RESEARCH REVIEW

AI planning and search, AI nanodegree, Udacity

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INTRODUCTION

As mentioned in the AIMA book [1] there are different approaches to solve the problem of planning in deterministic, fully observable, static environment. This review will shade the light on the following three algorithms:

- Probabilistic Planning Domain Definition language (PPDDL)
- Stanford Research Institute Problem Solver (STRIPS)
- Planning Graphs

PPDDL

PPDDL is an extension to Planning Domain Definition language(PDDL) which add probabilistic effects as general distribution for possible effect of an action, reward fluents to evaluate how good is the plan after the effect of an action, goal reward which increase the fitness of the state where one goal or more are reached. PPDDL deals with indeterministic, fully observable problems.[3]

STRIPS

In STRIPS world is described as set of well-formed formulas of the first-order predicate calculus. Given initial state STRIPS tries to reach a final goal through operations. Each action has preconditions and effect as a result of an action. The path is a sequence of actions that leads to the goal from an initial state. Strips Assumptions is a way to avoid the complexity of the frame problem for the purposes of planning within the situation calculus [1].

Planning Graphs

Planning graph is an organized graph for the problem where states are located in levels different from the possible actions level. State level describe the current or the possible state after an action as literals. Possible actions preconditions at each level must exist in the previous state level. In addition, new state level must include the effect of the parent action nodes. The result increase with the size of the problem, however planning graphs are effective approach to solve hard planning problems [2].

References

[1] Fikes, R., & Nilsson, N. (1971). Strips: A new approach to the application of theorem proving to problem solving. Artificial Intelligence, 2(3-4), 189-208. doi: 10.1016/0004-3702(71)90010-5

[2] Russell, S., & Norvig, P. (2010). Artificial intelligence (3rd ed., pp. 393-394). New Jersey: PEARSON.

[3] Younes, H., & Littman, M. (2004). PPDDL1.0: An Extension to PDDL for Expressing Planning Domains with Probabilistic Effects. School Of Computer Science Carnegie Mellon University.