Research Review

This is a short review of recent or at least important planning and search developments that are very influential in the Artificial Intelligence field.

Planning Domain Definition Language (PDDL)

Developed in 1998 and heavily inspired by STRIPS and ADL attempt to standardize AI planning languages.

Allows us to express all 4Tn^2 actions with one action schema. Describes the 4 things that we need to define in a search problem:

1. The initial State
2. The actions that are available in that state
3. The result of applying an action
4. The goal test

Graphplan Algorithm

Developed in 1997 uses backward chaining (regression) starting from the description of the goal states. This corresponds to selecting the operators in the order An1, An2, … A1, A0.

To reduce the amount of search, Graphplan uses memoization: information from failed subgoals are recorded so that unchanging subtrees of the search tree will not be traversed several times.

Ordered Binary Decision Diagrams (OBDD)

Binary Decision Diagrams are data structures that are used to represent a boolean function.

OBDDs have successfully been used for classical planning, as discussed in Section 5, but their benefits fully show up when a lot of uncertainty and incompleteness is involved.

An OBDD-based planner can be easily constructed on the basis of image or pre-image computation, and the resulting algorithm is a special case of algorithms for model-checking and construction of counterexamples

Reference

1. Stuart J. Russell, Peter Norvig (2010), Artificial Intelligence A Modern Approach (3rd Edition).
2. “Planning Domain Definition Language.” Wikipedia, Wikimedia Foundation, 14 Aug. 2017, en.wikipedia.org/wiki/Planning_Domain_Definition_Language.
3. Jussi Rintanen and Jorg Hoffmann, An overview of recent algorithms for AI planning