RESEARCH REVIEW: AI PLANNING AND SEARCH

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THE PLANNING DOMAIN DESCRIPTION LANGUAGE (PDDL)

PDDL (McDermott et al., 1998) was a language syntax to standardise planning problems. It was an important development in AI planning due to its formalisation of standardisation for planning languages, which has iteratively improved how a planning problem can be represented in a computer and therefore more easily tested with multiple algorithms. The extensions and further development of the language is an important ongoing effort to standardise new or updated planning methods (Gerevini and Long, 2005). Finally, its use in the International Planning Competitions means it is both practically useful and authoritative.

PROLOG

A logical programming language by the name of Prolog (Colmerauer and Roussel, 1993) was an early influential development for AI in Europe, where researchers often favoured it over Lisp (as preferred in North America). More generally, it is commonly used in natural language processing (which it was designed for) and is still in use today, despite first being designed in 1972 (Colmerauer and Roussel, 1993). It is thus an important development for the rigour and structure it brings as one of the first logic programming languages, and its multiple uses in AI research (Stickel, 1988) and industry including IBM Watson (Lally and Fodor, 2011).

It's relation to the above PDDL is most obviously represented by the influence of both languages to define, describe and help solve an AI problem. The formalisation of a problem into a computer in an expressive manner is important to solve the problem, and both developments built upon that goal. I would just claim that Prolog provides more general purpose with its Turing completeness.

HEURISTICS

An important development for solving problems in general, long before AI or computers. The formalisation of approximations for solving problems – 'heuristics' – is an important development in AI due to its advocation of practicality over purity: an answer 'close enough' is oftentimes better in the real world than the absolute right answer. The study of heuristics does not arise from AI, but psychology (Kahneman, Tversky, and Slovic, 1982), yet impacts the world of problem-solving, and problem-solving using an AI. The benefit of relaxing restrictions in a planning problem to form heuristics is often an intuitive and useful method.

The relationship it shares with Prolog is that of course many heuristics can be implemented in Prolog to help solve a (planning) problem. Heuristics can be informatively tested in a logic-based approached to determine under what domains (and conditions) a heuristic can potentially work best and worst. Further, a problem specified by PDDL can be reliably passed to a general heuristic function due to standardisation and abstraction.

While probably one of the most useful developments in AI is heuristics, the expressiveness of Prolog and the standardisation of a planning problem (using PDDL) are important advancements that rely on each other to further the field.

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