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Research Review

STRIPS: A New Approach to the Application of Theorem Proving to Problem Solving – One Page Summary

Introduction:

In the mid 1960's at SRI (Stanford Research Institute) there was work going on the robot Shakey which was the world's first mobile intelligent robot embodying numerous breakthroughs in AI. Shakey with its abilities such as camera to observe environment, antenna radio link, bump detector, push bar to push objects is like the great grandfather of self driving cars and even the military drones

As Shakey moved around in environment filled with obstacles there were some issues in programs controlling Shakey's actions such as how to navigate without bumping into obstacles and how Shakey should put together high level actions in order to achieve high level goals. To put together Shakey's high level actions in order to achieve high level goals Richard E Fikes and Nils J Nilsson developed a system called STRIPS (Stanford Research Institute Problem Solver)

Techniques:

STRIPS used high level models of Shakey's world ie. Instead of using coordinates it used a set of facts to represent environment state through database states. Now a graph searching program was required to search through these states so in order to convert this into a search problem - STRIPS rules were invented. STRIPS rules consist– Action, Precondition, Deletelist. Addlist.

STRIPS attempts to find a sequence of operators in a space of world models to transform a given initial world model into a model in which a given goal formula can be proven to be true. A star algorithm was used with STRIPS to navigate forward/backwards between initial state and goal state. STRIPS employ a resolution theorem prover to answer questions of particular models and uses means-ends analysis to guide it to the desired goal-satisfying model.

Results:

Combination of means-ends analysis and formal theorem-proving methods allowed objects (world models) much more complex and general and provided more powerful search heuristics than those found in theorem-proving programs.

STRIPS constructed a problem-solving tree whose nodes represent sub-problems. It searched the space of "world models" to find one in which a given goal is achieved. STRIPS separated entirely the processes of theorem proving from those of searching through a space of world models. This separation allowed employing separate strategies for these two activities and thereby improving the overall performance of the system.