THE COMPLEXITY OF SEARCHING IMPLICIT GRAPHS[1]

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We reproduce the abstract
"The standard complexity classes of complexity theory do not allow for direct classification of most of the problems solved by heuristic search algorithms The reason is that, almost always, these are defined in terms of implicit graphs of state or problem reduction spaces, while the standard definitions of all complexity classes are specifically tailored to explicit inputs
To allow for more precise comparisons with standard complexity classes, we introduce here a model for the analysis of algorithms on graphs given by vertex expansion procedures It is based on previously studied concepts of "succinct representation" techniques, and allows us to prove PSPACE-completeness or EXPTIME-completeness of specific, natural problems on implicit graphs, such as those solved by A^*, AO^*, and other best-first search strategies "

BEST-FIRST FIXED-DEPTH MINIMAX ALGORITHMS

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We reproduce the abstract
"This article has three main contributions to our understanding of minimax search
First, a new formulation for Stockman's SSS* algorithm, based on Alpha-Beta, is presented It solves all the perceived drawbacks of SSS*, finally transforming it into a practical algorithm In effect, we show that SSS* = Alpha-Beta + transposition tables The crucial step is the realization that transposition tables contain so-called solution trees, structures that are used in best-first search algorithms like SSS* Having created a practical version, we present performance measurements with tournament game-playing programs for three different minimax games, yielding results that contradict a number of publications

Second, based on the insights gained in our attempts at understanding SSS*, we present a framework that facilitates the construction of several best-first fixed-depth game-tree search algorithms, known and new The framework is based on depth-first null-window Alpha-Beta search, enhanced with storage to allow for the refining of previous search results It focuses attention on the essential differences between algorithms

Third, a new instance of this framework is presented It performs better than algorithms that are currently used in most state-of-the-art game-playing programs We provide experimental evidence to explain why this new algorithm, MTD(f), performs better than other fixed-depth minimax algorithms "

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[1] The full text of this Research Note is available at http //www elsevier nl/locate/artint by following the links Electronic Features / Research Notes

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