Research Review of Heuristic Search Performance

By Yutao Liu

Having a much deeper understand of Planning and Search algorithms, I chose to focus on the Heuristic Search algorithms which is very useful in the planning contest. In this research review, I've followed Bonet B, Geffner to have more knowledge of heuristic algorithms and discuss the performance of different algorithms in different condition.

Research Challenges

We study a family of heuristic search planners that are based on a simple and general heuristic that assumes that action preconditions are independent. We analyze the resulting planners, evaluate their performance, and explain when they do best.

Research Approaches

In [1], researcher has presented a formulation of planning as heuristic search and have shown that simple state space search algorithms guided by a general domain independent heuristic produce a family of planners that are competitive with some of the best current planners.
In [2], they describes a novel generalization of heuristic search, called LAO*, that can find solutions with loops. They shows that LAO* can be used to solve Markov decision problems and that it shares the advantage heuristic search has over dynamic programming for other classes of problems. Given a start state, it can find an optimal solution without evaluating the entire state space.
In [3], researcher present a new algorithm called Highest Utility First Search (HUFS) for searching trees characterized by a large branching factor, the absence of a heuristic to compare nodes at different levels of the tree, and a child generator that is both expensive to run and stochastic in nature. HUFS is applicable when there is a class of related problems, from which many specific problems will need to be solved. This paper explains the HUFS algorithm and presents experimental results comparing HUFS with alternative methods.
In [4], 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 combines several existing ideas. It transforms a best-first PN-search algorithm into an iterative-deepening depth-first approach.

Results

Heuristic search planners are related to specialized problem solvers but differ from them in the use of a general declarative language for stating problems and a general mechanism for extracting heuristics. Planners must offer good modeling language for expressing problems in a convenient way, and general solvers for operating on those representations and producing efficient solutions.

References

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