Research Review:
"Historical Developments in the Field of AI Planning and Search"
Udacity Artificial Intelligence Nanodegree
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Introduction

This report provides a brief summary of important historical developments in the field of AI planning and search, focused on STRIPS, ADL and PDDL.

STRIPS

Founded in 1971, the Stanford Research Institute Problem Solver (STRIPS) is an automated planning technique that works by executing a domain and problem to find a goal. With STRIPS, you first describe the world by providing objects, actions, preconditions, and effects.

STRIPS, separates the processes of theorem from those of searching through a space of world models. This separation enables separate strategies for the two activities to improve the overall performance of the system. For searching through the space of world models, STRIPS uses a GPS-like means-end analysis strategy (Fikes and Nilsson, 2). STRIPS constructs a problem-solving tree whose nodes represent subproblems. It then uses an evaluation function to incorporate the gauged complexity of the remaining subgoals, the expense of the current operators chosen, and the intricacy of the current difference.

STRIPS is the base for most of the languages for expressing automated planning problem instances in use today. One prevalent example is action language, a language for specifying state transition systems, and is commonly used to create formal models of the effects of actions on the world (Gelfond and Lifschitz, 16).

ADL

Action description language (ADL) is an automated planning and scheduling language. It is considered an enhancement of STRIPS by allowing the effects of conditional operators. ADL was proposed by an IBM researcher, Edwin Pednault, in 1987 (Pednault, 1). Contrary to STRIPS, the principle of the open world applies with ADL. Any situation not covered in the conditionals is assumed to be unknown, instead of false. In addition, STRIPS only allows positive literals and conjunctions, ADL additionally allows negative literals and disjunctions (Gelfond and Lifschitz, 6). In terms of computational efficiency, ADL is ranked between STRIPS and the Situation Calculus (Pednault, 324-332).

PDDL

Planning Domain Definition Language (PDDL) was created in hopes of standardizing the planning domain and problem description languages. PDDL is used to define the properties of a domain, the predicates which are used and the action definitions (Fox and Long, 14). PDDL was inspired from and contains both STRIPS and ADL. PDDL is intended to express only the physics of a domain, and requires extension to represent the search-control advice that most planners need.

In PDDL, the effects of an action are not explicitly divided into "adds" and "deletes". Instead, negative effects are denoted by negation. The language was developed by Drew McDermott and his colleagues in 1998 with the purpose of making the 1998/2000 International Planning Competitions conceivable (McDermott, 1).

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