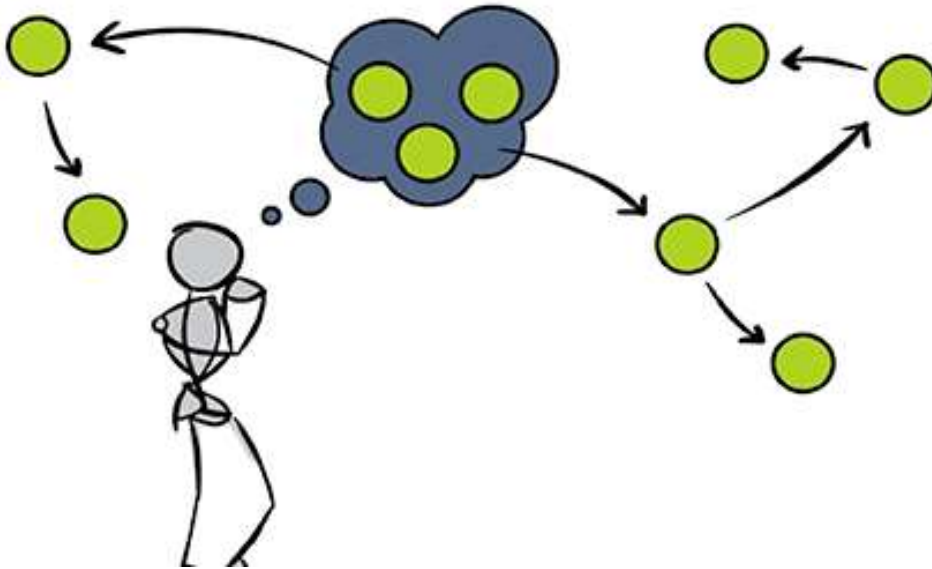


RESEARCH REVIEW

Historical developments in Planning and Search,
Artificial Intelligence



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The Artificial Intelligence Planning and Search problems was conceptualize in the year 1971. The investigation into state-space searches to theorem planning and control systems gave rise to the Artificial Intelligence Planning and Search Problems. STRIPS [Stanford Research Institute Problem Solver] was the first attempt at solving planning problems. A STRIPS language was developed to express automated planning.

A STRIPS instance is composed of:

1. **An initial state;**
2. **The specification of the goal states** – *situations which the planner is trying to reach;*
3. **A set of actions.** *For each action, the following are included:*
 - a. **preconditions** (*what must be established before the action is performed*);
 - b. **postconditions** (*what is established after the action is performed*).

The initial state is considered fully known in STRIPS: conditions that are not expressed are all assumed false. This is often a limiting assumption, as there are natural examples of planning problems in which the initial state is not fully known. This limitation gave rise to extension of STRIPS like ADL [Action Description Language].

A more formal standardize language called PDDL [Planning Domain Definition Language] was developed in the year 1998 for International Planning Competition [IPC]. PDDL is a general language, and most planners support only a subset. Most commonly used requirements are: strips, equality, typing and adl. A large variation of PDDL exists.

A next jump in AI Planning & Search came with GRAPHPLAN. GRAPHPLAN brought in orders of magnitude in performance. The GRAPHPLAN algorithm iteratively extends the planning graph, proving that there are no solutions of length $l-1$ before looking for plans of length l by backward chaining: supposing the goals are true, Graphplan looks for the actions and previous states from which the goals can be reached, pruning as many of them as possible thanks to incompatibility information.

The three key areas that impacted Planning and Search were STRIPS, PDDL, GRAPHPLAN.