

Research Review

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Project III

Historical Developments in AI Planning and Search

During the development of Shakey, which was the first AI-based robot, developed at the Artificial Intelligence laboratory of Stanford Research Institute, the researchers devised a planner called STRIPS which the robot used to perform task such as route planning, and object rearrangement. The STRIPS representation, which is based on either primitive or derived features, is used in determining primitive values in a state relative to the previous state and on which action an agent will take next.

Years later, in an attempt to standardize the various AI planning languages, and which was influenced by STRIPS, researchers defined the Planning Domain Definition Language or PDDL. PDDL consists of two parts, the domain definition and the problem specification. The domain definition is constituted by the predicates of the domain and its operators. The problem definition has the objects present in the problem instance, a description of the initial state and the desired goal. PDDL is still heavily used today and is considered state-of-the-art for planning and AI planning competitions such as International Planning Competition or IPC.

Finally, Graphplan is an algorithm which is used in a planner and was developed in 1995. It takes as input, a planning problem, that has been implemented in STRIPS, and will attempt to output a series of actions that will lead to the final goal state of the problem. It is called a graphplan because it uses a planning graph to minimize the search time and to find a more direct path without having to search the entire state space, which is costly in terms of computational complexity.

All three of these topics are intertwined by the initial development of the STRIPS planner. It ushered in a new world of planning procedures and algorithms that are still being developed today in order to more effectively find solutions to hard problems in a reasonable amount of time. We can thank these researchers at Stanford for pushing the world of AI search into the future.

References

STRIPS

http://artint.info/html/ArtInt_204.html

Shakey

<http://www.ai.sri.com/shakey/>

PDDL

<http://users.cecs.anu.edu.au/~patrik/pddlman/writing.html>

Graphplan

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