AIND Project 3 / Josef Schodl / 10/2017

Research review on:

Historical AI Planning & Search Developments

Linear Planning

At Stanford Research Institute (SRI) Richard Fikes and Nils Nillson developed Stanford Research Institute Problem Solver (STRIPS) in 1971. This was the first major planning system that was used for Stanford's robot Shakey, which became able to analyse the goals and create a plan existing on the given set of actions. STRIPS was composed of an initial state, a goal state and a set of actions. This is also the base for other planning languages to describe problems up to now, like the Problem Domain Description Language (PDDL), a computer parseable, standardized syntax.
In the 1970s linear planning was used for planners, but was soon figured out to be incomplete. In order to have a complete planner, action interleaving from different subplans within a single sequence must be allowed.

Sources:
https://en.wikipedia.org/wiki/STRIPS
http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/PublishedPapers/strips.pdf

Problem Domain Description Language

The Problem Domain Description Language (PDDL) has been introduced in 1998 as a parseable, standardized syntax for representation of planning problems. The goal was the widespread use of a common syntax, so it could foster reuse of research and more direct comparison of different approaches. From the use as standard language for the International Planning Competition in 1998, it has gone through several iterations and inspired the rise of other languages in the AI planning area. These include PDDL+, New Domain Definition Language (NDDL), Multi-Agent Planning Language (MAPL), Probabilistic PDDL (PPDDL), Abstract Plan Preparation Language (APPL), Ontology with Polymorphic Types (OPT), Relational Dynamic-influence Diagram Language (RDDL) and Multi-Agent PDDL (MA-PDDL).

Sources:
https://en.wikipedia.org/wiki/Planning_Domain_Definition_Language
https://www.cs.cmu.edu/afs/cs/project/jair/pub/volume20/fox03a-html/node2.html

Graphplan

When Partial Order Planning lost popularity in the late 1990s mostly due to the rise of Graphplan, which was introduced in 1995 as a general purpose planner based on ideas used in graph algorithms. Given a problem statement, Graphplan explicitly constructed and annotated a compact structure called a Planning Graph, in which a plan was a kind of flow of truth-values through the graph. This graph had the property that useful information for constraining search could quickly be propagated through the graph as it was being built. Graphplan turned out to be way faster than partial order planners at that time. Also, Graphplan induced other planning graph approaches to AI planning, many of them even faster than the original Graphplan, like IPP, STAN or Blackbox.

Sources:
https://en.wikipedia.org/wiki/Graphplan
https://www.cs.cmu.edu/~avrim/Papers/graphplan.pdf