Historical developments in AI Planning and Search

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In this report, I will examine three of these developments, along with relationships between the developments and their impact on the field of Artificial Intelligence (AI) as a whole.

1st Development: STanford Research Institute Problem Solver (STRIPS), 1971[1]

Originally, STRIPS refers to the name of the planning component in the software in Shakey, which was the first robot to be able to reason about its own actions. STRIPS was one of the first major project on state-space search to deal with AI planning and scheduling problems. As a classical planning language, it is composed of initial states, set of available actions and their effect on the initial state, and the goal of the statement. The goal of STRIPS was to find a sequence of actions in a space to transform the initial word model into a model which the goal state exists. If it is able to find such sequence, then this problem is said to be solved. STRIPS now primarily refers to the planning domain language that evolved out of this project and serves as the major source of inspiration for later planning languages.

2nd Development: Planning Domain Definition Language (PDDL) [2]

PDDL is one of STRIPS extensions and it is used widely in planning problems solving field. The goal of PDDL was to develop standard planning languages for International Planning Competition. In other words, PDDL contains STRIPS and many other representational languages. The development of PDDL fosters reuse of research as well as faster the progress in the field of AI.

3rd Development: GraphPlan, 1997[3]

GraphPlan is STRIPS-based, but instead of a traditional state-space, it creates a Planning Graph where each node is an action or fact, and the edges then connect these nodes such that action nodes connect to fact nodes which the action affects, and the fact nodes connect to action nodes for which they are conditions. A Planning Graph object is construct first in the problem solving process and it is helpful in reducing the search overhead as it inherently encodes constraints explicitly. The GraphPlan Algorithm guarantees that the shortest plan will be found.

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[1] Fikes and Nilsson, 1971 http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/PublishedPapers/strips.pdf
[2] Stuart J. Russell, Peter Norvig (2010), Artificial Intelligence: A Modern Approach (3rd Edition).
[3] Blum and Furst, 1997 https://www.cs.cmu.edu/~avrim/Papers/graphplan.pdf