Classical planning can always be reduced down to what is called a STRIPS model. The STRIPs model is a world model consisting of an arbitrary collection of 1^{st} order predicate calculus formulas. STRIPs stands for the "Stanford Research Institute Problem Solver". There are two activities that the model undertakes; they are theorem proving and searching through the space of world models. Theorem proving is undertaken at each discrete time point to search within a given model and see which operators are applicable and whether the goals are satisfied. Searching through the space of world models is done with a GPS like means end analysis strategy.

There are three entities in STRIPS. They are an initial world model stated as a well formed formula, a set of operators(each corresponding to an action routine), and a goal condition stated as a well formed formula(wff). The goal is solved when STRIPs makes a world model that matches the set of goal conditions.

STRIPS starts with theorem proving, if it fails to find a proof the uncompleted proof is the difference between the model state and the goal state. Operators that might be able to reduce the difference between the two states are searched for. This leads to a subgoal with a state that is closer to our desired state. This process is repeated until the goal is solved (Fikes And Neilson 1971).

One idea that came out of STRIPS was the graphplan planner based on planning graph analysis. Graphplan applies to STRIPs like planning domains and returns a shortest possible partial-order plan, or states that no valid plan exists. The advantage of using it is that instead of navigating the state space graph itself of a problem, you are navigating an abstracted version of the state space. Graphplan is polynomial size and built in polynomial time. It contains 2 types of nodes and three types of edges. It alternates between propositions and actions, which are also the two node types. The edges are comprised of preconditions, add effects, and delete effects (Blum and Furst 1995).

STRIPS is an example of what is called classical planning. Later other types of planning were developed. Cost based planning involves nonunit cost actions. For example the same two actions carried out in a different order, could have a different total cost to carry out. So in this case the cost to achieving a proposition at each layer needs to be tracked (Bryce and Kambhampati 2007).

Partial satisfaction planning, came out of the understanding that sometimes achieving all your goals exceeds some threshold of acceptable cost, so you only carry out the actions whose cost are acceptable for the given goal, depending on how important that particular goal is (Bryce and Kambhampati 2007).

Planning under uncertainty deals with situations where the state is only partially known and/or the actions are uncertain. In that case one solution is to have multiple planning graphs, one for each belief state in your set of beliefs and to aggregate them before deciding on a course of action. However, this has two problems. It requireds multiple graphs, which can be costly, and there is a lot of repeated graph structure between all the graphs. This led to labeled uncertainty graphs(LUG) which represent multiple graphs implicitly. Instead of multiple graphs, a single graph using labels which refer to which belief states are using them is created (Bryce and Kambhampati 2007).

Temporal planning is when the problem is better represented with durative time instead of atomic time. For example, when two simultaneous actions can be carried out, but with different delays till they are actually executed. Planning with resources is when booleans are insufficient to represent the variables in question (Bryce and Kambhampati 2007).

Works Cited

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