

Research Review

Representation Languages

One of the first representation languages was STRIPS (Fikes and Nilsson, 1971). STRIPS was one of the first major planning systems, and from this the same name was given to the language that was used for the inputs of this planner. This language is still used as the basis for most planning languages today.

ADL (Pednault, 1986) built on STRIPS and made it possible to represent more realistic problems. It did this by applying the principle of the open world, i.e. everything not occurring in the conditions is unknown, unlike STRIPS which would be assumed false.

PDDL (Ghallab *et al.*, 1998) was inspired by STRIPS and ADL is an attempt to standardize planning languages. Standardisation of the language was required to allow more direct comparison of approaches and make progress in the field quicker. PDDL is still in use today and the current version is PDDL3.1.

Partial Order Planning

Partial order planning dominated 20 years of research starting in 1975 with Sacerdoti's NOAH Planner and Tate's NONLIN system. Whereas other planners would search for plans in the full search space containing all possible orders where many plans are the same, other than the order of actions. Partial order planning ignores the order of steps until it is unnecessary therefore creating a much smaller search space and a more efficient algorithm.

Graphplan

In 1995 Avrim Blum and Merrick Furst created their GRAPHPLAN system, which was a lot faster than other partial order planners of the time. The idea of Graphplan was to reduce the amount of search needed to find the solution. It does this by creating a planning graph, which allows constraints inherent to the problem to become explicitly available to reduce the amount of search needed. (Blum and Furst, 1995)

Other graph-planners followed included: IPP (Koehler *et al.*, 1997), STAN (Fox and Long, 1998) and SGP (Weld *et al.*, 1998) and iterated on the idea.