Special issue on Heuristic search, edited by Rina Dechter, Richard Korf and Weixiong Zhang

M. Seo, H. Iida and J.W.H.M. Uiterwijk, The PN*-search algorithm: Application to Tsume-Shogi

This paper proposes a new search algorithm, denoted PN*, for AND/OR tree search. The algorithm is based on proof-number (PN) search, a best-first search algorithm, proposed by Allis et al. [Artificial Intelligence 66 (1) (1994) 91–124], and on Korf’s RBFS algorithm [Artificial Intelligence 62 (1) (1993) 41–78]. PN* combines several existing ideas. It transforms a best-first PN-search algorithm into an iterative-deepening depth-first approach. Moreover, it is enhanced by methods as recursive iterative deepening, dynamic evaluation, efficient successor ordering, and pruning by dependency relations. The resulting algorithm turns out to be highly efficient as witnessed by the experimental results.

The PN* algorithm is implemented in a tsume-shogi (Japanese-chess mating-problem) program, and evaluated by testing it on 295 notoriously difficult tsume-shogi problems (one problem has a depth of search of over 1500 plies). The experimental results are compared with those of other programs. The PN* program shows by far the best results, solving all problems but one. Needless to say, it outperforms the best human tsume-shogi problem solvers by far. © 2001 Published by Elsevier Science B.V.

M. Müller, Partial order bounding: A new approach to evaluation in game tree search

In computer game-playing, the established method for constructing an evaluation function uses a scalar value computed as a weighted sum of features. This paper advocates the use of partial order evaluation, and describes an efficient new search method called partial order bounding (POB).

Previous tree search algorithms using a partial order evaluation have attempted to propagate partially ordered values through the search tree, which leads to many problems in practice, such as the complexity of backing up sets of incomparable evaluations. POB compares partially ordered values only in the leaves of a game tree, and backs up boolean values through the tree. A closely related new algorithm, linear extension partial order bounding (LE-POB), uses a standard scalar alpha-beta search with values from a suitably chosen linear extension of the partial order evaluation. As an application, the effectiveness of partial order evaluation is shown in the case of modeling capturing races called semeai in the game of Go. © 2001 Published by Elsevier Science B.V.
Regular papers

M. Bode, O. Freyd, J. fisher, F.-J. Niedernostheide and H.-J. Schulze, Hybrid hardware for a highly parallel search in the context of learning classifiers

M. Levene and T.I. Fenner, The effect of mobility on minimaxing of game trees with random leaf values

M. Yokoo, Y. Sakurai and S. Matsubara, Robust combinatorial auction protocol against false-name bids

M. Cayrol, P. Régnier and V. Vidal, Least commitment in Graphplan

R. Hausser, Database semantics for natural language

C. Bailey-Kellogg and F. Zhao, Influence-based model decomposition for reasoning about spatially distributed systems

T. Taylor, Book Review of Christoph Adami’s* An Introduction to Artificial Life