Research Review

STRIPS

Artificial Intelligence (AI) planning arose from investigations into state-space search and other domains. The Stanford Research Institute Problem Solver (**STRIPS**) was the first major planning system, that works by executing a domain and problem to find a goal. As it turns out, the representation language used by STRIPS has been far more influential to the field of planning than its algorithmic approach (Norvig and Russell, 2009). The STRIPS system begins by first outlining a world state by providing objects, actions, preconditions and effects. After the world state has been described you can then approach solving a problem, which consists of an initial state and a goal. STRIPS then searches through all of the states and executes actions until reaching a goal. This framework for problem solving has been central to much of the research in artificial intelligence (Fikes and Nelson, 1971).

Planning Graph

Graphplan is an algorithm that takes a different approach to planning in STRIPS-like domains based on constructing and analyzing a compact structure called a Planning Graph (Blum and Furst, 1997). A Planning Graph encodes the planning problem in such a way that is significantly reduces the amount of search needed and furthermore, Planning Graphs can be constructed quickly: they have polynomial size and can be built in polynomial time. There has been empirical evidence on a variety of natural and artificial domains showing that Planning Graph Analysis is able to provide a substantial improvement in running time (Blum and Furst, 1997).

Problem Domain Description Language (PDDL)

In 1998 Drew McDermott introduced The Problem Domain Description Language (PDDL), as a computer-parsable, standardized syntax for representing planning problems and it has been used as the standard language for the International Planning Competition since its inception (Norvig and Russell, 2009). Although the core of PDDL is a STRIPS formalism, the language extends beyond that. The extended expressive power includes the ability to express a type structure for the objects in a domain, typing the parameters that appear in actions and constraining the types of arguments to predicates, actions with negative preconditions and conditional effects and the use of quantification in expressing both pre- and post-conditions (Pednault, 1989).

References

Artificial Intelligence: A Modern Approach (2009), Peter Norvig, Stuart J. Russell

Richard E. Fikes, Nils J. Nilsson. "STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving", (Winter 1971)

A. Blum and M. Furst, "Fast Planning Through Planning Graph Analysis", Artificial Intelligence, 90:281--300 (1997).

Pednault, E. 1989.
ADL: Exploring the middle ground between STRIPS and the situation calculus
In Proceedings of KR-89, 324-332.