Planning and Search – Research Review *

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In this paper we give a short summary of several important development in the field of planning and search. One of the first planning systems was Strips [4]. Strips represents a world as a collection of first-order predicate calculus formulas and was using theorem proving to obtain the sequence of actions. It could handle a large number of formulas and was used as part of the program for the Shakey robot.

In the early 90s, a new approach to planning in Strips domains was introduced, namely the Graphplan ([1], [2]) which used a compact structure called the planning graph to define heuristics for search. Graphplan always returns the shortest possible partial-order plan or reports that there is no valid plan for a given problem. Graphplan was orders of magnitude faster than the partial-order planners of that time. The winner of the 2002 AIPS planning competition was LPG ([5]), which was searching planning graphs using a local search technique

A different approach to planning was to apply satisfiability to planning. The first such system was SATplan ([7]). It was made due to the success of local search in solving Sat instances. Both, Graphplan and SATplan work in such a way that they first create an approproate structure from the problem and then search that structure.

The Heuristic Search Planner or HSP ([3]) was one of the first successful approaches of using heuristics search to planning. HSP extracted heuristics directly from Strips encodings and used a hill-climbing search from start to goal state. It was generally one of the first approaches that made the state-space search based planners feasible. The performance of HSP is comparable to Graphplan and SATplan. The most successful state-space searcher is Hoffman's ([6] FastForward searcher or FF, the winner of the AIPS 2000 planning competition. FF uses a simplified planning graph heuristic with a very fast search algorithm that combines the forward and local search in a novel approach.

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