

We need to start with STRIPS, as part of Shakey robot, which was the system used for generating plans to achieve goals. STRIPS rules are used in most modern planners, and these rules are a generic solution for the “frame problem” derived from the use of “situation calculus”. I think from the papers, one can understand that this was the way for many to start to use planning and bring active research to this area, quoting:

“”The STRIPS framework had sufficient intuitive appeal to most researchers for them to believe that it was a viable foundation on which to develop techniques that would be effective in more realistic models”” (1)

And:

“”STRIPS rules (or their derivatives) are used in most modern planners. (The STRIPS paper gets over 5000 citations on Google Scholar, and “STRIPS-style planning” gets over 3410 results on Google.) It’s the rules that are used, not the STRIPS program itself. STRIPS rules were a practical solution to the “frame problem” — inherent in the use of the “situation calculus,” proposed by McCarthy and Hayes (1969) for generating plans”” (2)

Worth mentioning also is that A* was also developed in this project.

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.93.1237&rep=rep1&type=pdf> (1)

<http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/General%20Essays/Shakey-aimag-17.pdf> (2)

Then I think the major advance was the combination of ideas about partial-order planning, in which we no longer need to create complete models and the impact that this generated is clearly stated in AIMA (p.394) “”Partial-order planning dominated the next 20 years of research””. The idea of partial-order planner is to have partial ordering between actions so that only when required we use ordering for actions: “The principle of least commitment is the idea of never making a choice unless required to do so (...) one application of this principle is never to order plan steps unless it’s necessary for some reason” (4)

Comparative between partial-order and total-order:

“”By focusing our analysis on a single issue, namely, operator ordering commitment, we have been able to carry out a rigorous comparative analysis of two planners. We have shown that the search space of a partial-order planner, u_a , is never larger than the search space of a total-order planner, t_o . Indeed for certain problems, u_a ’s search space is exponentially smaller than t_o ’s. Since u_a pays only a small polynomial time increment per node over t_o , it is generally more efficient.”” (4)

<http://pages.cs.wisc.edu/~dyer/cs540/notes/pop.html> (3)

<https://arxiv.org/pdf/cs/9412103.pdf> (4)

Finally, planning graphs and GRAPHPLAN, since this idea seemed to break through some of the established paradigms, it managed to speed up planning, and also it created new ways for other planning techniques to develop: IPP, STAN and SGP (AIMA p.395).

<https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-825-techniques-in-artificial-intelligence-sma-5504-fall-2002/lecture-notes/Lecture12FinalPart1.pdf>