Research Review

One of the most important developments in the planning problems in Artificial Intelligence (AI) is the STRIPS, developed by Fikes and Nilsson (1971). STRIPS solves planning problem by finding a sequence of operators (which will result in action routines) from one initial model (represented by a set of well-formed formulas (wffs) of the first-order predicate calculus) to some stated goal conditions (also represented by wffs). One of the key contributions of this study in the planning problems is that it separated the processes of theorem proving (to answer the questions about which operators are applicable and whether goals have been satisfied) from searching heuristics. This separation made it possible to employ separate strategies for the two process; and therefore, made it possible to solve large scale state-space planning problems.

An important improvement in planning problems following STRIPS is the Action Description Language (ADL), developed by Pednault (1986). It extended the STRIPS language by adding situation calculus, it introduced boundary conditions to model simultaneous actions and their effects sequentially. It also overcame the semantic pitfalls of the STRIPS language.

Both the STRIPS and ADL provide language to express complex real-world planning problems in notations, but they are not comparable notations. The Planning Domain Definition Language (PDDL), introduced by Ghallab et al. (1998), overcame this problem by providing a way to express a planning problem in a computer-parsable, standardized syntax. It supports basic STRIPS-style actions and conditional effects, and it does not require "advice" about which actions to be used in which goals. PDDL incorporated the ADL propositions from Pednault (1986), UMCP actions by Erol et al. (1994) and many other formalism. It is designed to encourage sharing of problems and algorithms and therefore it has been used as the standard language for the International Planning Competition since 1998.

References:

Fikes, R. E. and Nilsson, N. J. (1971). STRIPS: A new approach to the application of theorem proving to problem solving. AIJ, 2(3–4), 189–208.

Pednault, E. P. D. (1986). Formulating multiagent, dynamic-world problems in the classical planning framework. In Reasoning about Actions and Plans: Proc. 1986 Workshop, pp. 47–82.

Erol, K., Hendler, J., and Nau, D. S. (1994). HTN planning: Complexity and expressivity. In AAAI-94, pp. 1123–1128.

Ghallab, M., Howe, A., Knoblock, C. A., and Mc-Dermott, D. (1998). PDDL—The planning domain definition language. Tech. rep. DCS TR-1165, Yale Center for Computational Vision and Control.