Research Review

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Historical Developments in the Field of AI Planning and Search

1. STRIPS[1][2][3]

STRIPS (Stanford Research Institute Problem Solver) was the first major planning system and forms the base of most languages expressing automated planning problems. The STRIPS planner was developed in 1971 by Richard Fikes and Nils Nilsson[1]. The STRIPS planner represents a world model as a collection of first-order logic formulas. The planner searches the collection of formulas to find one in which a given goal is achieved.

STRIPS was created for a robotics experiment at the SRI AI Laboratory in the late 1960s and early 1970s. The robot being used had touch-sensitive "feelers", a television camera and an optical range-finder. The robot could push large boxes around in a fixed environment of hallways and open rooms. Within this environment STRIPS solved the problem of readjusting the plan when actions taken by the robot resulted in states that were not predicted by the planner. STRIPS decided which conditions needed to be met after each plan step in order for the remainder of the plan to succeed. The algorithm then back-propagated plan goals and operator preconditions to the states where they were expected to become true until the history of the planner was one in which the current state was the expected one.

2. ADL

Action Description Language (ADL) is an automated planning system that was introduced in 1989 by Edwin Pednault as an extension/improvement of STRIPS. The ability of ADL to represent a planning problem approaches that of the situational calculus (set of first-order logic formulae) while maintaining compute requirements close to those of STRIPS. ADL also allows for the derivation of which properties of a state remain unchanged as the *result* of an action, thereby eliminating the need to track which properties remain unaltered after each action. In effect ADL complements STRIPS and decreases its computational complexity.

3. FF:

Since the AIPS-2000 planning competition, the Fast-Forward (FF) planning system has performed at the top of state-space searchers. FF is a domain independent planning system that obtains explicit solutions to relaxed plans generated by ignoring the delete lists of all operators. It does so by utilizing a GRAPHPLAN-style algorithm. The number of actions in the solution are used to estimate goal distance which is used during breadth first search, in each intermediate step, to inform a successor. FF also uses the relaxed plans to assist in pruning the search space by assuming, usually correctly, that the true solution contains actions from the relaxed plan.

References:

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2. *STRIPS. (2017, October 08). Retrieved December 18, 2017, from https://en.wikipedia.org/wiki/STRIPS*

3. Fikes, R. E., & Nilsson, N. J. (1993). STRIPS, a retrospective. *Artificial Intelligence,59*(1-2), 227-232. doi:10.1016/0004-3702(93)90190-m

4. *Action description language. (2017, December 06). Retrieved December 18, 2017, from https://en.wikipedia.org/wiki/Action_description_language*

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