Research Review

Automated planning and scheduling is one of the major fields of AI.Planning focuses on realization of strategies or action sequences executed by:

- Intelligent agents - the autonomous entities being able to observe the world through different types of sensors and perform actions based on those observations.
- Autonomous robots - physical intelligent agents which deliver goods (factory robots), keep our house clean (intelligent vacuum cleaners) or discover outer worlds in space missions.
- Unmanned Vehicles - autonomous cars, drones or robotic spacecrafts.

STRIPS is an action language which was a part of the first major planning system with the same name.Fikes and Nilsson in 1971 introduced STRIPS. It was designed as the planning component of the software for the Shakey robot project at SRI.Its overall control structure was modeled on that of GPS,the General Problem Solver(Newell and Simon, 1961), a state-space search system that used means-end analysis.Bylander(1992) shows simple STRIPS planning to be PSPACE-complete.Fikes and Nilsson(1993) give a historical retrospective on the STRIPS project and its relationship to more recent planning projects.STRIPS as a classical planning language is composed from states,goals and set of actions.

The Action Description Language,or ADL(Pednault,1986), relaxed some of the STRIPS restrictions and made it possible to encode more realistic problems.The Problem Domain Description Language, or 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 one PDDL 3.0,includes plan constarints and preferences(Gereveni and Long, 2005).Planners in the early 1970s generally considered totally ordered action sequences.Problem decomposition was achieved by computing a subplan for each subgoal and then stringing the subplans together in some order.

Partial-order planning dominated the next 20 years of research, yet the first clear for- mal exposition was TWEAK (Chapman, 1987), a planner that was simple enough to allow proofs of completeness and intractability (NP-hardness and undecidability) of various planning problems. Bylander (1994) and Ghallab *et al.* (2004) discuss the computational complexity of several variants of the planning problem. Helmert (2003) proves complexity bounds for many of the standard benchmark problems, and Hoffmann (2005) analyzes the search space of the ignore-delete-list heuristic.Heuristics for the set-covering problem are discussed by Caprara *et al.* (1995) for scheduling operations of the Italian railway. Most recently, there has been interest in the representation of plans as **binary decision diagrams**, compact data structures for Boolean expressions widely studied in the hardware verification community (Clarke and Grumberg, 1987; McMillan, 1993). There are techniques for proving properties of binary decision diagrams, including the property of being a solution to a planning problem. It is interesting to see the change in the five years between the two surveys: the first concentrates on partial-order planning, and the second introduces GRAPHPLAN and SATPLAN

References:-

- https://machinelearnings.co/historical-intro-to-ai-planning-languages-92ce9321b538
- Artificial Intelligence: A Modern Approach Textbook by Peter Norvig and Stuart J. Russell