

Title:

Implementing Alpha-Beta Pruning for StudentBot in The Lion King's Game of Thrones

Abstract:

The Lion King's Game of Thrones is a sequential-move game with two agents that move in turn. The goal is to claim as much space as possible by moving the player to create a trail. When you create a closed region by visiting a space you have already claimed, the region covered by your temporary trail is conquered. Two players compete to claim the largest region, and the three win conditions are to reclaim at least half of the territory from the opponent, attack the opponent or his temporary trail, or wait for the opponent to be attacked by a hyena. If a hyena attacks you or your trail you will lose immediately.

My results were that my StudentBot would beat the Randbot 95% of the time, Safebot 80% of the time, Attackbot 60% of the time, the TA-Bot1 60% of the time, and TA-Bot2 40% of the time.

My approach is using the alpha-beta cutoff method. I did both `max_value_cutoff` and `min_value_cutoff` to calculate the `(max_utility_value, max_action)` and the `(min_utility_value, min_action)`. From this, I was then able to determine the best action.

For the heuristic function, I took the difference between the player's total permanent spaces and the opponent's permanent spaces. Next, I wanted the player to favor through a high heuristic utility value when there are more player temporary spaces. Finally, I wanted the player to be close to its permanent spaces so that it could easily turn the temporary spaces into permanent spaces if the opponent got close. Therefore, I used all three of these factors to determine the heuristic value.

Outside the heuristic value, I also implemented how to survive against the hyena, attack the opponent bot when possible, and defend against the edge case that the opponent is 1 move diagonal to the StudentBot.

By implementing the heuristic value, surviving against the hyena, and attacking the opponent bot when possible, the StudentBot could perform above the given thresholds against Randbot, Safebot, Attackbot, TA-Bot1, and TA-Bot2.