Research Review of Multi-Agent Planning

Introduction

A multi-agent planning problem can be defined as the problem of planning by and for a group of agents. The solution to a multi-agent planning problem is a plan: a partially ordered sequence of actions that, when executed successfully, results in a set of achieved goals for some of the agents.

Approaches to the problem

In [1], a generalization of Sacerdoti's NOAH (Nets of Action Hierarchies) planning system is described. This generalization involves distribution of NOAH's criticism (conflict resolution) and world-model mechanisms. The suitability of this type of distributed planner is discussed, and a potentially more appropriate distributed-planning organization is outlined.

The algorithm is based on Hierarchical planning and

- distributes conflict resolution (critic)
- distributes world model
- distributes resolution of deadlock
- distributes elimination of redundant actions

In [2] the authors describes the the architecture of COLLAGE. COLLAGE is:

- Planner by multiple agents
- Distributes planning by partitioning into sub-problems
- Works with partially order plans
- Views planning as constraint satisfaction

In [3] the authors use Graph Merging as follows:

- Goal decomposition (every agent gets a goal from the planning graph)
- There are steps of state expansion and merging (where agents share back their efforts)
- The final step is coordination step

References

[1] Hierarchical Planning in a Distributed Environment (1979), By Daniel D. Corkill, Proceedings of the Seventh International Joint Conference on Artificial Intelligence, pages 168-175, Tokyo, August.

[2] Collage: A Diversified Constraint-Based Planning Architecture (1991), Amy L. Lansky and Andrew G. Philpot, Sterling Software/NASA Ames Research Center , Artificial Intelligence Research Branch,

[3] Distributed Planning Through Graph Merging (2010), Damien Pellier