Research Review

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I have read three of these developments in planning, highlighting the relationships between the developments and their impact on the field of AI as a whole.

STRIPS:

Which is the first major planning system. This system is used to illustrate the interaction of these influences. STRIPS was designed as the planning component of the software for the Shakey robot project at SRI. The basic idea of STRIPS is 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.

The representation language used by STRIPS has been far more influential than its algorithmic approach. Evolved from STRIPS's language, ADL(The Action Description Language) was introduced in 1986, ADL relaxed some of restrictions and made STRIPS more flexible to realistic problems; PDDL(The Problem Domain Description Language), was introduced as a computer-parsable, standardized syntax for representing planning problems and has been used as the standard language since 1998.

Partial-order planning:

Linear planning, an algorithm for planning is soon find to be incomplete, It cannot solve some very simple problems. In order to solve this problem, partial-order planning, a technique in which steps in a totally ordered plan are reordered so as to avoid conflict between subgoals, was introduced in 1975.

Partial-order planning dominated the next 20 years of research. TWEAK(Chapman, 1987) is a planner originated from it and allow proofs of completeness and intractability of various problem, this work led to a complete partial order planner (McAllester and Rosenblitt, 1991). Partial order planning fell out of favor in the late 1990s when faster planning algorithm created.

binary decision diagrams:

Recent years, this technique has been viewed in the representation of plans frequently. Binary decision diagrams is a data structure that is used to represent a Boolean function. BDDs can be considered as a compressed representation of sets or relations. In BDD, operations are performed directly on the compressed representation.

BDDs are extensively used in CAD software to synthesize circuits (logic synthesis) and in formal verification. There are several lesser known applications of BDD, including fault tree analysis, Bayesian reasoning, product configuration, and private information retrieval.

References:

- Stuart Russell Peter Norvig. *Artificial-Intelligence*. Prentice Hall 2010
- STRIPS: A New Approach to the Application of .Theorem Proving to Problem Solving[Presented at the 2nd IJCAI, Imperial College, London, England, September 1-3, 1971.] http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/PublishedPapers/strips.pdf
- Binary decision diagram. Wikipedia