Historical Developments in the field of AI planning and search.

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The STRIPS (Stanford Research Institute Problem Solver) was the first major planning system ever designed by Richard E. Fikes and Nils J. Nilsson in 1971. STRIPS were designed as the planning component of the software for the Shakey robot project at SRI (Stanford Research Institute). (Russell and Peter, 2010). STRIPS attempt to find a sequence of operators in a space of world models to transform a given initial world model into a model in which a given goal formula can be proven to be true. STRIPS represent a world model as an arbitrary collection of first-order predicate calculus formulas and is designed to work with models consisting of large numbers of formulas. It employs a resolution theorem prover to answer questions of particular models and uses means-ends analysis to guide it to the desired goal-satisfying model. (Fikes and Nilsson, 1971)

Despite of the advantages in the representation language, it has limitations in algorithmic approach. The ADL (Action Description Language) relaxed some of the STRIPS restrictions and made it possible to encode more realistic problems. ADL is an excellent example of an action language that is used most commonly in robots as an automated planning and scheduling system. This planning algorithm was developed by Edwin Pednault in 1987, an IBM Research Staff Member, and is regarded as an improvement of STRIPS. It extended the syntax of STRIPS' action schemata by dropping some of its restrictions and allowing more complex problems to be encoded. In addition to increasing the domain encoding convenience, ADL reduced the required size of domain descriptions. (Russell and Peter, 2010).

PDDL (Planning Domain Definition Language) then was introduced by Drew McDermott and his colleagues in 1998 as a computer-parsable, standardized syntax for representing planning problems and has been used as the standard language for the International Planning Competition since 1998. There have been several extensions; the most recent version, PDDL 3.0, includes plan constraints and preferences. (Russel and Peter, 2010). PDDL is an attempt to standardize Artificial Intelligence planning languages. The described models have been fully defined in the XML Schema Definition Language (XSDL) and in the Web Ontology Language (OWL) for kit building applications. PDDL has continued to evolve and several extensions have been built off it, such as including features like non-propositional state-variables (NDDL) and notation to create ontologies (MAPL). (Russell and Peter, 2010)

In conclusion, the developments of AI planning and search changed noticeably since the STRIPS. Over the next decades it will still play a major role in complicated planning problems such as space exploration and colonization.

References

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