

Research Review: Historical Developments In The Field Of AI

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STRIPS

The first major development in the field of planning was without a doubt the *Stanford Research Institute Problem Solver* (or *STRIPS*) developed during the 1968-1971 period. Initially, this planner was integrated with several other technologies such as computer vision and robotics [1]. These technologies brought to life the robot Shakey - the first robot to perform reasoning tasks such as planning, route-finding, and the rearranging of simple objects [2].

Seen from today's perspective, the STRIPS project spurred wide media interest for the fields of robotics and AI and left an eponym representation language that is still the basis of today's representations.

LINEAR PLANNING

Linear Planning was the major approach in the field in its beginnings [3]. The intuition behind this approach is to solve a set of sub-goals (constituting the global goal) then to find a way to arrange the sub-solutions together. Exploring state spaces and building sequences of actions to execute, these planners offer a straightforward view of the solution being built and use small amounts of computation for each node.

But this approach was rapidly proven to be incomplete as it cannot solve simple problem where achieving a sub-goal implies undoing another sub-goal (Sussman anomaly, 1975).

PARTIALLY ORDERED PLANNING

First used in 1975 (Tate & Sacerdoti), *Partially Ordered Plans*, unlike the linear ones, do not commit to an unnecessary order to the action being part of the plan. They explore a space of incomplete plans that may be a solution to the problem [3].

On the one hand, this minimum commitment strategy, or constraint-posting strategy is more computationally expensive per node as several checking mechanisms are involved. It is also more complex. On the other hand, it saves needless future calculations [4]. For a period of approximately 15 years (from 1975 to 1991) it led to the emergence of planners that are faster than linear ones. TWEAK is probably the most notable planner implemented based on this approach. In addition, it led in 1991 to the first description of a complete and systematic lifted nonlinear planner [5].

References:

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- [3]: Earl David Sacerdoti, The Nonlinear Nature Of Plans, 1975
- [4]: S. Russell, P. Norvig, AIMA 3rd edition, 10.4.4
- [5]: Systematic Nonlinear Planning, D. McAllester, D. Rosenblitt, 1991