Important historical developments in the field of AI planning and search

AI solutions are complex and they must be discovered and optimised in a multidimensional space. In planning, the idea is that you are given some description of a starting state or states; a goal state or states; and some set of possible actions that the agent can take.The planner output will be a sequence of actions, which when executed in any world satisfying the initial state descriptions, will achieve the goal
Many methodologies on planning representation have been used in AI developments. I am going to talk about 3 of these methodologies.

STRIPS

Plannification on AI emerges from the practical necessities of robotics, organisation and other fields. STRIPS (Fikes and Nilsson, 1971) can be considered as the first automated planning system. It was designed as a component for the software planning for robot Shakey built in Stanford. The algorithm itself was not as influential as the methodology used for its representation[1]
Its structure was modelled on the General Problem Solver (GPS) created by Simon, Shaw and Newell in 1957.
A STRIP instance has,

- An initial state.
- Meta specifications of the states
- A set of actions wh8ich can be: Preconditions or Postconditions

Linear planners such as STRIPS were proven to present certain limitations like problems with goal interactions and could not handle conflicting subgoals.

PDDL

Although the core of PDDL (Ghalla et al.1998) uses STRIPS formalism, the language extends beyond that. Its main components are:

- Objects: or things in the world we are interested about.
- Predicates: Properties of these objects. They can be TRUE or FALSE
- Initial State: the state of the world in which we start in.
- Specifications of Meta: Things we want to be TRUE.
- Actions/operators: Ways of changing the state of the world

PDDL splits planning tasks in two: Domain file for predictions and actions and problem file for objects, initial state and specification of the objective.

GRAPHPLAN:

Brum and Furst (1995,1997) GRAPHLAN algorithm was one of the most exciting developments in AI planning for two reasons[2]. First is a simple, elegant algorithm that yields an speedy planner. Second, the representation used by Graph-Plan form the basis of the most successful encodings of planning problems into propositional SAT; hence familiarity with GRAPHLAN aids in understanding SAT-based planning systems.
Beyond its use as a form to represent planning, it is also used as a heuristic measure. It gives an estimation of how many steps are needed to reach the goal. For that 2-in-one characteristic, it is probably the most useful methodology and, in my opinion, the one that makes worth to focus on more developments.

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[1] Stuart Russell, Peter Norvig. Artificial Intelligence, a modern approach. (3r edition). Chapter 10

[2] Daniel S. Weld (1999). Recent Advances in AI Planning AI Magazine Volumen 20 Number 2.

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