Brief history of planning problems in AI

In the last 50 years, there are 3 major developments that contribute to the evolution of the planning solutions. This report aims to provide a short summary for these 3 developments.

It all dated back to 1971 for the first major development of the STRIPS planning system (Stanford Research Institute Problem Solver). Fikes and Nilson from the Stanford Research Institute formalized the use of propositional logic for planning problems. In the world of STRIPS, it is full of a set “well formed formulas”, which like the air cargo planning assignments as a propositional logic statement. The goal states are represented as formulas and transitions between the states are “actions” which upon the satisfaction with any pre-conditions, the actions can be executed.

2nd Major advancement was come by 26 years later at 1997 named as GRAPHPLAN. It was published by Blum and First from Carnegie Mellon University (CMU). It advocates the concept of “Planning Graph Analysis” which is to represent the world as a graph. The propositional is the vertex/node enlist the properties of the world and actions is the edge that connect the vertices/nodes. Since the graph is presented as node – edge – node (propositional – actions – propositional ……..), the planning graph can address the problem concisely without the worries to look ahead entire world. GRAPHPLAN is very efficient in the result searching.

The last advancement is the Heuristic Search Planner (HSP) or Fast Forward Planner (FF). Both leverage the heuristic search to tackle the

planning problem with assumption if the sub goals are independent and solve the relaxed version of the problem by an estimate of the complexity of the real problem. The FF solutions share the same manner as HSP but can outperform on large domain planning problems which is more effective in HSP.

Ref:

1. http://ai.stanford.edu/~nilsson/OnlinePubs-Nils/PublishedPapers/strips.pdf
2. https://www.cs.cmu.edu/~avrim/graphplan.html
3. https://www.cs.toronto.edu/~sheila/2542/s14/A1/bonetgeffner-heusearch-aij01.pdf
4. http://www.cs.toronto.edu/~sheila/2542/w06/readings/ffplan01.pdf