Reactive Search: a history-based heuristic for MAX-SAT

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Abstract

The Reactive Search (RS) method proposes the integration of simple history-based feedback schemes in local search for the on-line determination of free parameters. In this paper a new RS algorithm is proposed for the solution of the Maximum Satisfiability problem: a component based on Tabu Search is complemented with a reative scheme that determines ("learns") the appropriate value of the prohibition parameter by monitoring the Hamming distance along the search trajectory (algorithm H-RTS).

The algorithm is developed in two phases. First the exploitation-exploration (bias-diversification) properties of individual candidate components are analysed by extensive empirical evaluation, then a reactive scheme is added to the winning component, based on Tabu Search. In the algorithm the starting configuration after a restart is obtained with the recently introduced non-oblivious local search technique.

The final tests on a benchmark of random MAX–3–SAT problems demonstrate the superiority of H-RTS with respect to alternative heuristics.