METHODEN ZUR KONSTRUKTION VON BEWERTUNGSFUNKTIONEN

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This slender document is a tutorial effort, concentrating on evaluation functions as a means to an end, the end being effective construction of game-playing algorithms, and, beyond that, to goal-directed programs generally. The background assumed is that of a rather unworldly pure mathematician. It is therefore quite refreshing to note that the many examples are down to earth and show a fine awareness of merits and drawbacks of the computers' chess scene in so far as it attracts or should attract academic attention.

COMPUTER-CHESS ARTICLES PUBLISHED ELSEWHERE

Starting from this issue the Editors intend to give relevant details on computer-chess literature published in other journals. Authors (or others) wishing to have such information included are requested to provide the Editors with one complete copy and all relevant details.

Hermann Kaindl, Reza Shams, and Helmut Horacek (1992). Minimax Search Algorithms with and without Aspiration Windows. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 13, No. 12, pp. 1225-1235.

Abstract – This paper is based on investigations of several algorithms for computing exact *minimax values* of game trees (utilizing *backward pruning*). The focus is especially on trees with an ordering similar to that we have actually found in game-playing practice. We also compare the algorithms using two different distributions of the static values, the uniform distribution, and a distribution estimated from practical data. Moreover, this is the first systematic comparison of using aspiration windows for all of the usual minimax algorithms. We analyze the effects of *aspiration windows* of varying size and position.
Increasing the ordering of moves to near the optimum results in unexpectedly high savings. Algorithms with linear space complexity especially benefit most. Although the ordering of the first move is of predominant importance, that of the remainder has only second-order effects. The use of an *aspiration window* not only makes *alpha-beta* search competitive, but there also exists previously unpublished dependencies of its effects on certain properties of the trees. In general, the more recently developed algorithms with exponential space complexity are not to be recommended for game-playing practice since their advantage in having to visit fewer nodes is more than outweighed under practical conditions by their enormous space requirements. Finally, we propose a method for an analytic determination of estimates of the *optimal window size*, presupposing evidence about some characteristic properties of the domain of application. In summary, we discovered and found empirical evidence for several effects unpredicted by theoretical studies.