

Comparing Increasing depth and better evaluation functions

Evaluation Function

I designed 4 types of evaluation functions. They are as follows:

1. Offensive (named evaluator in AlphaBetaSearch.java)
2. Offensive + double jump checks
3. Defensive (named evaluator1 in AlphaBetaSearch.java)
4. Defensive + double jump checks

The offensive heuristic prioritizes killing the opponent more than saving pieces. This is achieved by giving more weight to the pawns in the front row.

The defensive heuristic prioritizes the pawns in the first row of the black player by giving those pawns more weight. This heuristic sacrifices the pawns in the front by making them jump more often.

The double jump check is in charge of making sure to eliminate the double jump opportunities for the red player while maximizing double jumps for the black player. When coupled with offensive strategy, it will try and kill every red player with as many double jumps as possible but sacrifices a lot of pawns in the process. When coupled with the defensive heuristic, it will try and save as many pawns as it can in the back row of the black player while making smart sacrifices to get more double jump opportunities.

Depth 6

At depth 6, the alpha beta search takes under 2 seconds to pick a move. Coupled with double jump checks, the time taken to pick a move stays the same.

Depth 12

At depth 12, the alpha beta search takes around 2-3 seconds to pick a move but in some edge cases, it takes almost 12 seconds to pick a move. Coupled with double jump checks, the algorithm still takes around 3 seconds to pick a move but in some early game cases, it takes more than 20 seconds.

Depth 16

At depth 16, the alpha beta search takes less than 20 seconds to pick a move in most cases. Coupled with double jump checks, on average, the algorithm takes around 3 minutes and 30 secs.

Depth 18

At depth 18, in most cases, the alpha beta search takes more than 2 minutes to pick a move. In some edge cases, it takes more than 6 minutes to pick a move. I tried coupling depth 18 with double jump checks but my testing was inconclusive. It took much more than acceptable time limits.