

Game Tree Searching by Min / Max Approximation

In his paper “Game Tree Searching by Min / Max Approximation, Ronald L. Rivest introduced a new technique for game search tree that he suggest is superior to the minimax algorithm with alpha-beta pruning.

The idea is to approximate the min and max operator by linear operator. The linear operator has a continuous derivative and as such is more suitable for sensitivity analysis.

Using this property, it is possible to identify in an interesting way the leaf in a game tree upon whose value the value at the root depends most strongly.

In order to evaluate the algorithm, a set of experiments was done using the game “connect four”. The new algorithm was compared with a traditional minimax algorithm with alpha-beta pruning and iterative deepening.

49 different starting positions were evaluated. And two parameters where varied, the max time per round and the number of moves allowed to be visited.

From this experiments, it is apparent that the new algorithm performs better when bounding the number of moves but do not improve on minimax when bounding time due to the computational complexity of the heuristic.