Using patterns and plans in chess.

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Using Patterns and Plans in Chess

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ABSTRACT

The purpose of this research is to investigate the extent to which knowledge can replace and support search in selecting a chess move and to delineate the issues involved. This has been carried out by constructing a program, PARADISE (PAttern Recognition Applied to Directing SEarch), which finds the best move in tactically sharp middle game positions from the games of chess masters. It encodes a large body of knowledge in the form of production rules. The actions of the rules post concepts in the data base while the conditions match patterns in the chess position and data base. The program uses the knowledge base to discover plans during static analysis and to guide a small tree search which confirms that a particular plan is best. The search is "small" in the sense that the size of the search tree is of the same order of magnitude as a human master's search tree (tens and hundreds of nodes, not thousands to hundreds of thousands as in many computer chess programs).

Once a plan is formulated, it guides the tree search for several ply and expensive static analyses (needed to analyze a new position) are done infrequently. PARADISE avoids

placing a depth limit on the search (or any other artificial effort limit). By using a global view of the search tree, information gathered during the search, and the analysis provided by the knowledge base, the program produces enough terminations to force convergence of the search. PARADISE has found combinations as deep as 19 ply.

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