Game Tree Searching by Min / Max Approximation by Ron Rivest, MIT

A brief summary of the paper's goals or techniques introduced

The paper presents a technique to improve game tree searching by using min/max approximation. This technique tries to expand the node in the tree that has the largest effect on the value of the root node.

In order to find the best node, the author presents a method called "penalty-based iterative search" which assigns a "penalty" to every edge of the tree so that bad moves are penalized more heavily than good moves. Edges with the smallest penalty are expanded and the whole process is repeated iteratively. The min/max approximation heuristic is a special case of the penalty-based search method where penalties represent the derivatives of the approximating function. In this case, Generalized Mean Values is the approximating function and is preferred to min/max because its derivative is continuous.

A brief summary of the paper's results

The author states that his technique is superior to minimax search with alpha-beta pruning when the number of moves is the limiting factor but the technique has higher overhead and therefore minimax is still a better option when CPU time per turn is the limiting factor.

The author reached this conclusion by playing 980 games of the "Connect-four" game against an adversary using minimax with alpha-beta pruning.