

Invitation to Combinatorial Reconfiguration

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Abstract

Combinatorial reconfiguration studies reachability and related questions over the solution space formed by feasible solutions of an instance of a combinatorial search problem. For example, as the solution space for the SATISFIABILITY problem, we may consider the subgraph of the hypercube induced by the satisfying truth assignments of a given CNF formula. Then, the reachability problem for SATISFIABILITY is the problem of asking whether two given satisfying truth assignments are contained in the same connected component of the solution space. The study of reconfiguration problems has motivation from a variety of fields such as puzzles, statistical physics, and industry. In this decade, reconfiguration problems have been studied intensively for many central combinatorial search problems, such as SATISFIABILITY, INDEPENDENT SET and COLORING, from the algorithmic viewpoints. Many reconfiguration problems are PSPACE-complete in general, although several efficiently solvable cases have been obtained. In this talk, I will give a broad introduction of combinatorial reconfiguration.

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