LITERATURE RECEIVED

EXPERIMENTS IN SEARCH AND KNOWLEDGE

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We quote the abstract:

As a contribution to experimental computer science and artificial intelligence, a set of experiments were conducted to examine issues in heuristic knowledge and search strategies for a chess expert system. The results could not be obtained using existing theory, yet were observed in practice, and required experimental confirmation.

Search and knowledge are fundamental components of all expert systems. The performance of a computer chess program is tied not only to its expert knowledge, but also to the speed at which the program operates. Better search algorithms improve performance by building smaller trees. A new enhancement to the alpha-beta search algorithm, the history heuristic, is introduced. Experiments show that it is possible to reduce tree sizes to within 50% of the minimal tree, with the history heuristic accounting for 88% of the savings. Two new minimax algorithms are presented for searching application-independent game trees. Experiments show that they are comparable to SSS* in nodes searched with significantly lower time and space overheads.

The knowledge of the chess expert system is evaluated by performing a series of experiments using programs with different levels of expertise. From this, the relative importance of each expert component can be measured and the interactions observed. These experiments provide insight into some difficulties in expert system design. Finally, the trade-offs of search versus knowledge are examined. It is shown that knowledge can be substituted for search only to a limited extent before the knowledge requirements become impractical.