Artificial Intelligence Nanodegree

AI Planning Research Review

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Review

The first significant advance in AI planning happened on 1971; it was the creation of a "Problem Solving Program." The project was called STRIP. STRIP was the confluence of two different research; the first occurred in the area of robotics and the second in the field of state space searching. In STRIP research we see a lot of the foundations of today's AI planning search frameworks. STRIP terms as "world models," operators, and goals, are equivalent to new plan search graph nodes, goals and actions. Another innovation of STRIP that has used as the fundamental concept in AI planning is the representation of "world models' using well-formed formulas of first order predicate calculus; this language evolved into what we know today as PDDL. STRIP was innovative also because was the first AI approach that separated the inference (theorem proving) from the space search. STRIP did not lack areas of improvement, some of these were the order in which node to explore next, the lack of action interleaving (Sussman anomaly), recursion. In the next paragraph, we will talk about the later research that addressed some of the STRIP areas of improvement.

In 1986 Edwin Pednault using the STRIP representation language and relaxed some of its restrictions resulting in the creation of the "Action Description Language" or ADL. ADL flexibility made possible the description of problems that otherwise could not be represented using the STRIP representation language. ADL added conditionals to the STRIP operators allowing the planner to select only actions that are possible based on the precondition and solving the problem of the planner actions order.

In 1975 another significant advance was introduced by Waldinger the goal-regression planning. Goal regression planning technic helps with the STRIP linear planning limitations. This technic allows for the partial-order planning (sub plans for each goal) which the main idea of detecting conflicts and the protection of achieved conditions from interferences.

The AI planning evolution has converged into two primary schools that have evolved from more than 20 years. The "Search Base" approach and the Graphplan Search. During the years various improvements in both approaches have proof the usefulness of both. Also, the improvement of the definitions of better heuristics functions (ignore delete list heuristic Drew McDermott 1996) has also made planning search practical for large planning problems.