This document intends to describe some developments in the field of planning in Artificial Intelligence.

Strips

The Stanford Research Institute Problem Solver (STRIPS) was developed in 1971 by Richard E. Fikes and Nils J. Nilsson .

It's an automated planning technique that works by executing a domain and problem to find a goal. The world is described by objects, actions, preconditions and effects. A problem consists of an initial state and a goal condition which STRIPS can search all possible states, from initial state, executing various actions, until it reaches the goal.

Different problems can be solved using STRIPS and PDDL. If the world domain and problem can be described with a finite set of actions, preconditions, and effects, it's possible to write a PDDL domain and problem to solve it.

For example, STRIPS can work on stacking blocks, Rubik's cube, Starcraft build orders, navigating a robot.

Graphplan

It's an algorithm for automated planning developed by Avrim Brum and Merrick Furst in 1995. It takes as input a planning problem expressed in STRIPS and produces, if one is possible, a sequence of operations for reaching a goal state. Graphplan always returns a shortest possible partial-order plan, or states that no valid plan exists.

Given a problem statement, Graphplan explicitly constructs and annotates a compact structure called Planning Graph, in which a plan is a kind of "flow" of truth-values through the 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. Besides, they have polynomial size and can be built in polynomial time.

Collaborative planning

In order to attempt reduce plan computation time, increase the quality of resulting plans and make more interpretable by humans, the paper Collaborative Planning with Encoding of Users' High-level Strategies was developed in 2017 by Joseph Kim, Christopher J. Banks and Julie A. Shah. They developed collaborative planning techniques that actively involve human users in plan generation.

They explore a framework in which users provide high-level strategies in order to guide low-level planner. Besides getting results statistically better than other approaches, the plans produced are pretty similar to those generated by humans.

Although this work was not domain independent, it has space for improved in that sense.

References

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