# Game Tree Searching by Min/Max Approximation

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# The idea

The paper introduces a new technique for searching in game trees, based on the idea of approximating the min and max operators with generalized mean-value operators.

This technique tries to solve the need of a method which will always expand the node that is expected to have the largest effect on the value.

# The approach

The major reason why the generalized means are used is because they are more suitable for a *sensitive analysis* than the min or max functions.

# The assumption

Most of the familiar games as one increases the search depth, the accuracy of the algorithm seems to improve. However, there are *pathological* games for which increasing the depth seems to yield less accuracy. This algorithm assumes that is used in non-pathological games.

# The context

The paper also describes a well-known iterative search heuristic: *MiniMax*.

# The solution

It is presented a penalty-based iterative search method which make uses of estimates as the values of the different sub-trees. Nonnegative *penalties* will help to distinguish edges representing bad and good moves. The algorithm will expand the node which has least penalty.

# The results

The initial experimental results leads to the following conclusion:

- MiniMax Approximation approach can produce play superior to that produced by MiniMax Search with Alpha-Beta Pruning, for the same number of calls to the underlying *move* operator.
- When CPU time is the limiting resource, MiniMax Search with Alpha-Beta Pruning seems to play better.