Preventing Overfitting in Decision Trees

11 questions

1 point

1. (True/False) When learning decision trees, smaller depth USUALLY translates to lower training error.

- ○ True
- ◉ False

1 point

2. (True/False) If no two data points have the same input values, we can always learn a decision tree that achieves 0 training error.

- ◉ True
- ○ False

1 point

3. (True/False) If decision tree T1 has lower training error than decision tree T2, then T1 will always have better test error than T2.

- ○ True
- ◉ False

1 point

4. Which of the following is true for decision trees?

- ○ Model complexity increases with size of the data.
- ◉ Model complexity increases with depth.
- ○ None of the above

1 point

5. Pruning and early stopping in decision trees is used to

- ◉ combat overfitting
- ○ improve training error
- ○ None of the above

1 point

6. Which of the following is NOT an early stopping method?

- ○ Stop when the tree hits a certain depth
- ○ Stop when node has too few data points (minimum node "size")
- ◉ Stop when every possible split results in the same amount of error reduction
- ○ Stop when best split results in too small of an error reduction

1 point

7. Consider decision tree T1 learned with minimum node size parameter = 1000. Now consider decision tree T2 trained on the same dataset and parameters, except that the minimum node size parameter is now 100. Which of the following is always true?

- ☐ The depth of T2 >= the depth of T1
- ☐ The number of nodes in T2 >= the number of nodes in T1
- ☑ The test error of T2 <= the test error of T1
- ☐ The training error of T2 <= the training error of T1

1 point

8. Questions 8 to 11 refer to the following common scenario:

Imagine we are training a decision tree, and we are at a node. Each data point is (x1, x2, y), where x1,x2 are features, and y is the label. The data at this node is:

x1	x2	y
0	1	+1
1	0	+1
0	1	+1
1	1	-1

What is the classification error at this node (assuming a majority class classifier)?

0.25

1 point

9. Refer to the scenario presented in Question 8.

If we split on x1, what is the classification error?

0.25

1 point

10. Refer to the scenario presented in Question 8.

If we split on x2, what is the classification error?

0.25

1 point

11. Refer to the scenario presented in Question 8.

If our parameter for minimum gain in error reduction is 0.1, do we split or stop early?

- ○ Split
- ◉ Stop early

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