

Hybrid Search for Dynamically Changing CSPs

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Abstract. Constraints satisfaction problems are often used for modeling and solving problems in an environment which is subject to changes. When some of the constraints are changed after a solution was obtained it is often desired to search for a solution to the derived problem where the solution to the changed problem is as similar as possible to the previous (e.g., current) solution. This requirement is relevant for many timetabling and scheduling scenarios. Previous approaches to this problem include the method of Roos et. al. [5] which traverses the possible assignments according to their distance from the original solution, starting from the smallest distance. In a more recent paper by Hebrard et. al. [1] the problem of finding the most similar solution was shown to be NPhard and a method based on a Branch and Bound scheme was proposed. This method enforces global arc-consistency on a global soft constraint of similarity. The present paper proposes a new approach for finding the most similar solution to a changing constraints satisfaction problem. The proposed method exploits the fact that the goal is to find a complete assignment with two different properties. The first is that it contains as many as possible identical assignments to the previous solution. The second is that the assignment must be consistent, i.e. it must be a satisfying solution to the new CSP. According to these two different requirements our proposed solution method interleaves constraint optimization and constraint satisfaction techniques in order to find the most similar solution to the changed CSP. Preliminary experiments on random CSPs present the advantage of the proposed method over previous approaches.