

HW01: Decision trees

Hand in via moodle at: <https://moodle.umass.edu/course/view.php?id=20836>. Remember that only PDF submissions are accepted. We encourage using L^AT_EX to produce your writeups. See `hw00.tex` for an example of how to do so. You can make a `.pdf` out of the `.tex` by running “`pdflatex hw00.tex`”. You’ll need `mydefs.sty` and `notes.sty` which can be downloaded from the course page.

1. How many decision trees are there with 3 binary attributes? With 4?
2. In class we looked at an example where all the attributes were binary (i.e., yes/no valued). Consider an example where instead of the attribute “Morning?”, we had an attribute “Time” which specifies when the class begins.
 - (a) We can pick a threshold τ and use $(\text{Time} < \tau)?$ as a criteria to split the data in two. Explain how you might pick the optimal value of τ .
 - (b) In the decision tree learning algorithm discussed in class, once a binary attribute is used, the subtrees do not need to consider it. Explain why when there are continuous attributes this may not be the case.
3. Give two reasons why memorizing the training data and doing table lookups is a bad strategy for learning.