

Washington State University
School of Electrical Engineering and Computer Science
Fall 2017

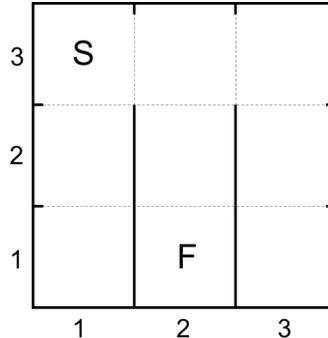
CptS 440/540 Artificial Intelligence

Homework 2

Due: September 21, 2017 (11:59pm)

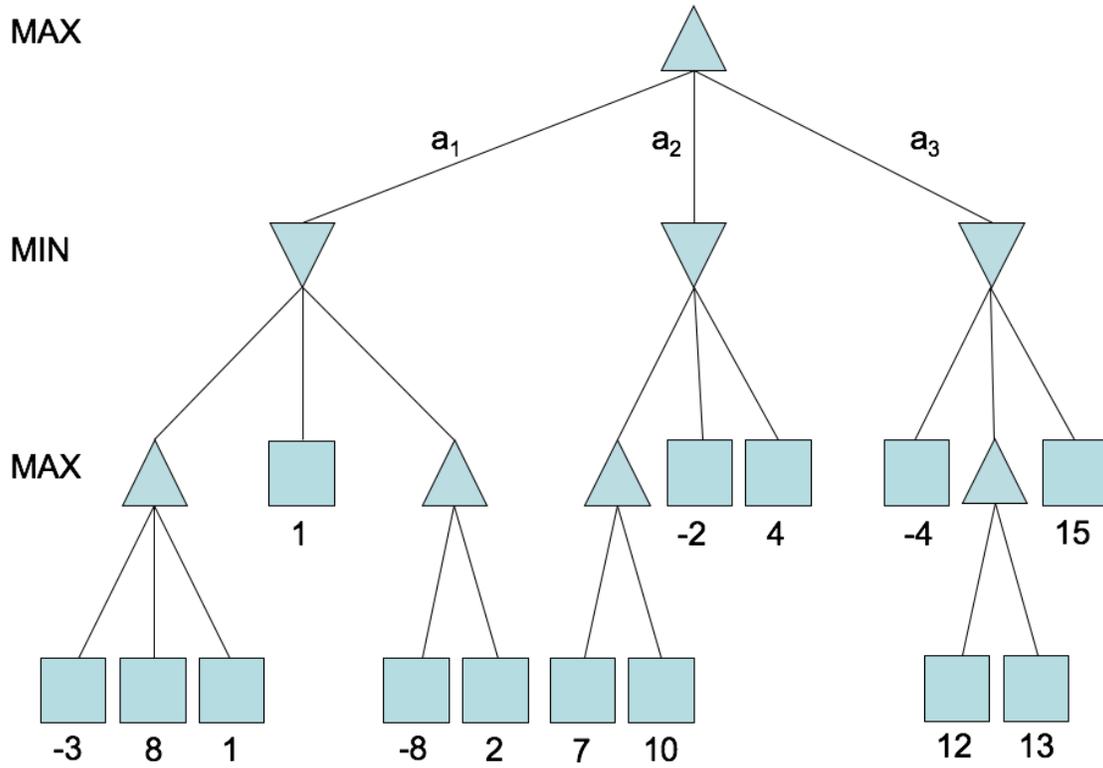
General Instructions: Put your answers to the following problems into electronic form. Your answers to problems 1-2 should be a PDF document. Your answer to problem 3 should be in Agent.h and Agent.cc files (or PyAgent.py file), perhaps with a readme.txt file. Collect all these homework files into one zip file and submit as an attachment under Content → Homework 2 for the course CptS 440 Pullman (all sections of CptS 440 and 540 are merged under the CptS 440 Pullman section) on the Blackboard Learn system by the above deadline. Note that you may submit multiple times, but we will only grade the most recent entry submitted before the above deadline.

1. Consider the maze problem from HW1, where again the goal is to get from the Start location in (1,3) to the Finish location in (2,1). There are four moves available at each location: up, down, left, right. If a move runs into a wall, then you will stay in the same location.



- a. Draw the search tree generated by A* search using straight-line (Euclidean) distance for the heuristic h . As you draw child nodes from left to right, consider actions in the order: up, down, left, right (label branches with U, D, L, R). For each node, show the values of f , g and h . If two nodes have the same f value, then prefer nodes farther to the right in the search tree.
- b. Is the heuristic used in part (a) admissible? Justify your answer.
- c. Draw the search tree generated by hill-climbing search using value = $1/(c+1)$, where c is the city-block distance. Remember that the search does not stop until all generated successor nodes are no better than their parent.
- d. *CptS 540 students only.* Repeat part (a) using city-block distance for the heuristic h .

2. Perform alpha-beta pruning on the following tree. Upward-pointing triangles are MAX nodes, downward-pointing triangles are MIN nodes, and squares are terminal nodes. Put an "X" over each node that is pruned, i.e., not evaluated (including all nodes in a pruned subtree). Put the final value next to all other nodes. Finally, indicate which action MAX should take: a_1 , a_2 or a_3 .



3. Wumpus World problem coming soon...