REPORT ON THE WORKSHOP "COMPUTER CHESS AND GAME TREES"

held at the University of Bielefeld on July 19, 1988

ICCA Communication

by Ingo Althöfer

The University of Bielefeld has succeeded in bringing together a number of prominent researchers in the field of Computer Chess and Game Trees at the Workshop held on July 19, 1988. At the first talk Gunther Schrüfer from the TU Braunschweig explained the theoretical background of his *STC Search.* STC means Solution-Tree-Cost. The STC search has successfully been implemented in the tournament program BOBBY (see the Computer-Chess World Championship 1986 in Cologne).
In a search tree alpha-beta (or any other algorithm, e.g. SSS*) finds a solution tree, which is the union of two parts: an optimal strategy for player one, and an optimal strategy for player two. The idea of Schrüfer is to build up the search tree in such a way - depending on the branching degrees and heuristic values at interior nodes - that both these strategies have approximately the same reliability. As a consequence of this criterion the search trees no longer have all leaves at the same distance from the root. STC search is superior to other search schemes, for instance in positions with checks sequences.

Ingo Althöfer from the University of Bielefeld spoke about *hanging trees.* He considered a theoretical tree model with arbitrary topological search trees, directional search algorithms, and erroneous evaluation functions. A (topological) tree T is called better than another tree, if it has smaller average search costs and smaller error probabilities. A characterization of "best" trees was given. In several models with heuristic information at the interior nodes it turned out that the traditional move ordering (best first) need not to be optimal. Often it is better to make first a shallow search on the less promising alternatives, and only after that a more sophisticated search on the better ones.

Helmut Horacek from the University of Hamburg presented a search algorithm, in which the static values of a usual alpha-beta algorithm are substituted by intervals with probabilities at the two endpoints. A fast version of this procedure has been embodied in the program *MERLIN.* Helmut Horacek compared his ideas with two other interval- and/or probability-based algorithms, namely B* and PB*. He emphasized that the key problem is to make such theoretical nice, but complicated search schemes fast enough for successful applications in practice.

Rainer Seidel from the TU Berlin investigated the endgame King+Rook vs. King+Knight and presented a decision tree for parts of this endgame. Seidel had built up his decision tree in a deductive manner, yielding a somewhat simpler and more natural tree than Quinlan. The key question upon these well-analysed endgames is up to what degree the large database solutions can be compressed by methods like decision trees.

Rainer Feldmann from the University-GHS Paderborn gave a report on his diplom thesis, which has been a joint work with Peter Mysliwietz. His talk had a title *Parallelizing alpha-beta search by dynamic game tree splitting.* This theoretical dynamic splitting concept has been practically realized on a ring of 16 SIRIUS I PCs and led to a speed-up of more than 11. In optimally ordered trees this parallel algorithm searches only those leaves which are also searched by sequential alpha-beta.

Hans-Joachim Kraas (TU Braunschweig) gave a talk on the benefits of theoretical game trees, and how to generate them adequately. He gave a survey of previous models and analyzed their short-comings. Then he presented a new concept, in which the construction of typical trees is based on statistical data from computer-chess games. In this model the exact node value does not occur. Instead it is only important to know, whether a node is "inferior", a "principal-variation node", or a "cutoff-node".