Research Review (Planning)

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1 Introduction

In artificial intelligence (AI), the planning is a program which is executed by an agent/solver. The agent executes sequence of actions which will result in satisfying a desired goal. STRIPS [1] was one of the earliest planning system in the field of AI.

1.1 STRIPS

STRIPS stands for Stanford Research Institute Problem Solver. This problem solver works by finding sequence of action descriptions in the solution space. The goal is to use these sequence of action descriptions to transform a given initial world model into another model which can be used to prove that goal formula is ture. STRIPS used first-order predicate calculus formulas to represent a world model in the space. According to STRIPS, a world model is an arbitrary collection of first-order predicate calculus formulas. STRIPS had an ability to work with large number of formulas. Since STRIPS planning algorithm was simple, it was ineffective on even moderately complex problems. Though STRIPS didn't become extremely successful AI agent the achieved results created a profound influence in subsequent AI planning research.

1.2 Graphplan

Graphplan [2] was another AI planning algorithm based on concepts used in graph algorithms. In AI planning problems, previously existed standard approach was immediate search. In contrast, Graphplan algorithm started to tackle the problem by constructing a structure called a planning graph. This graph represented the planning problem such a way that inherent problem constraints became more visible and reduce the amount of search needed. In addition, the graph size and construction time were polynomial. One main limitation of Graphplan was it could only be applied in STRIPS-like domains. That implied actions couldn't create new objects. There are many planning problems that violate this condition.

1.3 Satplan (Planning as Satisfiability)

Planning as Satisfiability (SAT) [3] is planning model based on satisfiability. Satplan transforms the planning problem in to a Boolean satisfiability problem (classical propositional SAT). Then the problem can be solved by establishing satisfiability conditions using Davis-Putnam-Logemann-Loveland algorithm.

References

[1] R. E. Fikes,and N. Nilsson, STRIPS: A new approach to the application of theorem proving to problem solving. Artificial Intelligence, 5(2):189-208 (1971).

[2] Avrim L.Blum and Merrick L.Furst. Fast Planning Through Planning Graph Analysis. Artificial Intelligence, 90:281–300, (1997).

[3] H. Kautz and B. Selman . Planning as satisfiability.In Proceedings of the 10^{th} European conference on Artificial intelligence, 359-363, (1992).