Abstract

Planning with temporally extended goals has recently been the focus of much attention to researchers in the planning community. These goals, unlike a final goal state, specify an acceptable sequence of states. Linear temporal logics, including the timed versions, has been used to specify a wide range of planning goals. We study a class of real life planning goal situations where in addition to a main goal there exist other goals, which we call auxiliary goals, that act as constraints to the main goal. Both these type of goals can, in general, be a temporally extended goal. Linear temporal logic is inadequate for specification of the overall goals of this type, although, for some situations, it is capable of expressing them separately. First, we show the usefulness of a branching-time temporal logic for the purpose. Next, we consider situations where an auxiliary goal has to be satisfiable within a fixed bound. For this we use a timed branching-time temporal logic for specifying goals. The emphasis of the dissertation is from two perspectives—first to provide suitable logical specification mechanisms, depending on the type of constraints, and second to develop computationally efficient algorithms for the goal formulas expressed in such logical languages. To this end, we have come up with suitable languages and efficient algorithms for the planning problems in both deterministic as well as stochastic domains.