

Quiz 1 - Decision Trees

Total points 11/20

1. More than one options may be correct. You have to check all correct answers for full credit. No partial credits.
2. Upload /Submit solutions for Q3(b) and Q5.
3. Note that the Questions are shuffled.

Max Marks: 20

Max Time : 40 mts (+10 minutes if you are uploading two files)

✗ Q 2(b). Give reason for your choice.

0/4

Binary splits are preferable for continuous attributes

✗

Feedback

See answer to Q2a.

✓ Q1. Consider a decision tree of depth 2 (T1) and a decision tree that is grown till a maximum depth of 4 (T2). Which of the following is/are correct? 2/2

☐ Bias(T1) < Bias(T2)

☒ Bias(T1) > Bias(T2)

✓

☒ Variance(T1) < Variance(T2)

✓

☐ Variance(T1) > Variance(T2)



✗ Q2. (a) Given a training set with 4 numeric attributes. A DT induction algorithm always splits one node into k branches, and decides k for each node by calculating the information gain for different values of k . Thus it optimizes simultaneously over the splitting threshold(s) and k . Which of the following is/are true? 0/2

- ☒ The algorithm will always choose $k = 2$ ✗
- ☐ The algorithm will prefer high values of k
- ☐ There will be $(k-1)$ thresholds for a k -ary split
- ☐ This model is strictly more powerful than a binary decision tree.

Correct answers

- ☒ The algorithm will prefer high values of k
- ☒ There will be $(k-1)$ thresholds for a k -ary split

Feedback

It is possible to have K branches for numeric attributes when you consider K intervals for an attribute. Clearly $k-1$ thresholds are required for k splits. Higher values of k will always lead to more pure partitions of the data, which will ultimately lead to higher information gain.

✗ Q4. Consider d -dimensional training set with N instances. If all attributes are continuous, what is the maximum number of leaf nodes in a decision tree for this data? Give reason for your answer. 0/3

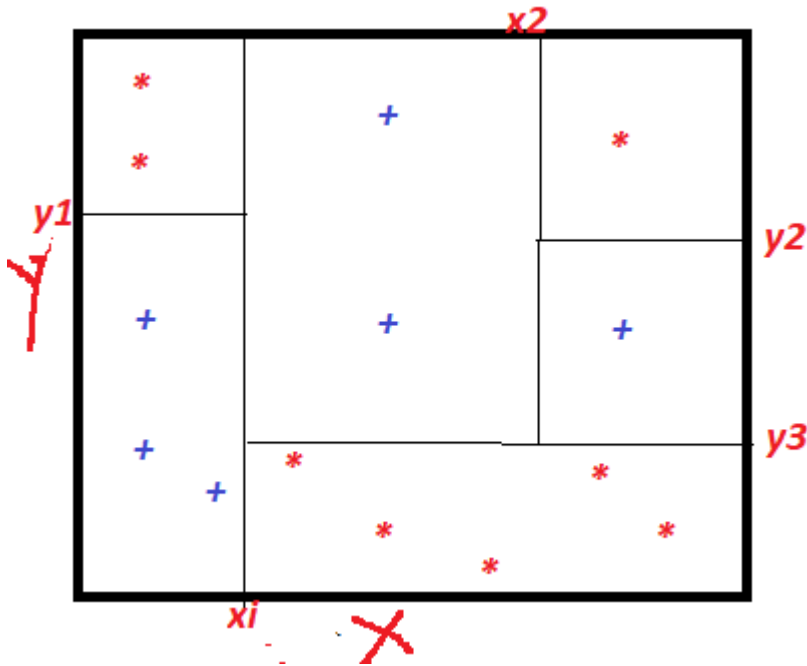
There may be N nodes for every instance ✗

✓ Q 3(b) Submit the sheet with calculations for Q 3 (a) 4/4



- ✓ Q. 5. Draw the decision tree for the following decision boundaries. Upload/Submit the solution.

3/3



- ✓ Q3 (a). Consider the training set X , with instance $x = (f_1, f_2, L)$. Here, f_1 denotes feature 1, f_2 denotes feature 2, and L denotes the label. Which of the following splits at the root node gives the highest information gain?
 $X = \{(10, 3, 1), (6, 3, 1), (2, 7, 0), (9, 6, 1), (4, 2, 0)\}$.

☐ $f_1 > 2$

☒ $f_1 > 4$

☐ $f_2 > 3$

☐ $f_2 > 6$



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