ABSTRACT

The k-SAT problem, which asks whether a k-CNF formula has a satisfying assignment, is the canonical NP-complete problem, so we do not expect to find polynomial time algorithms for it. However, a number of results have shown that it is possible to do better than the naive 2^n running time.

Here, we analyze a simple randomized algorithm for k-SAT, and show that it succeeds with high probability in time $O(n^2 2^{(1-1/k)n})$. Then, we improve on this by adding a resolution-based preprocessing phase to this algorithm. The resulting algorithm, ResolveSat, improves on existing algorithms for k-SAT for all k. In particular, we obtain a running time of $2^{0.446n}$ for 3-SAT.

This is joint work with Ramamohan Paturi, Pavel Pudlak, and Michael Saks.