Research Review

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Stanford Research Institute Problem Solver (STRIPS)

STRIPS is an automated planner developed by Richard Fikes and Nils Nilsson in 1971 [1]. The goal of the planner was to find a series of operators in a space of models to alter an initial state into a model in which a given goal can be proven to be true. The impact of STRIPS in the artificial intelligence field was greater in terms of the representation language it created [2], which is very close to the "classical" planning language. This language described a set of applicable operators that allowed to transform one state into a different state. This definition of a framework to solve complex planning problems has been a central to much of the research in artificial intelligence [3].

The Planning Deomain Definition Language (PDDL)

In 1998 Drew McDermott released a Planning Domain Description Language, PDDL [4], which has since become a community standard for the representation and exchange of planning domain models. Pddl the language has enabled considerable progress to be made in planning research because of the ease with which systems sharing the standard can be compared and the enormous increase in availability of shared planning resources. The introduction of PDDL has facilitated the scientific development of planning. The PDDL was primarily inspired by STRIPS (discussed above), and ADL (The Action Description Language), which is a simpler representation of STRIPS that allows to encode more realistic problems by relaxing some of the STRIPS restrictions [2].

Graphplan

Graphplan is an approach to planning in STRIPS-like domains based on constructing and analyzing a compact structure, called Planning Graph Analysis. In this approach, rather than immediately embarking upon a search as in standard planning methods, the algorithm instead begins by explicitly constructing a compact structure, the so called Planning Graph. A Planning Graph encodes the planning problem in such a way that many useful constraints inherent in the problem become explicitly available to reduce the amount of search needed. Furthermore, Planning Graphs can be constructed quickly: they have polynomial size and can be built in polynomial time. [5] This algorithm had two characteristics that separated it from earlier ones: it finds plans of a fixed length (that is incrementally increased until a plan is found), and it uses reachability information for pruning the search tree. These differences brought the performance of Graphplan to a level not seen in connection with earlier planners. [6]

References:

1. Richard E. Fikes, Nils J. Nilsson (Winter 1971). "STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving".
2. Stuart J. Russell, Peter Norvig (2010), Artificial Intelligence: A Modern Approach (3rd Edition).
3. Nilsson, N. J. Problem-Solving Methods in Artificial Intelligence. McGraw-Hill Book Company, New York, New York, 1971.
4. McDermott, D., & the AIPS-98 Planning Competition Committee (1998). PDDL–the planning domain definition language. Tech. rep., Available at: www.cs.yale.edu/homes/dvm
5. Blum, Avrim L., and Merrick L. Furst. "Fast planning through planning graph analysis." Artificial intelligence 90.1 (1997): 281-300.

6. Rintanen, Jussi, and Jörg Hoffmann. “An overview of recent algorithms for AI planning.” KI 15.2 (2001): 5-11.