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Game: Khet

Intro/Description of problem:

The game we have chosen to program an AI for is the laser game Khet. Khet is a lot like chess. it is a grid with all pieces known and each player is given the task of defeating the enemy pharaoh. The difference between Khet and Chess is that instead of moving pieces to take out the opponents pharaoh, each player has a ‘sphinx’ which fires a laser at the end of each his turn. Both player’s pieces on the board are either mirrors to reflect the laser or blocks to stop he laser. Mirrored pieces change the direction of the beam and are kept in play, but if a piece is hit on a non-mirrored side, then it is removed. The goal of Khet is to hit your opponent’s pharaoh with your laser while also protecting yours from getting hit. Our goal is to program both the game to be playable by humans through simple console commands and by our own programmed agents.

Solutions we found and their merits:

            Because Khet is a relatively new game compared with games like chess or Go, it does not have much critical research devoted specifically to it. We were, however, able to find one master’s thesis which looks deeply into both minimax/alpha-beta pruning solutions and Monte Carlo solutions for Khet. [1] In order to have a sufficiently broad take on these algorithms and their advantages and disadvantages, we looked more closely at other examples of their employment. We found one paper which describes a variation on a Scouting algorithm called Negascout. [2] We took notice of this paper because it claims that its algorithm explores 20 to 30 percent fewer nodes than does alpha-beta pruning. We also found a simple paper describing the use of Monte-Carlo tree search in a game context. [3]

            Due to the ease of mutability in our agent design, we chose to implement all three different algorithms and test them against each other. Our intention with this testing was to determine which algorithm won more often, and which algorithm performed faster on average.

Our Solutions:

            We decided to use the same heuristic function for all three algorthms that is described in the master’s thesis.

Outline:

Intro/Description of problem

Solutions we found and their merits

Our solutions

How it performed

Conclusion

Citations

[1] Using Intelligent Search Techniques to Play the Game Khet.

<https://project.dke.maastrichtuniversity.nl/games/files/msc/pmthesis.pdf>

[2] An improvement to the scout tree search algorithm.pdf. (n.d.).

<http://www.top-5000.nl/ps/An%20improvement%20to%20the%20scout%20tree%20search%20algorithm.pdf>

[3] Chaslot, G., Bakkes, S., Szita, I., & Spronck, P. (2006). Monte-Carlo Tree Search : A New Framework for Game AI, 216–217.

<http://www.aaai.org/Papers/AIIDE/2008/AIIDE08-036.pdf>