Takahiro Ishikawa
AIND: Implement a Planning Search

Research Review

Summary

This report describes about the developments, highlighting the relationships between the developments and their impact on the field of artificial intelligence as a whole for some planning methods.

Stanford Research Institute Problem Solver (STRIPS)

STRIPS is problem solving program and a member of the class of problem solvers that search space to find model which provide a goal achieved. STRIPS assumes that there exists a set applicable operators, and its task is to find some composition of operators that transform a given initial state into a goal satisfying some state. Initial version of the program had been implemented in Lisp [2].

Most of the assumptions made by STRIPS have also been adopted by most of the posterior planning systems [1].

Planning Domain Description Language (PDDL)

PDDL is the manually described syntax that has the excessiveness of STRIPS-style actions. PDDL is intended to express the physics of a domain, that is, what predicate there are, what actions are possible, what the structure of compound actions are, and what the effects of actions are [3].

PDDL has been significantly extended and polished since that time. Currently all new planners support some subset of PDDL [4].

Multi-Agent Planning Domain Description Language (MA-PDDL)

MA-PDDL is a extension of PDDL that is currently latest official version. Multi-agent planning is fundamentally different from single-agent planning. Not only it is harder because of an exponential increase of actions, but others also constructive/destructive synergies of concurrent actions, and agent's different abilities and goals may need to be considered [5].

MA-PDDL has been important to solve problems of the real world, for example multi-robots or networking problems [5].

Reference

[1] https://web.archive.org/web/20131222165824/http://www.eetn.gr/index.php/eetn-publications/ai-research-in-greece/planning-and-scheduling

[2] Richard E. Fikes, Nils J. Nilsson 1971. "STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving". http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/PublishedPapers/strips.pdf

[3] http://www.informatik.uni-ulm.de/ki/Edu/Vorlesungen/GdKI/WS0203/pddl.pdf

[4] http://www.ida.liu.se/~TDDC17/info/labs/planning/writing.shtml

[5] Daniel L. Kovacs 2013. "A Multi-Agent Extension of PDDL3.1" http://www.r3-cop.c3e.cs.tu-bs.de/wp-content/uploads/2013/01/A-Multy-Agent-Extension-of-PDDL3.1.pdf