Summary of "Game Tree Searching by Min / Max Approximation" by Ron Rivest

Over the years, computer science has put significant focus on the concept of game playing, specifically the study and design of intelligent game-playing agents. One technique that usually helps in the process of designing an intelligent game-playing agent is searching game trees. For certain types of games, it is possible to trace out all the possible configurations of events that could happen in the course of a game. Traversing all these possible configurations to know the best move to make at each point in the game, is one of the main goals of game tree search. In this paper, Ron Rivest suggests a new way to efficiently search a game tree. This new way of searching a game tree is called Min/Max Approximation.

As its name suggests, Min/Max Approximation focuses on approximating how likely traversing a node in a game tree will lead to a winning state. For the purpose of brevity, we will call this approximate value given to a node, score. The technique proposed by Ron Rivest use a penalty-based iterative heuristic, that decides which of a given node's children has the least penalty, and then traverses down the resulting node. Using a combination of derivatives, and backing up node scores on each on iteration during game search, Ron Rivest hypothesizes that this technique should lead agents to picking more optimal moves during game play.

At the end of the paper, Ron Rivest describes a summary of an experiment ran to compare the performance of Min/Max Approximation versus that of AlphaBeta Pruning. Two types of experiments were run on both algorithms. The first was a time bound experiment, where each agent had a limited amount of time to pick a move on each turn. The second was a move bound experiment, where each agent had a limited number of game tree nodes to touch in its search before picking a move.

The results from the first experiment (time bound) showed that AlphaBeta Pruning did better than the Min/Max Approximation. However, on the second experiment (move bound) Min/Max Approximation did better than AlphaBeta Pruning.

Ron Rivest closed the paper by suggesting that since this algorithm is relatively new, further experiments and research will need to be done on it, to refine its results.