

## AI planning

Planning is an active branch of AI and has been an active ground for research. Planning is the process of determining future actions to achieve goals. A Planner algorithm is provided a description of a problem through a language. The problem contains a set of state literals, action and goals. The planner algorithm tries to reach the goal by sequencing a set of actions.

Several schemes have been proposed and fine tuned over time. Three of them are of particular importance: STRIPS, ADL and PDDL

STRIPS (Stanford Research Institute Problem Solver) [1] was the first major planning system introduced in 1971 by Fikes and Nilsson at SRI international. It is an automated planner that takes a formal language as an input. STRIPS is both a planner algorithm and a description language. The planner algorithm executes a backward search. The language is based on propositional logic. It was the first successful implementation of a generic planner. It was used by Shakey who was the first general-purpose mobile robot.

STRIPS language was a good starting point for planning problems representation but there was room for improvements as the language is not very expressive. The lack of expressiveness was a design goal to allow planning algorithm to be simpler and more efficient.

Several extensions were created that removed some of the constraints imposed by STRIPS and allow the resolution of more realistic problems.

This includes including ADL(Action Description Language)[2] created by Edwin Pednault. ADL provided some more freedom in the expressions like be able to use “unknown” to abstract a set of literals instead of having to explicitly state each literal

Eventually, the Problem Domain Description Language or PDDL (Ghallab et al., 1998) [3] was introduced as a computer-parsable, standardized syntax for representing STRIPS, ADL, and other languages. PDDL is used by researchers to exchange benchmark problems and compare results. It is capable of representing sophisticated planning problems. It is still in active development and multiple variants exist.

- [1] Richard E. Fikes, Nils J. Nilsson (Winter 1971). *"STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving"* (PDF). *Artificial Intelligence*. 2 (3–4): 189–208. doi:10.1016/0004-3702(71)90010-5.
- [2] Edwin P.D. Pednault. ADL. Exploring the Middle Ground Between STRIPS and the Situation Calculus. In Proceedings of KR-89, 324-332.
- [3] McDermott, Drew; Ghallab, Malik; Howe, Adele; Knoblock, Craig; Ram, Ashwin; Veloso, Manuela; Weld, Daniel; Wilkins, David (1998). *"PDDL---The Planning Domain Definition Language"* (PDF). *Technical Report CVC TR98003/DCS TR1165*. New Haven, CT: Yale Center for Computational Vision and Control. CiteSeerX 10.1.1.51.9941 .