Historical Development in AI Planning and Search

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In this paper I review three major three major AI planning and search breakthroughs.

Stanford Research Institute Problem Solver (STRIPS):

STRIPS (Stanford Research Institute Problem Solver) is an automated planner developed by Richard Fikes and Nils Nilsson in 1971 at SRI International [1].

The task of the planner was to find some composition of operators that transforms a given initial world model into one that satisfies some stated goal condition.

The development of STRIPS led to AI community adopting a representation language such as ADL and PDDL [2] for planning problems. STRIPS was primarily used for robot research at Stanford Research Institute.

Planning Domain Definition Language (PDDL)

PDDL is the standard language for representing planning domains and it was inspired by STRIPS and ADL. PDDL is an attempt to standardize Artificial Intelligence (AI) planning languages, it was first developed by Drew McDermott and his colleagues in 1998.

PDDL is intended to express the "physics" of a domain, that is, what predicates there are, what actions are possible, what the structure of compound actions is, and what the effects of actions are [2]. It separated the model of the planning problem in two major parts: (1) domain description and (2) the related problem description.

Graphplan:

Graphplan is an algorithm for automated planning developed by Avrim Blum and Merrick Furst in 1995 [3]. Graphplan takes as input a planning problem expressed in STRIPS and produces, if one is possible, a sequence of operations for reaching a goal state and it returns shortest possible partial-order plan or state that no valid plan exists. The Graphplan planner uses the Planning Graph that it creates to guide its search for a plan. The search that it performs combines aspects of both total-order and partial-order planners. The planning graph can be computed relatively quickly (that is, in a polynomial amount of time), and the restriction that the backward search must operate within the planning graph dramatically improves the efficiency of the backward search. As a result, GraphPlan runs much faster than plan-space planning algorithms [4].

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[4] Dana S. Nau (2007). "Current Trends in Automated Planning". AI Magazine Volume 28 Number 4 (2007).