Design of a new metaheuristic for MAXSAT problems

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Iterated Local Search for MAXSAT

Metaheuristics [1] are approximate algorithms which effectively and efficiently exploit search space characteristics to find near-optimal solutions. Their combination with CP [2] is also very successful. In this work we present a new metaheuristic for tackling large MAXSAT instances. A survey of the state of the art of metaheuristics for MAXSAT can be found in [4]. The algorithm we designed is based on Iterated Local Search strategy [3] and combines the most effective local search strategies for SAT problems. Its high level scheme is the following:

s_0 = Generate_Initial_Solution_Randomly()
s^* = Parallel_MAX–GSAT(s_0, stop condition)
repeat
    s' = WalkSAT_Perturbation(s^*, *number of non_improving moves*)
    Adapt_tabu_length(*number of non_improving moves*)
    $s^{*'}$ = Tabu_Search(s')
    if $F(s^{*'}) > F(s^*)$ **then set** $s^* = s^{*'}$ [accept $s^{*'}$ if it is better than s^*]
while termination condition met

The most important property of *ILS-MAXSAT* is to achieve a dynamic balance between intensification and diversification, crucial in the exploration of large search spaces. The algorithm has been proven very effective on large unweighted MAXSAT instances and extensive comparisons with the best available algorithms is subject of ongoing work.

References

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