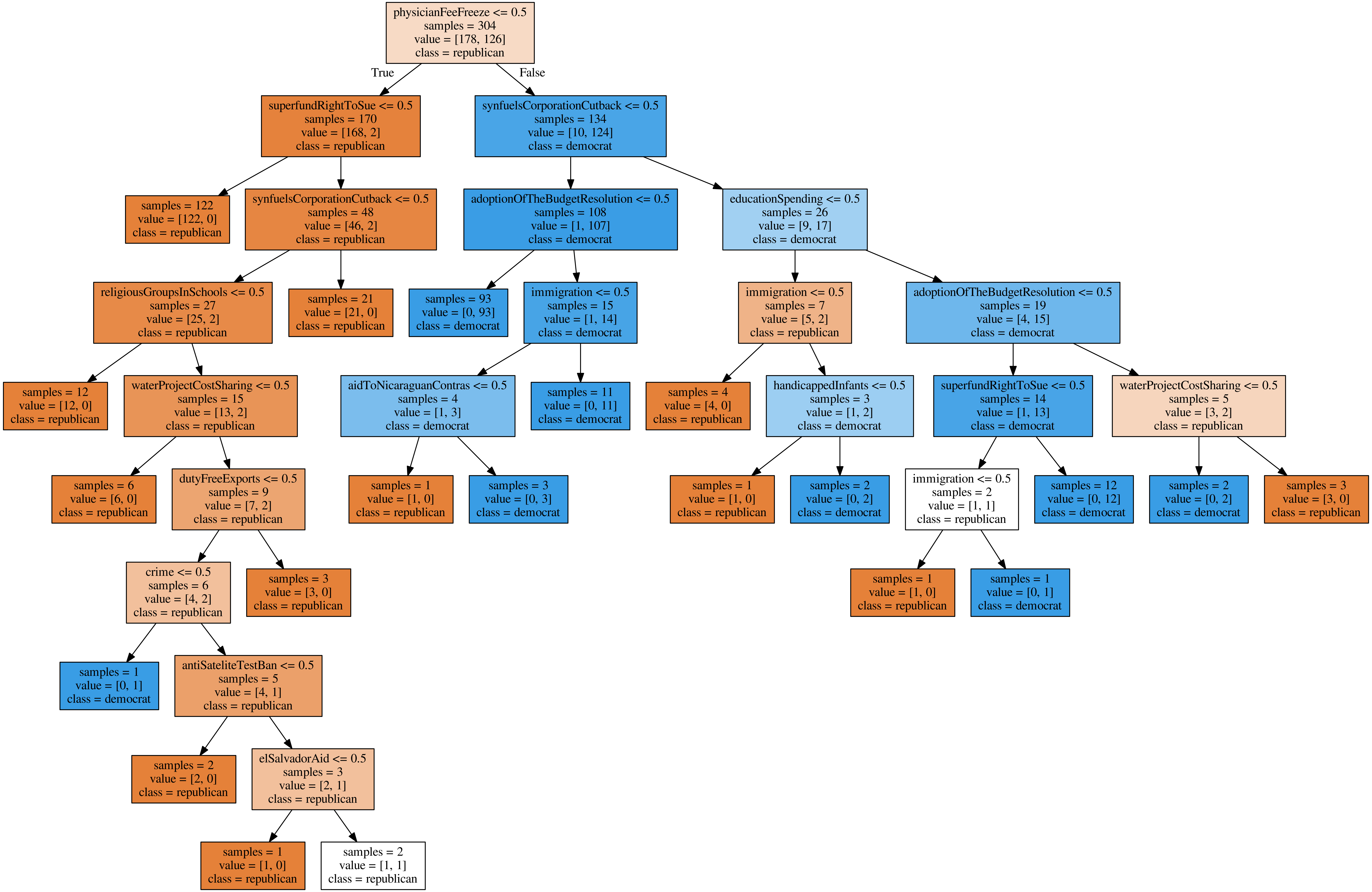
<u>Interesting Rules:</u>

I visualized the importance of each feature on a scale of 0 to 1 (0 = feature not important at all, 1 = feature perfectly predicts the target). In case of the cancer dataset, the most important feature (almost 0.8) is uniformity of cell size. Therefore, it makes sense that this attribute is the root node of the cancer decision tree classifier. The second most important feature is bare nuclei (around 0.1), which is why it makes sense that this attribute appears in the first level of the tree right below the root node. The most important feature (over 0.8) of the voting dataset is physician fee freeze. Therefore, it makes sense that this feature is the root node of the voting decision tree classifier since it provides the most amount of information. The other features have little importance. Therefore, I expect that the five trees in task 3 (c) will have the same root node, but may differ in the lower levels.


mitoses
normalNucleoli
blandChromatin
bareNuclei
singleEpithelialCellSize
marginalAdhesion
uniformityOfCellShape
uniformityOfCellSize
clumpThickness
sampleCodeNumber
Feature
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Feature importance


ortAdministrationActSouthAfrica
dutyFreeExports
crime
superfundRightToSue
educationSpending
synfuelsCorporationCutback
immigration
mxMissile
aidToNicaraguanContras
antiSateliteTestBan
religiousGroupsInSchools
elSalvadorAid
physicianFeeFreeze
adoptionOfTheBudgetResolution
waterProjectCostSharing
handicappedInfants
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Feature importance

uniformityOfCellSize <= 3.5
samples = 478
value = [311, 167]
class = benign
True
False
bareNuclei <= 3.5
samples = 329
value = [304, 25]
class = benign
uniformityOfCellSize <= 4.5
samples = 149
value = [7, 142]
class = malignant
normalNucleoli <= 3.5
samples = 298
value = [293, 5]
class = benign
uniformityOfCellSize <= 1.5
samples = 31
value = [11, 20]
class = malignant
singleEpithelialCellSize <= 6.5
samples = 29
value = [6, 23]
class = malignant
sampleCodeNumber <= 249307.0
samples = 120
value = [1, 119]
class = malignant
mitoses <= 2.5
samples = 291
value = [290, 1]
class = benign
uniformityOfCellShape <= 2.5
samples = 7
value = [3, 4]
class = malignant
clumpThickness <= 3.5
samples = 13
value = [10, 3]
class = benign
mitoses <= 2.5
samples = 18
value = [1, 17]
class = malignant
sampleCodeNumber <= 1199492.0
samples = 25
value = [3, 22]
class = malignant
blandChromatin <= 6.0
samples = 4
value = [3, 1]
class = benign
clumpThickness <= 5.5
samples = 4
value = [1, 3]
class = malignant
samples = 116
value = [0, 116]
class = malignant
samples = 287
value = [287, 0]
class = benign
normalNucleoli <= 2.5
samples = 4
value = [3, 1]
class = benign
samples = 3
value = [3, 0]
class = benign
samples = 4
value = [0, 4]
class = malignant
samples = 9
value = [9, 0]
class = benign
marginalAdhesion <= 8.0
samples = 4
value = [1, 3]
class = malignant
samples = 14
value = [0, 14]
class = malignant
blandChromatin <= 4.0
samples = 4
value = [1, 3]
class = malignant
samples = 18
value = [0, 18]
class = malignant
bareNuclei <= 8.5
samples = 7
value = [3, 4]
class = malignant
samples = 3
value = [3, 0]
class = benign
samples = 1
value = [0, 1]
class = malignant
samples = 1
value = [1, 0]
class = benign
samples = 3
value = [0, 3]
class = malignant
samples = 3
value = [3, 0]
class = benign
samples = 1
value = [0, 1]
class = malignant
samples = 3
value = [0, 3]
class = malignant
samples = 1
value = [1, 0]
class = benign
samples = 1
value = [1, 0]
class = benign
samples = 3
value = [0, 3]
class = malignant
marginalAdhesion <= 6.5
samples = 4
value = [3, 1]
class = benign
samples = 3
value = [0, 3]
class = malignant
samples = 3
value = [3, 0]
class = benign
samples = 1
value = [0, 1]
class = malignant


physicianFeeFreeze <= 0.5
samples = 304
value = [178, 126]
class = republican
True
False
superfundRightToSue <= 0.5
samples = 170
value = [168, 2]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 134
value = [10, 124]
class = democrat
samples = 122
value = [122, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 48
value = [46, 2]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 108
value = [1, 107]
class = democrat
educationSpending <= 0.5
samples = 26
value = [9, 17]
class = democrat
religiousGroupsInSchools <= 0.5
samples = 27
value = [25, 2]
class = republican
samples = 21
value = [21, 0]
class = republican
samples = 93
value = [0, 93]
class = democrat
immigration <= 0.5
samples = 15
value = [1, 14]
class = democrat
immigration <= 0.5
samples = 7
value = [5, 2]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 19
value = [4, 15]
class = democrat
samples = 12
value = [12, 0]
class = republican
waterProjectCostSharing <= 0.5
samples = 15
value = [13, 2]
class = republican
aidToNicaraguanContras <= 0.5
samples = 4
value = [1, 3]
class = democrat
samples = 11
value = [0, 11]
class = democrat
samples = 4
value = [4, 0]
class = republican
handicappedInfants <= 0.5
samples = 3
value = [1, 2]
class = democrat
superfundRightToSue <= 0.5
samples = 14
value = [1, 13]
class = democrat
waterProjectCostSharing <= 0.5
samples = 5
value = [3, 2]
class = republican
samples = 6
value = [6, 0]
class = republican
dutyFreeExports <= 0.5
samples = 9
value = [7, 2]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 3
value = [0, 3]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 2
value = [0, 2]
class = democrat
immigration <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 12
value = [0, 12]
class = democrat
samples = 2
value = [0, 2]
class = democrat
samples = 3
value = [3, 0]
class = republican
crime <= 0.5
samples = 6
value = [4, 2]
class = republican
samples = 3
value = [3, 0]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [0, 1]
class = democrat
antiSateliteTestBan <= 0.5
samples = 5
value = [4, 1]
class = republican
samples = 2
value = [2, 0]
class = republican
elSalvadorAid <= 0.5
samples = 3
value = [2, 1]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 2
value = [1, 1]
class = republican

TASK 2:

Breast cancer data set accuracy

Accuracy based on 95 percent confidence interval: average 5-fold cross validation score: 0.9326953230602866 +/- 0.01879049587007505

5-fold cross validation scores:
[0.91970803 0.90510949 0.9270073 0.96350365 0.94814815]

Simple accuracy (not k–fold cross-validation estimation accuracy):
Accuracy on training set: 1.0
Accuracy on testing set: 0.9463414634146341

TASK 3:

Congressional data set accuracy

Accuracy based on 95 percent confidence interval: average accuracy on testing 0.9241379310344827 +/- 0.02488239513283033

Accuracies for D_i for i=1, 2, ...5:

k = 1
Accuracy on training set: 0.9942528735632183
Accuracy on testing set: 0.9195402298850575

k = 2
Accuracy on training set: 0.9971264367816092
Accuracy on testing set: 0.9655172413793104

k = 3
Accuracy on training set: 0.9971264367816092
Accuracy on testing set: 0.9080459770114943

k = 4
Accuracy on training set: 0.9971264367816092
Accuracy on testing set: 0.9080459770114943

k = 5
Accuracy on training set: 0.9942528735632183
Accuracy on testing set: 0.9195402298850575

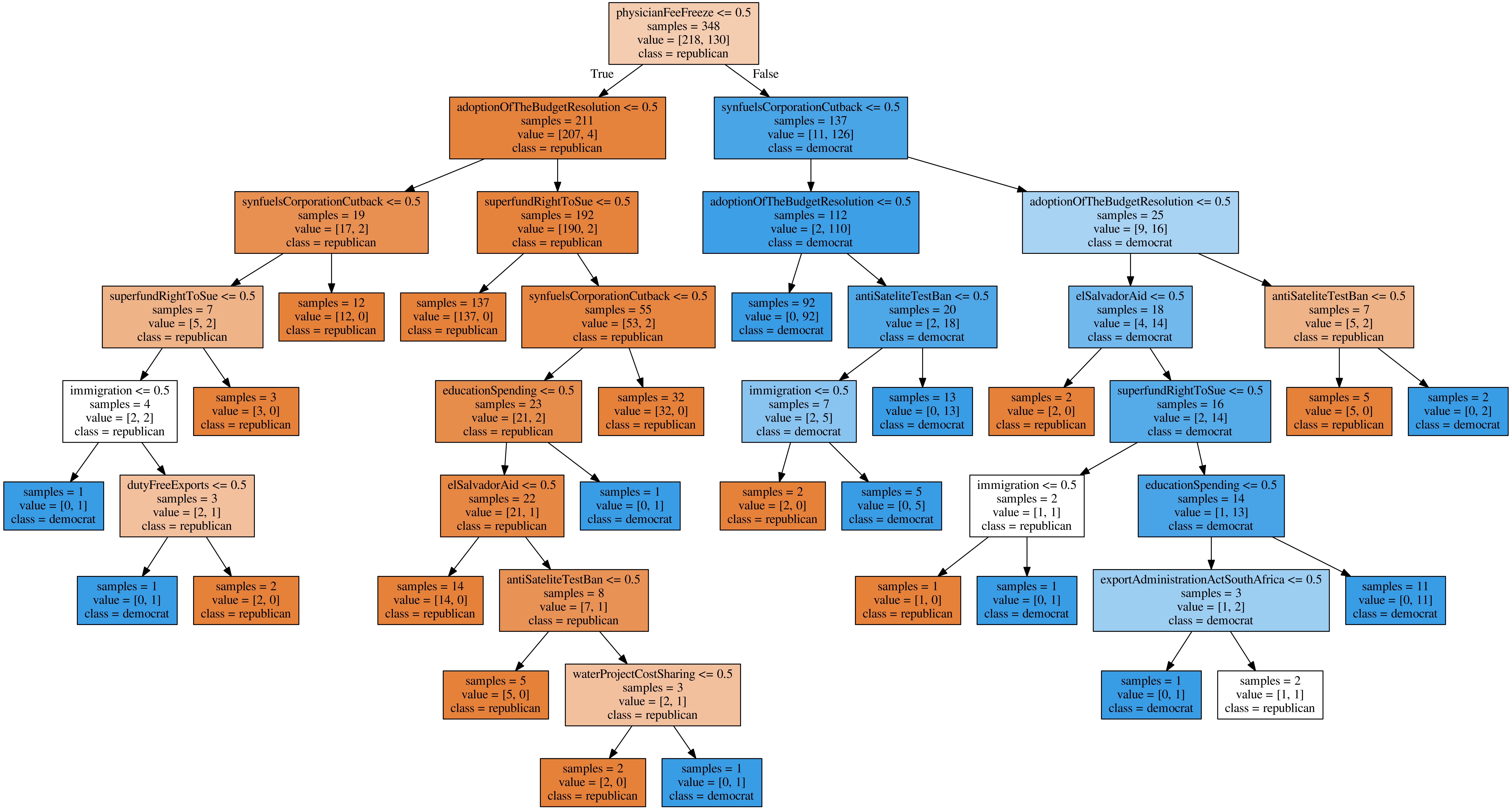
Simple accuracy (not k–fold cross-validation estimation accuracy):
Accuracy on training set: 0.9967105263157895
Accuracy on testing set: 0.9312977099236641

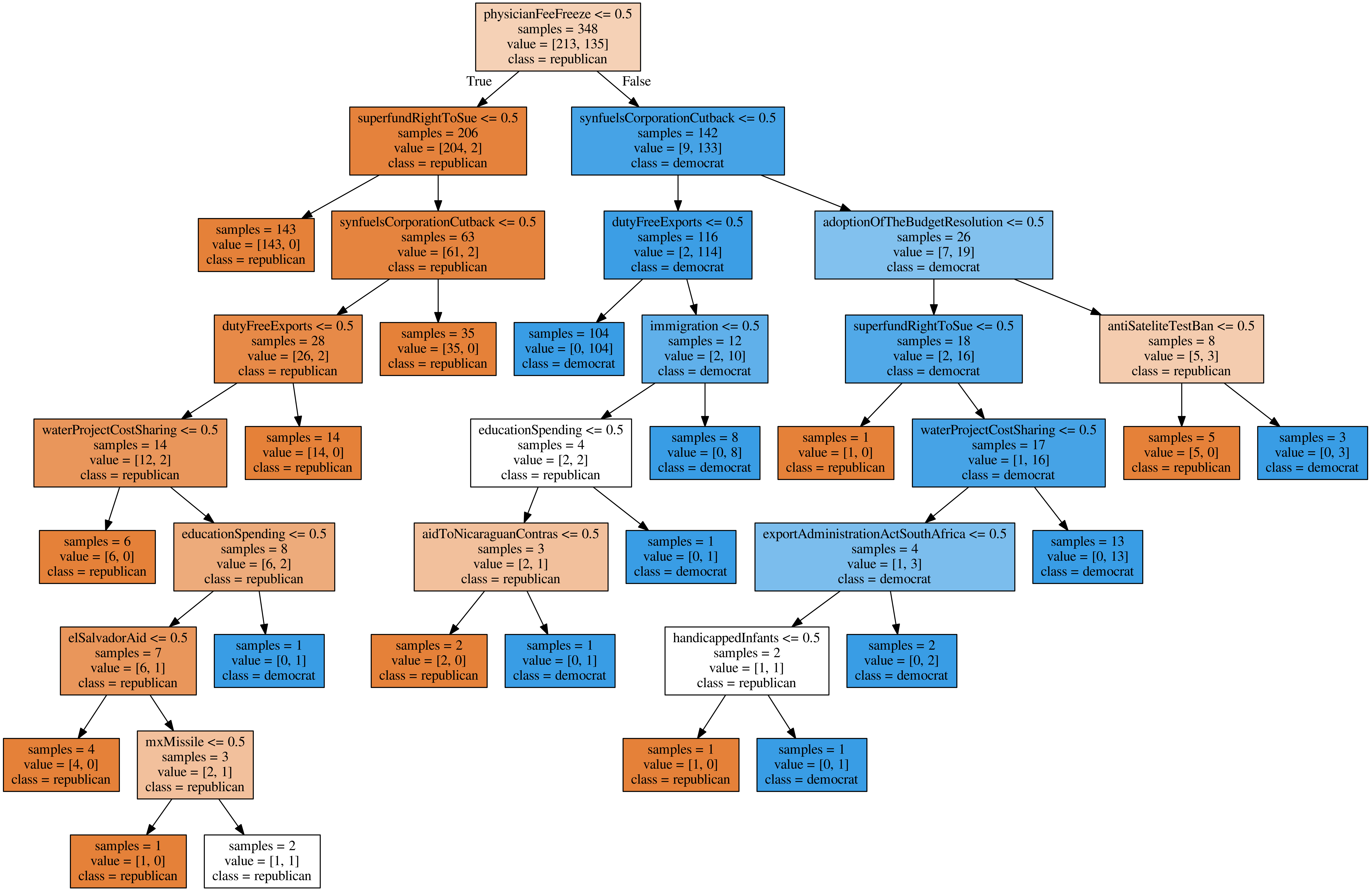
Difference between the trees

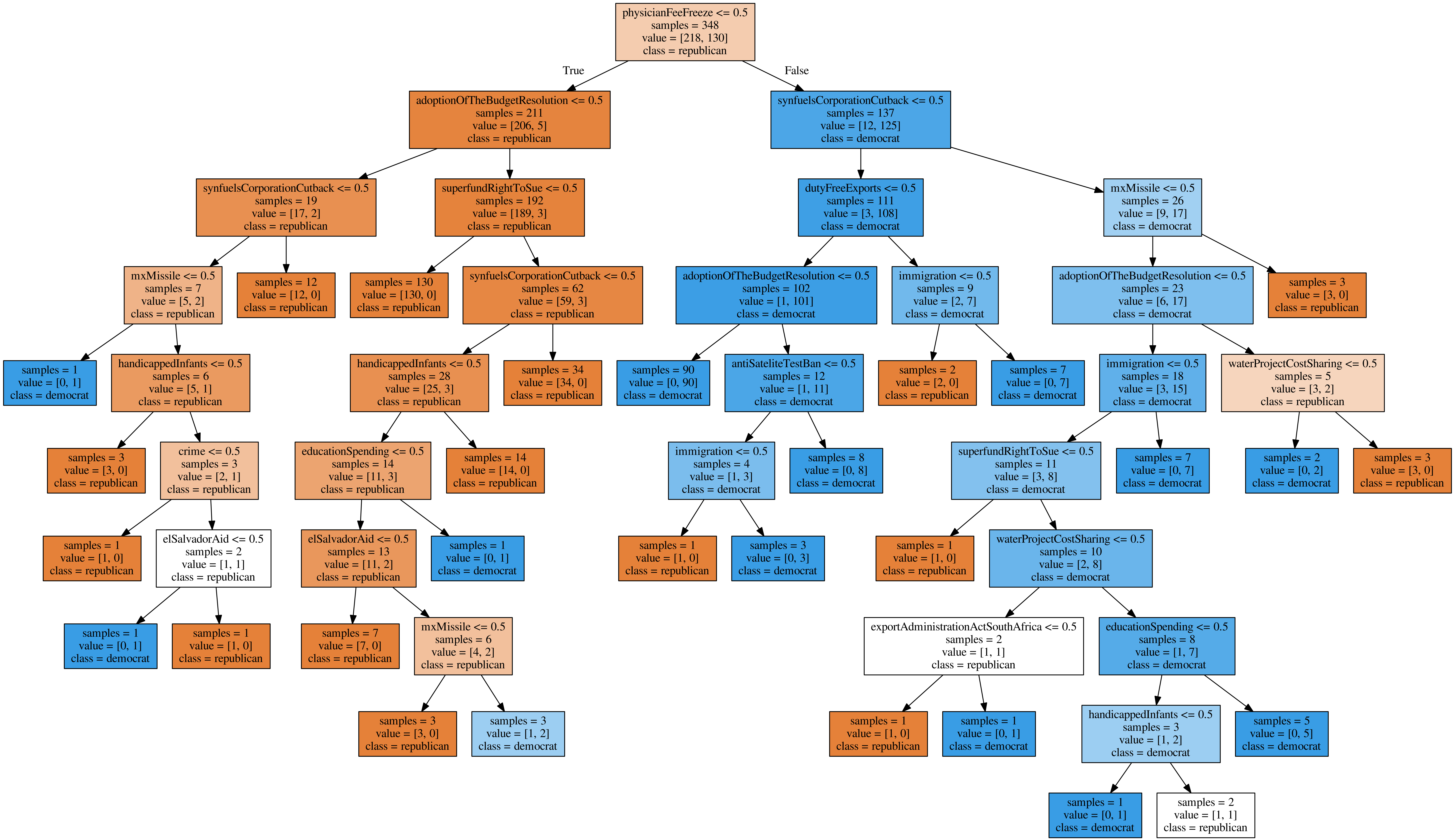
The five trees constructed in task 3 and the one constructed in task 1 have the same root node (physician fee freeze), which makes sense because it is the most important feature by far as discussed above. The first levels of the trees are fairly similar with adoption of the budget resolution and synfuels corporation cutback appearing in the first levels. The lower levels somewhat differ, but that is expected since the most important feature by far is physician fee freeze and the others are fairly equally unimportant.

physicianFeeFreeze <= 0.5
samples = 348
value = [211, 137]
class = republican
True
False
crime <= 0.5
samples = 203
value = [199, 4]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 145
value = [12, 133]
class = democrat
samples = 130
value = [130, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 73
value = [69, 4]
class = republican
dutyFreeExports <= 0.5
samples = 121
value = [3, 118]
class = democrat
immigration <= 0.5
samples = 24
value = [9, 15]
class = democrat
elSalvadorAid <= 0.5
samples = 34
value = [30, 4]
class = republican
samples = 39
value = [39, 0]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 110
value = [1, 109]
class = democrat
immigration <= 0.5
samples = 11
value = [2, 9]
class = democrat
mxMissile <= 0.5
samples = 15
value = [8, 7]
class = republican
dutyFreeExports <= 0.5
samples = 9
value = [1, 8]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 18
value = [17, 1]
class = republican
handicappedInfants <= 0.5
samples = 16
value = [13, 3]
class = republican
samples = 100
value = [0, 100]
class = democrat
immigration <= 0.5
samples = 10
value = [1, 9]
class = democrat
aidToNicaraguanContras <= 0.5
samples = 4
value = [2, 2]
class = republican
samples = 7
value = [0, 7]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 12
value = [5, 7]
class = democrat
samples = 3
value = [3, 0]
class = republican
samples = 7
value = [0, 7]
class = democrat
aidToNicaraguanContras <= 0.5
samples = 2
value = [1, 1]
class = republican
dutyFreeExports <= 0.5
samples = 4
value = [3, 1]
class = republican
samples = 14
value = [14, 0]
class = republican
immigration <= 0.5
samples = 9
value = [6, 3]
class = republican
samples = 7
value = [7, 0]
class = republican
aidToNicaraguanContras <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 8
value = [0, 8]
class = democrat
educationSpending <= 0.5
samples = 3
value = [2, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
exportAdministrationActSouthAfrica <= 0.5
samples = 10
value = [3, 7]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
waterProjectCostSharing <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 2
value = [2, 0]
class = republican
superfundRightToSue <= 0.5
samples = 6
value = [5, 1]
class = republican
samples = 3
value = [1, 2]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
handicappedInfants <= 0.5
samples = 3
value = [2, 1]
class = republican
handicappedInfants <= 0.5
samples = 7
value = [1, 6]
class = democrat
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
dutyFreeExports <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 4
value = [4, 0]
class = republican
samples = 2
value = [2, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 4
value = [0, 4]
class = democrat
educationSpending <= 0.5
samples = 3
value = [1, 2]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [1, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat

physicianFeeFreeze <= 0.5
samples = 348
value = [208, 140]
class = republican
True
False
adoptionOfTheBudgetResolution <= 0.5
samples = 201
value = [196, 5]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 147
value = [12, 135]
class = democrat
synfuelsCorporationCutback <= 0.5
samples = 21
value = [19, 2]
class = republican
superfundRightToSue <= 0.5
samples = 180
value = [177, 3]
class = republican
dutyFreeExports <= 0.5
samples = 120
value = [2, 118]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 27
value = [10, 17]
class = democrat
superfundRightToSue <= 0.5
samples = 10
value = [8, 2]
class = republican
samples = 11
value = [11, 0]
class = republican
samples = 124
value = [124, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 56
value = [53, 3]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 111
value = [1, 110]
class = democrat
waterProjectCostSharing <= 0.5
samples = 9
value = [1, 8]
class = democrat
elSalvadorAid <= 0.5
samples = 19
value = [4, 15]
class = democrat
antiSateliteTestBan <= 0.5
samples = 8
value = [6, 2]
class = republican
mxMissile <= 0.5
samples = 6
value = [4, 2]
class = republican
samples = 4
value = [4, 0]
class = republican
handicappedInfants <= 0.5
samples = 27
value = [24, 3]
class = republican
samples = 29
value = [29, 0]
class = republican
samples = 99
value = [0, 99]
class = democrat
immigration <= 0.5
samples = 12
value = [1, 11]
class = democrat
samples = 7
value = [0, 7]
class = democrat
aidToNicaraguanContras <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 2
value = [2, 0]
class = republican
educationSpending <= 0.5
samples = 17
value = [2, 15]
class = democrat
samples = 6
value = [6, 0]
class = republican
samples = 2
value = [0, 2]
class = democrat
samples = 1
value = [0, 1]
class = democrat
religiousGroupsInSchools <= 0.5
samples = 5
value = [4, 1]
class = republican
educationSpending <= 0.5
samples = 14
value = [11, 3]
class = republican
samples = 13
value = [13, 0]
class = republican
antiSateliteTestBan <= 0.5
samples = 4
value = [1, 3]
class = democrat
samples = 8
value = [0, 8]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
immigration <= 0.5
samples = 3
value = [1, 2]
class = democrat
waterProjectCostSharing <= 0.5
samples = 14
value = [1, 13]
class = democrat
crime <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 3
value = [3, 0]
class = republican
elSalvadorAid <= 0.5
samples = 13
value = [11, 2]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 3
value = [0, 3]
class = democrat
handicappedInfants <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
exportAdministrationActSouthAfrica <= 0.5
samples = 5
value = [1, 4]
class = democrat
samples = 9
value = [0, 9]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 8
value = [8, 0]
class = republican
antiSateliteTestBan <= 0.5
samples = 5
value = [3, 2]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
handicappedInfants <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 3
value = [0, 3]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 3
value = [1, 2]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat


physicianFeeFreeze <= 0.5
samples = 348
value = [218, 130]
class = republican
True
False
adoptionOfTheBudgetResolution <= 0.5
samples = 211
value = [207, 4]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 137
value = [11, 126]
class = democrat
synfuelsCorporationCutback <= 0.5
samples = 19
value = [17, 2]
class = republican
superfundRightToSue <= 0.5
samples = 192
value = [190, 2]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 112
value = [2, 110]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 25
value = [9, 16]
class = democrat
superfundRightToSue <= 0.5
samples = 7
value = [5, 2]
class = republican
samples = 12
value = [12, 0]
class = republican
samples = 137
value = [137, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 55
value = [53, 2]
class = republican
samples = 92
value = [0, 92]
class = democrat
antiSateliteTestBan <= 0.5
samples = 20
value = [2, 18]
class = democrat
elSalvadorAid <= 0.5
samples = 18
value = [4, 14]
class = democrat
antiSateliteTestBan <= 0.5
samples = 7
value = [5, 2]
class = republican
immigration <= 0.5
samples = 4
value = [2, 2]
class = republican
samples = 3
value = [3, 0]
class = republican
educationSpending <= 0.5
samples = 23
value = [21, 2]
class = republican
samples = 32
value = [32, 0]
class = republican
immigration <= 0.5
samples = 7
value = [2, 5]
class = democrat
samples = 13
value = [0, 13]
class = democrat
samples = 2
value = [2, 0]
class = republican
superfundRightToSue <= 0.5
samples = 16
value = [2, 14]
class = democrat
samples = 5
value = [5, 0]
class = republican
samples = 2
value = [0, 2]
class = democrat
samples = 1
value = [0, 1]
class = democrat
dutyFreeExports <= 0.5
samples = 3
value = [2, 1]
class = republican
elSalvadorAid <= 0.5
samples = 22
value = [21, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 5
value = [0, 5]
class = democrat
immigration <= 0.5
samples = 2
value = [1, 1]
class = republican
educationSpending <= 0.5
samples = 14
value = [1, 13]
class = democrat
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 14
value = [14, 0]
class = republican
antiSateliteTestBan <= 0.5
samples = 8
value = [7, 1]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
exportAdministrationActSouthAfrica <= 0.5
samples = 3
value = [1, 2]
class = democrat
samples = 11
value = [0, 11]
class = democrat
samples = 5
value = [5, 0]
class = republican
waterProjectCostSharing <= 0.5
samples = 3
value = [2, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [1, 1]
class = republican
samples = 2
value = [2, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat


physicianFeeFreeze <= 0.5
samples = 348
value = [213, 135]
class = republican
True
False
superfundRightToSue <= 0.5
samples = 206
value = [204, 2]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 142
value = [9, 133]
class = democrat
samples = 143
value = [143, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 63
value = [61, 2]
class = republican
dutyFreeExports <= 0.5
samples = 116
value = [2, 114]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 26
value = [7, 19]
class = democrat
dutyFreeExports <= 0.5
samples = 28
value = [26, 2]
class = republican
samples = 35
value = [35, 0]
class = republican
samples = 104
value = [0, 104]
class = democrat
immigration <= 0.5
samples = 12
value = [2, 10]
class = democrat
superfundRightToSue <= 0.5
samples = 18
value = [2, 16]
class = democrat
antiSateliteTestBan <= 0.5
samples = 8
value = [5, 3]
class = republican
waterProjectCostSharing <= 0.5
samples = 14
value = [12, 2]
class = republican
samples = 14
value = [14, 0]
class = republican
educationSpending <= 0.5
samples = 4
value = [2, 2]
class = republican
samples = 8
value = [0, 8]
class = democrat
samples = 1
value = [1, 0]
class = republican
waterProjectCostSharing <= 0.5
samples = 17
value = [1, 16]
class = democrat
samples = 5
value = [5, 0]
class = republican
samples = 3
value = [0, 3]
class = democrat
samples = 6
value = [6, 0]
class = republican
educationSpending <= 0.5
samples = 8
value = [6, 2]
class = republican
aidToNicaraguanContras <= 0.5
samples = 3
value = [2, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
exportAdministrationActSouthAfrica <= 0.5
samples = 4
value = [1, 3]
class = democrat
samples = 13
value = [0, 13]
class = democrat
elSalvadorAid <= 0.5
samples = 7
value = [6, 1]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
handicappedInfants <= 0.5
samples = 2
value = [1, 1]
class = republican
samples = 2
value = [0, 2]
class = democrat
samples = 4
value = [4, 0]
class = republican
mxMissile <= 0.5
samples = 3
value = [2, 1]
class = republican
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 2
value = [1, 1]
class = republican


physicianFeeFreeze <= 0.5
samples = 348
value = [218, 130]
class = republican
True
False
adoptionOfTheBudgetResolution <= 0.5
samples = 211
value = [206, 5]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 137
value = [12, 125]
class = democrat
synfuelsCorporationCutback <= 0.5
samples = 19
value = [17, 2]
class = republican
superfundRightToSue <= 0.5
samples = 192
value = [189, 3]
class = republican
dutyFreeExports <= 0.5
samples = 111
value = [3, 108]
class = democrat
mxMissile <= 0.5
samples = 26
value = [9, 17]
class = democrat
mxMissile <= 0.5
samples = 7
value = [5, 2]
class = republican
samples = 12
value = [12, 0]
class = republican
samples = 130
value = [130, 0]
class = republican
synfuelsCorporationCutback <= 0.5
samples = 62
value = [59, 3]
class = republican
adoptionOfTheBudgetResolution <= 0.5
samples = 102
value = [1, 101]
class = democrat
immigration <= 0.5
samples = 9
value = [2, 7]
class = democrat
adoptionOfTheBudgetResolution <= 0.5
samples = 23
value = [6, 17]
class = democrat
samples = 3
value = [3, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
handicappedInfants <= 0.5
samples = 6
value = [5, 1]
class = republican
handicappedInfants <= 0.5
samples = 28
value = [25, 3]
class = republican
samples = 34
value = [34, 0]
class = republican
samples = 90
value = [0, 90]
class = democrat
antiSateliteTestBan <= 0.5
samples = 12
value = [1, 11]
class = democrat
samples = 2
value = [2, 0]
class = republican
samples = 7
value = [0, 7]
class = democrat
immigration <= 0.5
samples = 18
value = [3, 15]
class = democrat
waterProjectCostSharing <= 0.5
samples = 5
value = [3, 2]
class = republican
samples = 3
value = [3, 0]
class = republican
crime <= 0.5
samples = 3
value = [2, 1]
class = republican
educationSpending <= 0.5
samples = 14
value = [11, 3]
class = republican
samples = 14
value = [14, 0]
class = republican
immigration <= 0.5
samples = 4
value = [1, 3]
class = democrat
samples = 8
value = [0, 8]
class = democrat
superfundRightToSue <= 0.5
samples = 11
value = [3, 8]
class = democrat
samples = 7
value = [0, 7]
class = democrat
samples = 2
value = [0, 2]
class = democrat
samples = 3
value = [3, 0]
class = republican
samples = 1
value = [1, 0]
class = republican
elSalvadorAid <= 0.5
samples = 2
value = [1, 1]
class = republican
elSalvadorAid <= 0.5
samples = 13
value = [11, 2]
class = republican
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 3
value = [0, 3]
class = democrat
samples = 1
value = [1, 0]
class = republican
waterProjectCostSharing <= 0.5
samples = 10
value = [2, 8]
class = democrat
samples = 1
value = [0, 1]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 7
value = [7, 0]
class = republican
mxMissile <= 0.5
samples = 6
value = [4, 2]
class = republican
exportAdministrationActSouthAfrica <= 0.5
samples = 2
value = [1, 1]
class = republican
educationSpending <= 0.5
samples = 8
value = [1, 7]
class = democrat
samples = 3
value = [3, 0]
class = republican
samples = 3
value = [1, 2]
class = democrat
samples = 1
value = [1, 0]
class = republican
samples = 1
value = [0, 1]
class = democrat
handicappedInfants <= 0.5
samples = 3
value = [1, 2]
class = democrat
samples = 5
value = [0, 5]
class = democrat
samples = 1
value = [0, 1]
class = democrat
samples = 2
value = [1, 1]
class = republican