RESEARCH REVIEW

HISTORICAL DEVELOPMENTS IN AI PLANNING AND SEARCH

By Vineet Jacob Kuruvilla, 18 July 2017

STRIPS

STRIPS stands for Stanford Research Institute Problem Solver. This is one of the first planning system, developed as part of the Shakey robot project at SRI by Fikes and Nilsson in 1971 [1]. In the STRIPS, a problem is defined by initial states, the goal states and set of operators (including their effects and preconditions) which are all described as well formed formulae (wff) [2]. A wff is similar to state descriptions we have used in our planning project. The language used to describe a problems and the world for the STRIPS solver formed the basis for the present day planning language such as Planning Domain Description Language (PDDL).

PDDL

PDDL was introduced so as to standardise the description language for planning problems. This was done as part of the first International Planning Competition in 1998 but it continued to evolved as more and more researchers adopted this language. This was mainly derived from the STRIPS language and the Action Description Language (ADL). The common language that PDDL provided for all AI planning researchers greatly enhanced the progress of development by enabling reuse of research work and also made it easier to directly compare systems and problem solving approaches [3]. Many versions of PDDL have been released since its introduction, the latest being PDDL 3.1.

Graphplan

Graphplan is a planning system where problem and domain are described in STRIP-like language (PDDL) [4]. It solves planning problem orders of magnitude faster than the dominant planner used at that time. Graphplan starts the planning by first constructing a “compact structure” called Planning graph which basically contains alternating levels of states and actions where the states formed the necessary condition for the following action level and the state level after the action level are the resulting states as the effect of the actions in the action level. The first state level is the initial state of a problem. These planning graphs helps reduce the branching factor quite significantly. Many faster planners have been developed since but all are derived from the Graphplan algorithm.

[1] S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach Ed 3,
[2] Fikes et al (1971), STRIPS: A New Approach to the Application of .Theorem Proving to Problem Solving, Artificial Intelligence 2, 189 - 208
[3] Planning Domain Description Language, Wikipedia, accessed on 18/07/2017, 23:54
[4] Blum et al (1997), Fast Planning Through Planning Graph Analysis, Artificial Intelligence 90, 281 - 300