Using Local Search to Solve Some #P-complete Problems

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Abstract. Both exact and heuristic techniques generally focus on solving NP-complete problems. However, in many cases, finding a single solution satisfying given criteria may not be sufficient. In applications, it may be important to have alternative solutions to a particular problem instance—perhaps there are intangible differences between them that a client or practitioner might prefer. The total *number* of satisfying solutions thus becomes a relevant issue in practice. Enumerating all these solutions typically belongs to the class of #P-complete problems. In this paper we show that estimates of this number can be obtained from statistics on the number of repetitions in the sample history of a local search. The approach is exemplified in the problem of counting the number of satisfying solutions in random and structured SAT instances.