NORWEGIAN UNIVERSITY OF SCIENCE AND
TECHNOLOGY

Assignment 3 - Minimax and Alpha-Beta Pruning
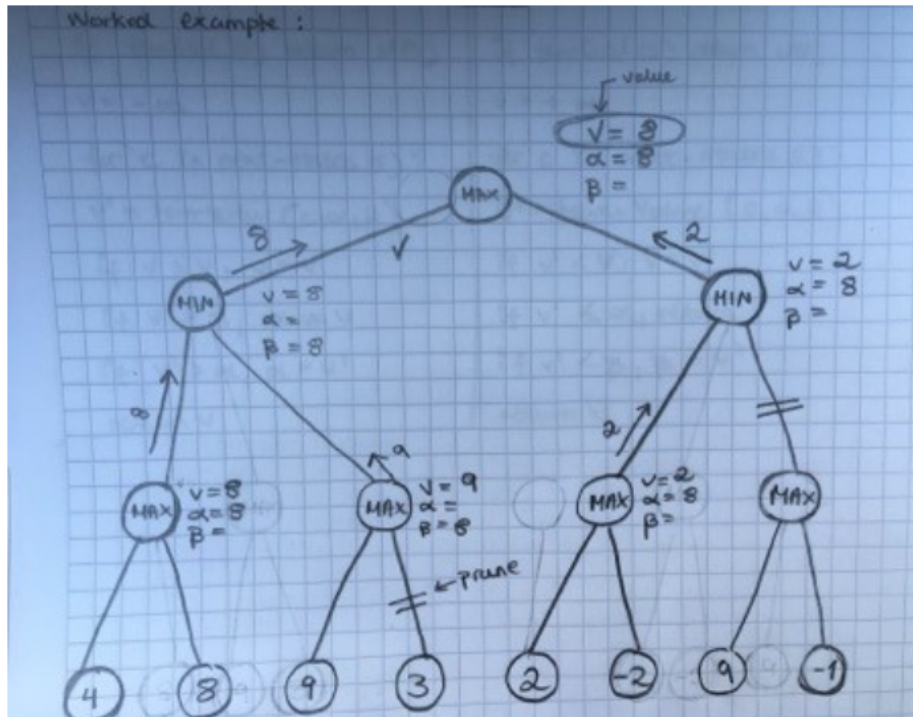
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Figure 1: Example of minimax with Alpha-Beta Pruning

Max - trying to maximize the reward of the game. Min - trying to minimize the reward of the game. Alpha - the value of the best (i.e., highest-value) choice we have found so far at the choice point along the for MAX. Beta- the value of the best (i.e., lowest-value) choice we have found so far at any choice point along the path for MIN. Alpha-Beta Pruning is a way to make MIN-MAX search much more effective. It is a way of essentially say "you do not need to generate any more children, because there is no way we are going to take your path".

1   Question 2 - Minimax

Code: See multiAgents.py for all code changes with comments. 5/5 points are achieved.
Results: See question 3 for the successful output from the autograder.

2   Question 3 - Alpha-Beta Pruning

Code: See multiAgents.py for all code changes with comments. 5/5 points are achieved.

Here are the successful output from the autograder (we've removed the results from q1, q4 and q5, as they were only throwing exceptions):

Question q2

===========

*** PASS: $test_cases2 - lecture - 6 - tree.test$
$*** PASS : test_cases2 - small - tree.test$
$*** PASS : test_cases2 - 1 - minmax.test$
$*** PASS : test_cases2 - 2 - minmax.test$
$*** PASS : test_cases2 - 3 - minmax.test$
$*** PASS : test_cases2 - 4 - minmax.test$
$*** PASS : test_cases2 - 5 - minmax.test$
$*** PASS : test_cases2 - 6 - minmax.test$
$*** PASS : test_cases2 - 7 - minmax.test$
$*** PASS : test_cases2 - 8 - minmax.test$
$*** PASS : test_cases2 - 1a - vary - depth.test$
$*** PASS : test_cases2 - 1b - vary - depth.test$
$*** PASS : test_cases2 - 2a - vary - depth.test$
$*** PASS : test_cases2 - 2b - vary - depth.test$
$*** PASS : test_cases2 - 3a - vary - depth.test$
$*** PASS : test_cases2 - 3b - vary - depth.test$
$*** PASS : test_cases2 - 4a - vary - depth.test$
$*** PASS : test_cases2 - 4b - vary - depth.test$
$*** PASS : test_cases2 - one - ghost - 3level.test$
$*** PASS : test_cases2 - one - ghost - 4level.test$
$*** PASS : test_cases2 - two - ghosts - 3level.test$
$*** PASS : test_cases2 - two - ghosts - 4level.test$
$*** PASS : test_cases2 - tied - root.test$
$*** PASS : test_cases2 - 1a - check - depth - one - ghost.test$
$*** PASS : test_cases2 - 1b - check - depth - one - ghost.test$
$*** PASS : test_cases2 - 1c - check - depth - one - ghost.test$
$*** PASS : test_cases2 - 2a - check - depth - two - ghosts.test$
$*** PASS : test_cases2 - 2b - check - depth - two - ghosts.test$
$*** PASS : test_cases2 - 2c - check - depth - two - ghosts.test$
$*** Running Minimax Agent on small Classic 1 time(s).$
$Pacman died! Score : 84$
$Average Score : 84.0$
$Scores : 84.0$
$Win Rate : 0/1 (0.00)$
$Record : Loss$
$*** Finished running Minimax Agent on small Classic after 1 seconds.$
$*** Won 0 out of 1 games. Average score : 84.000000 ***$
$*** PASS : test_cases2 - pacman - game.test$

Question q2: 5/5

Question q3
===========

*** PASS: $test_cases3 - lecture - 6 - tree.test$
*** $PASS : test_cases3 - small - tree.test$
*** $PASS : test_cases3 - 1 - minmax.test$
*** $PASS : test_cases3 - 2 - minmax.test$
*** $PASS : test_cases3 - 3 - minmax.test$
*** $PASS : test_cases3 - 4 - minmax.test$
*** $PASS : test_cases3 - 5 - minmax.test$
*** $PASS : test_cases3 - 6 - minmax.test$
*** $PASS : test_cases3 - 7 - minmax.test$
*** $PASS : test_cases3 - 8 - minmax.test$
*** $PASS : test_cases3 - 1a - vary - depth.test$
*** $PASS : test_cases3 - 1b - vary - depth.test$
*** $PASS : test_cases3 - 2a - vary - depth.test$
*** $PASS : test_cases3 - 2b - vary - depth.test$
*** $PASS : test_cases3 - 3a - vary - depth.test$
*** $PASS : test_cases3 - 3b - vary - depth.test$
*** $PASS : test_cases3 - 4a - vary - depth.test$
*** $PASS : test_cases3 - 4b - vary - depth.test$
*** $PASS : test_cases3 - one - ghost - 3level.test$
*** $PASS : test_cases3 - one - ghost - 4level.test$
*** $PASS : test_cases3 - two - ghosts - 3level.test$
*** $PASS : test_cases3 - two - ghosts - 4level.test$
*** $PASS : test_cases3 - tied - root.test$
*** $PASS : test_cases3 - 1a - check - depth - one - ghost.test$
*** $PASS : test_cases3 - 1b - check - depth - one - ghost.test$
*** $PASS : test_cases3 - 1c - check - depth - one - ghost.test$
*** $PASS : test_cases3 - 2a - check - depth - two - ghosts.test$
*** $PASS : test_cases3 - 2b - check - depth - two - ghosts.test$
*** $PASS : test_cases3 - 2c - check - depth - two - ghosts.test$
*** $Running AlphaBeta Agent on smallClassic 1 time(s).$
$Pacman died! Score : 84$
$Average Score : 84.0$
$Scores : 84.0$
$Win Rate : 0/1(0.00)$
$Record : Loss$
*** $Finished running AlphaBeta Agent on smallClassic after 0 seconds.$
*** $Won 0 out of 1 games. Average score : 84.000000 ***$
*** $PASS : test_cases3 - pacman - game.test$

Question q3: 5/5

Finished at 13:46:25

Provisional grades
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Question q1: 0/4
Question q2: 5/5
Question q3: 5/5
Question q4: 0/5
Question q5: 0/6
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Total: 10/25

Your grades are NOT yet registered. To register your grades, make sure to follow your instructor's guidelines to receive credit on your project.