Open-WBO-Inc in MaxSAT Evaluation 2019

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I. Introduction

Open-WBO-Inc [1], [2] is developed on top of Open-WBO [3], [4], [5] and placed first and second on the weighted incomplete tracks for 60 and 300 seconds in the MaxSAT Evaluation 2018, respectively. For many applications that can be encoded into MaxSAT, it is important to quickly find solutions even though these may not be optimal. Open-WBO-Inc is designed to find a good solution[1] in a short amount of time. Since Open-WBO-Inc is based on Open-WBO, it can use any MiniSAT-like solver [6]. For this evaluation, we use Glucose 4.1 [7] as our back-end SAT solver.

II. Algorithms

For the MaxSAT Evaluation 2019, we restrict Open-WBO-Inc to the weighted category where it uses the novel approximation algorithms that have been recently proposed [1], [2]. In particular, we submitted two versions of Open-WBO-Inc: inc-bmo-complete and inc-bmo-satlike.

Both inc-bmo-complete and inc-bmo-satlike versions are based on bounded multilevel optimization [8] using a variant of linear search algorithm SAT-UNSAT [9]. The algorithms used in these versions consider n objective functions where n is the number of different weights in the MaxSAT instance. This is done by performing a sequence of calls to a SAT solver and refining an upper bound μ on the number of unsatisfied soft clauses. To restrict μ at each iteration, we need to encode cardinality constraints into CNF, for which, incremental Totalizer encoding [4] has been used. Once for a given objective function the upper bound μ cannot be improved, it is frozen, and the next objective function in the order is optimized.

If an optimal solution is found when using this algorithm, then it is not necessarily an optimal solution of the input formula. inc-bmo-complete and inc-bmo-satlike versions different between themselves once this occurs. inc-bmo-complete keeps the best-known solution and resumes the search using the LSU algorithm which can potentially find better solutions and prove optimality. In contrast, inc-bmo-satlike changes the search algorithm to SATLike [10], a MaxSAT stochastic algorithm. The best model found by the first phase is passed to SATLike as its initial starting model.

[1]By "good solution" we mean that it can be potentially suboptimal but is not far from the optimal solution.

III. Availability

We submit the source of Open-WBO-Inc as part of our submissions to the MaxSAT Evaluations 2019. inc-bmo-complete version and the full Open-WBO-Inc framework is available under a MIT license in GitHub at *https://github.com/sbjoshi/Open-WBO-Inc*. The inc-bmo-satlike version is available in the same repository under the *satlike* branch.

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