Important historical developments in the field of AI planning and search

Review of evolution of GPS, STRIPS and PDDL.

GPS was an early development of a way to formalize problem and problem solving. Paper[1] introduces psychological background as the base theory in pursuit of formalizing human reasoning. Paper draws parallels between human thinking and computer ability to perform various transformation "*We have learned that a computer is a general manipulator of symbols not just a manipulator of numbers. Basically, a computer is a transformer of patterns*." It is interesting how authors approached the problem of formalizing human trivial problem reasoning. They formulated a logical problem, introduces some logic symbols like Or, And, Infers etc and asked student to find a solution for a provided goal. The student had to speak out the steps he took and his reasoning. Later when testing GPS the steps program performed in solving same problem as student did was compared to latter - a way to validate or assess the difference between computer and human "reasoning". The results were rather interesting especially keeping in mind that research paper was published in 1961.

Fast forward to 1971 - a new problem solver called **STRIPS** was developed. It was presented in a paper[2] by Fikes, Richard E., and Nils J. Nilsson. *For searching through the space of world models, STRIPS uses a GPS-like means-end analysis strategy*. This combination of means-ends analysis and formal theorem-proving methods allows objects (world models) much more complex and general than any of those used in GPS and provides more powerful search heuristics than those found in theorem-proving programs.
Publication authors present multiple analysis of STRIPS method performance: decision tree formation, world model representation, etc. Authors also present a real world application examples - tasks for for robot navigation and problem solving.

1998 came with an introduction of a problem-specification language PDDL - a Planning Domain Definition Language[3]. The language combined features from multiple languages developed earlier to mention a few: ADL, UMCP and of course STRIPS. The goal of the language is to encourage empirical evaluation of planner performance, and development of standard sets of problems all in comparable notations.

To sum it all up "*Planning research has been central to AI since its inception, and papers on planning are a staple of mainstream AI journals and conferences*." [4]

References

1. Newell, Allen, and Herbert Alexander Simon. *GPS, a program that simulates human thought*. No. P-2257. RAND CORP SANTA MONICA CALIF, 1961.
2. Fikes, Richard E., and Nils J. Nilsson. "STRIPS: A new approach to the application of theorem proving to problem solving." Artificial intelligence 2, no. 3-4 (1971): 189-208.
3. Ghallab et al., *PDDL | The Planning Domain Definition Language (version 1.2)*, 1998.
4. P. Norvig, S. Russell, Artificial Intelligence: A Modern Approach 3rd ed., 2009.