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Overview of algorithms used in Planning

This document deals with various algorithms that are used in the field of AI planning.

STRIPS

STRIPS (**S**tanford **R**esearch **I**nstitute **P**roblem **S**olver) is an automated planner, created by Fikes and Nilsson in 1971. The STRIPS algorithm is the prototype, whose representational structure has influenced what is known today as "classic planning".

A STRIPS instance is composed of:

- An initial state
- A set of goal states
- A set of actions, alongwith preconditions and postconditions for each action

A plan for such a planning instance is a sequence of operators that can be executed from the initial state and that leads to a goal state, similar to a formal automaton. A prerequisite is that STRIPS cannot have negative literals.

Planning Domain Definition Language (PDDL)

The PDDL is an extension of STRIPS, developed by McDermott in 1998. Planning tasks specified in PDDL are separated into two modules:

1. A *domain module* for predicates and actions.
2. A *problem module* for objects, initial state and goal specification.

Thus several problems may be connected to a single domain for planning, or a single domain can be used for various problem descriptions.

GraphPlan

Graphplan is an algorithm planning based on STRIPS, developed by Blum and Furst in 1995. GraphPlan uses a planning graph instead of a state-space search graph to reduce time required for searching for a path to a goal state.

- In a traditional state-space graph, the nodes are possible states and the edges of the search tree are used to indicate whether the goal state can be reached via some action.
- In a planning graph, the nodes are actions and atomic facts, arranged into alternate levels. The edges are of 2 kinds: one from an action to the atomic facts it makes true or false, and from atomic facts that represent boolean values of the conditions for actions.

References

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