

Historical Developments in the field of AI Planning and Search

A lot of development has taken place in the field of AI, right from the day a workshop was organized by John McCarthy in 1956. The goal was to investigate ways in which machines could be made to simulate aspects of intelligence – the very idea that has driven the field ever since.

Search plays a major role in solving many Artificial Intelligence problems. Many different types of search algorithms were devised over the period of time but it actually went mainstream when Deep Blue beat world chess champion Garry Kasparov at a game of chess. The underlying algorithm is a mini max search with a better evaluation function. Since then search algorithms have been improved using heuristic functions to solve most of the board games with ease and the same algorithms have been used in various domains and one of those domains is planning.

The task of coming up with a sequence of actions that will achieve a goal is called planning. One of the most common examples is the Air Cargo Transport Problem where we have to find the efficient route to transport the cargos between different airports. One way to solve this would be to employ one of the search algorithms but it would easily be overwhelmed by irrelevant actions. To tackle this, a planning language called STRIPS was developed by Richard Fikes and Nils Nilsson in 1971 and many different approaches on top of STRIPS were proposed but most of them suffered from inaccuracies. However, in 1997 Avrim Blum and Merrick Furst at Carnegie Mellon developed a new approach called Planning Graphs. Graphplan is a general-purpose planner for STRIPS-style domains, based on ideas used in graph algorithms. Given a problem statement, Graphplan explicitly constructs and annotates a compact structure called a Planning Graph, in which a plan is a kind of "flow" of truth-values through the graph. This graph has the property that useful information for constraining search can quickly be propagated through the graph as it is being built. Graphplan then exploits this information in the search for a plan.

Search and planning have contributed to the field of AI immensely. Development in one field is directly proportional to the overall development of the field in general.

References:

1. Stuart J. Russell, Peter Norvig (2010), Artificial Intelligence: A Modern Approach (3rd Edition)
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3. <https://www.cs.cmu.edu/~avrim/graphplan.html>