Historical Development Of Planning And Search

STRIPS

The first major planning system is STRIPS (Fikes and Nilsson, 1971), which was designed as the planing component of the software for the Shakey robot project at SRI. The most influential part of STRIPS is its representation language, which is the foundation of what we call “classical” language. The idea of STRIPS is to use a set of applicable operator to transform a problem into a model. The task of the problem solver is to find some composition of operators that transforms a given initial state into one that satisfies some stated goal condition. Many improvements to the STRIPS representation language have been developed such as Action Description Language (ADL) (Pednault, 1986). ADL relaxed some of the STRIPS restrictions and made it possible to encode more realistic problems. The Planning Domain Definition Language (PDDL) (mcdermott et al, 1998) is an attempt to standardize the planning language to encourage sharing of problems and algorithms, as well as to allow meaningful comparison of the performance of planners on different problems

Partial-order planning

Total-ordered planning or *linear planning* is an approach that maintains a partial solution as totally ordered list of steps found so far. STRIPS is a total-ordered planning. In contrast to total-ordered planning, *partial-ordered planning* or *non-linear planning* delays steps ordering decision as long as possible. The total-ordered planning is incomplete. It cannot solve simple problems such as Sussman anomaly required inter-leaving to solve. Partial-ordered planning allows inter-leaving and can solve Sussman anomaly problems easily and optimally. Partial-ordered planning is based on the principle of least-commitment. The idea is that avoid doing work that might have to undone later. So in partial-ordered planning, plan steps will not be ordered unless necessary for some reasons. Partial-ordered planning is complete and generally faster and more efficient than total-order planning (Barrett, A., and Weld, D., 1993).

GRAPHPLAN

Research on AI planning had concentrated on the partial-ordered planning algorithm until the introduction of the GRAPHPLAN algorithm by Blum and Furst (1995). GRAPHPLAN is a general-purpose planner for STRIPS-style domains, based on ideas used in graph algorithms. GRAPHPLAN explicitly constructs and annotates a compact data structure called a Planning Graph and use it as a guide for searching the solution. The compactness and reachability information of Planning graph allows efficient searching and pruning the search tree. This make GRAPHPLAN out perform partial-order planning of the time.

Reference document

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