RESEARCH REVIEW

James Byrne

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Historical AI Planning Events

GPS

The General Problem Solver (GPS) is an early planning program that was able to determine and reduce the difference between a model and a goal. The program can solve any problem which can be defined as well-formed formulas (wff). This means GPS was able to solve problems such as the Towers of Hanoi, as this could be defined in a well-formed manor, but struggled when it came to real-world problems as the program was easily lost in an explosion of possible combinations.

STRIPS

This leads onto STRIPTS. STRIPS (which stands for Stanford Research Institute Problem Solver) is a problem solving program which searches a space of "World Models" until one is found which satisfies the goal. For each "World Model" there is defined a set of actions which will transform the world model to some other world model and the program must be given an initial world model from which it can begin searching.

STRIPS records the steps taken to reach a world model which satisfies the goal state so they can be used as a list of instructions. It used a GPS style strategy of determining the differences the current world model and the goal, which it can then use to determine which actions are most likely to reduce the difference. The authors believe that STRIPS can be used to generate computer programs which they state is already being considered by a number of researchers.

Situation Calculus

This brings us onto Situation Calculus. In Situation Calculus the idea is to plan using first-order logic, as it is known. The basic elements of situation calculus are the actions that can be performed in the world, the fluents that describe the state of the world and the situations. These world states have variables and constants which allows us to use theorem proving to prove that a list of actions can be applied to the situation to lead to the end goal. In theory this should work well, but in planning, often the search is exponential. Also, the resolution will find a plan, but this is not guaranteed to be the best or even a good one.

Each of these historical events has led to a huge advancement in the world of planning AI. This can be seen by looking at ADL and PDDL which essentially started from STRIPS. Although the algorithms and ideas may have changed, the language used to represent the states has stayed pretty similar.

References

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