Abstract

In this paper we address the problem of generating preferred plans by combining the procedural control knowledge specified by Hierarchical Task Networks (HTNs) with rich user preferences. To this end, we extend the popular Planning Domain Definition Language, PDDL3, to support specification of simple and temporally extended preferences over HTN constructs. To compute preferred HTN plans, we propose a branch-and-bound algorithm, together with a set of heuristics that, leveraging HTN structure, measure progress towards satisfaction of preferences. Our preference-based planner, HTNPLAN-P, is implemented as an extension of the SHOP2 planner. We compared our planner with SGPLAN5 and HPLAN-P — the top performers in the 2006 International Planning Competition preference tracks. HTNPLAN-P generated plans that in all but a few cases equalled or exceeded the quality of plans returned by HPLAN-P and SGPLAN5. While our implementation builds on SHOP2, the language and techniques proposed here are relevant to a broad range of HTN planners.

Keywords

Preferences; Planning; Planning Algorithms

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The outcome of our work is a language for specifying user preferences, tailored to HTN planning, together with a provably optimal preference-based planner, HTNPLAN, that is implemented as an extension of SHOP2. To compute preferred plans, we propose an approach based on forward-chaining heuristic search. Our heuristic uses an admissible evaluation function measuring the satisfaction of preferences over partial plans. Our empirical evaluation demonstrates the effectiveness of our HTNPLAN heuristics. We prove our approach sound and optimal with respect to the plans it generates by appealing to a