Historical developments in the field of AI planning and search

In this research we are going to review three important historical developments in the field of AI planning and search, we are going to briefly describe what they are, how are they related between each other and finally, how have they impacted the AI as a whole. First we are going to talk about the Problem Domain Description Language (PDDL), then we are going to briefly describe the Systematic Nonlinear Planning (SNLP) algorithm and finally we are going to mention how binary decision diagrams are being used to represent plans.

As it name implies, PDDL is a standardized and computer-parsable language used to describe the domain of a problem [Norvig, 2002]. It defines a formal syntax and less formal semantics intended to describe the "physics" of a domain including the predicates, actions, structure of compound actions and the effects the actions may have (Ghallab et al., 1998). The ease to compare the systems which use the standards has enabled substantial progress in planning research (Fox, 2003). Recently PDDL has been the subject of some research giving birth to frameworks (like myPDDL) [Strobel, 2015], benchmarks [Vassos, 2011], extensions and hybrid languages [Balduccini, 2016].

The SNLP is an implementation of a partial-order planner which uses the description of David McAllester and David Rosenblitt. SNLP was used by many researchers to experiment with the concepts of partial-order planning, it also was used as the base for the POP (Partial Order Planner) algorithm [Norvig, 2002]. This implementation analyzed the efficiency of nonlinear planning on both analytical and empirical studies [Soderland, 1991]. Recently SNLP has been cited by many articles which use its simplicity in order to elaborate into more complicated planning problems. Some examples are, a propositional planning using restricted parameters in order to reduce the search space [Bäckström, 2013]. Optimizing the planning process by capturing and exploiting knowledge of planning problems, decomposing the plan into smaller blocks which encapsulates some effects and preconditions [Chrpa, 2015].

Binary Decision Diagrams are graph based data structure that have been used for the representation of plans [Norvig, 2002]. They are very effective for representing first order logic but they can fail when extended logic needs to take place [Friso 2003]. BDDs inspired several other structures optimized for specific planning problems like the First Order Decision Diagrams which uses both the benefits of the decision diagrams and combines them with first order logic concepts in order to create planners that can come up with plans when using partially observed states [Joshi, 2010].

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