Research Review

AI planning arose from investigations into state-space search, theorem proving, and control theory and from the practical needs of robotics, scheduling, and other domains. STRIPS (by Fikes and Nilsson, 1971) is the first major planning system, illustrates the interaction of these influences. STRIPS overall control structure was modeled on that of GPS , the General Problem Solver , the first state-space search system that used mean-ends analysis.

The representation language used by STRIPS has been far more influential than its algorithmic approach, what is usually called **"CLASSICAL"** language is close to what STRIPS used. However it wasn't good for more realistic problems. This led to the introduction of ADL -- Action Description Language (Pednault, 1986), relaxing some of STRIPS restrictions providing a solution for STRIPS disadvantage. However still ADL , had some problems , this further led to PDDL -- Problem Domain Description Language (Ghallab, 1998).

PDDL was introduced 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 3.0 including plan constraints and preferences.

In the early 1970s problem decomposition was achieved by computing a subplan for each subgoal and then stringing the subplans together in some order. This approach famously called **Linear Planning** by Sacerdoti (1975) , was incomplete. It failed to solve many simple problems such as the Sissman anomaly. A complete planner must allow for interleaving of actions from different subplans within a single sequence.

One solution to interleaving problem was goal-regression planning. It is a technique in which steps in a completely ordered plan are reordered to avoid conflict between any subgoals. This was introduced by Waldinger (1975). WARPLAN used this concept of solving problems and is the first planner to be written in a logic programming language (Prolog) and is one of the best economy that can sometimes be gained with logic programming. It consists of only 100 lines of code, which is very small compared to other planners at that time.

The ideas underlying partial order planning include the detection of conflicts and the protection of achieved condition from interference(Sussman, 1975). The construction of partially ordered plans (then called **TASK NETWORKS**) was pioneered by **NOAH** planner.

Partial-order planning dominated the next 20 years of research, yet the first clear formal exposition was **TWEAK** , a planner that was simple enough to allow proofs of completeness and intractability of various planning problems.This let to a straightforward description of a complete partial order planner, then to widely distributed implementations SNLP and UCPOP. Due to later

advancements like faster methods use of partial order planning fell in the later years.Nguyen and Kambhampati (2001) suggest that a reconsideration is merited: with accurate heuristics derived from a planning graph, their **REPOP** planner scales up much better than **GRAPHPLAN** in various domains and is competitive with the fastest state space planners.

Planning has been a central part of AI since the start and will always be. Papers on planning are a staple of mainstream AI journals and conferences. There are also specialized conferences such as the International Conference on AI Planning Systems, the International Workshop on PLanning and Scheduling for Space & finally the European Conference on Planning.