Research Review

STRIPS[1](1960-1970s)

Richard, Nilsson and their team in SRI AI laboratory developed a mobile robot being able to push objects around a multi-room environment to the goal. The robot consists of a mobile cart, bunch of touch-sensitive feelers, a television camera and an optical range finder.

Development: Automatic plan generator is the first big part contributing to STRIPS. It requires the environment to be static rather than dynamic, in other words, the world state will only change due to action effect. The difficulties of finding rigorous logic representation of actions and effects force researchers to come up with ad-hoc representations. Together with logic representation of individual states, this whole model provides functionalities of path generation by using GPS as paradigmatic problem solver architecture. Plan execution monitor is another key part which considers more practical effects of actions. It takes stochastic and incomplete effect representation into account and decide whether to replanning to make sure reaching the goal.

Impact: Provided context and motivation for development of the A* search algorithm, the STRIPS and ABSTRIPS planning system, programs for generalizing and learning macro-operators, triangle tables for plan execution and region-finding scene analysis programs.

GraphPlan[2] (1997)

Based on data structure of "planning graph", graphplan always returns a shortest possible partial-order plan. It outperforms the total-order planner "Prodigy" and the partial-order planner "UCPOP".

Development: "Planning Graph" explicitly encodes the constraints between each states variables and actions so that the search space greatly reduced. It combines the idea from standard total-order and partial-order plan and put them into a graph structure able to be analyzed.

Impact: Provided directions of combining the approach of graphplan with heuristics, learning methods developed in planning literature.

CoBot Robots[3]

Called as grandchildren of "Shaky"(STRIPS), it has completed 1k km in SCS building in CMU(Saw it personally). It inherits the same features from shaky, planning, moving and navigating.

Reference:
[1]. Richard E.Fikes and Nils J.Nilsson: STRIPS, a retrospective.
[2]. Avrim L.Blum, Merrick L.Furst: Fast Planning Through Planning Graph Analysis
[3]. Benjamin Kuipers, Edward A. Feigenbaum, Peter E. Hart, Nils J.Nilsson: Shakey: From Conception to History