Historical developments in the field of AI planning and search

This paper will discuss 3 developments in the field of AI planning, the relationship between the developments and their impact on the field of AI as a whole. The paper is outlined in sequential order of the developments beginning with the automated planner STRIPS, followed by the general purpose planner for STRIPS-style domains GRAPHPLAN, and finally the Planning Domain Definition Language (PDDL), which is an attempt to standardize AI planning languages.

Stanford Research Institute Problem Solver (STRIPS)
STRIPS is a problem solver developed by Richard E Filkes and Nils J Nilsson at the Stanford Research Institute, the paper STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving was published in 1971. The paper describes a classical planning problem in which there is an initial state, a goal state and a problem solver that searches the state spaces to find a sequence of actions that the given goal state is achieved, given that such a sequence exists.[1]

GRAPHPLAN
The STRIPS planning approach can be used to solve complex problems, but the state spaces involved on a planning tree can be of exponential size.[2] A planning graph as introduced by Avrim Blum and Merrick Furst in their 1997 paper Fast Planning Through Planning Graph Analysis is a polynomial size approximation to this tree and is able to be constructed quickly using STRIPS-like domains. The planning graph, "encodes the planning problem in such a way that many useful constraints inherent in the problem become explicitly available to reduce the amount of search needed."[3]   This planning technique guarantees to find the shortest plan using a backward chaining strategy.

Planning Domain Definition Language
Planning languages offer planning researchers a factored representation where a state space is represented by a collection of variables. PDDL is intended to describe the predicate and available actions within a given domain as well as the effects of a given action. This language, as shown in STRIPS and GRAPHPLAN can be used to solve complex planning problems because all actions can be represented with a single action schema.[4] PDDL was an attempt to standardize planning languages with the intent to foster a greater reuse in research and a more direct comparison of systems and approaches.[5]

Discussion
Three developments in the field of AI were discussed, STRIPS, GRAPHPLAN and PDDL. The developments were presented in chronological order to demonstrate that the field of AI is built upon previous research. The STRIPS planning approach using state spaces and a planning language influenced many other papers including the GRAPHPLAN. Planning languages were central to these developments, but research and results were difficult to interpret without an

understanding of individual planning languages. The introduction to a standardized language frees researchers from having to develop on their own language and focus on new ideas.

Sources

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