

Summary of Selected Developments in the History of Planning and Search

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The following is a brief summary of selected developments in technology with significant influence in the field of AI planning and search.

The STRIPS planning system was developed at the Stanford Research Institute for an early robotics project in the 1970s. The robot developed for the project “was capable of rolling around an environment consisting of large boxes in rooms separated by walls and doorways; it could push the boxes from one place to another in its world” (Fikes and Nilsson 1993). STRIPS was limited by its assumptions that only one instantaneous action could occur in the world at a time and that the state of the world could change only by those available actions. Despite these limitations, the planning system was an important component of the SRI project. While the algorithm of STRIPS addressed the needs of the SRI project, the representation language it used had a much greater impact on the field of AI planning (Norvig and Stuart 2005). The framework for the system was used as a foundation for “most automatic planning research for many years” (Fikes and Nilsson 1993) and is used in GRAPHPLAN (see below).

In response to the incompleteness of linear planning, partial-order planning rose in prominence for decades. This planning approach involves finding all necessary actions for goal satisfaction while leaving the order of those actions as open as possible. Sacerdoti’s NOAH planner was an important introduction of partial-order planning systems (Norvig and Stuart 2005). NOAH is a “problem solving and execution monitoring system that uses a nonlinear representation of plans” (Sacerdoti, 1975). While partial-order planners have declined in popularity as faster methods have been discovered, some researchers have shown viable planners like REPOP that scale better than state-space planners (Norvig and Stuart 2005).

Finally, GRAPHPLAN, introduced by Blum and Furst, offered an alternative to state-space and partial-order planning systems. At the time of its introduction, it was orders of magnitude faster than the partial-order planners of the time (Norvig and Stuart 2005). GRAPHPLAN uses “STRIPS-like domains based on constructing and analyzing a compact structure” of a planning graph (Blum and Furst 1995). Norvig and Stuart (2005) cite GRAPHPLAN as a revitalization of the field of search and planning, and the system is featured prominently in this very project.

References

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