

TT-Open-WBO-Inc-22: an Anytime MaxSAT Solver Entering MSE'22

Alexander Nadel

Email: alexander.nadel@cs.tau.ac.il

Abstract—This document describes the solver TT-Open-WBO-Inc-22, submitted to the four incomplete tracks of MaxSAT Evaluation 2022. TT-Open-WBO-Inc-22 is the 2022 version of our solver TT-Open-WBO-Inc [8], itself based on Open-WBO-Inc [3]. The main innovation in TT-Open-WBO-Inc-22 is the integration of our new open-source SAT solver Intel® SAT Solver (IntelSAT) [5].

I. INTRODUCTION

TT-Open-WBO-Inc [8] is our anytime MaxSAT solver, based on Open-WBO-Inc [3]. Similarly to the previous year's version [9], TT-Open-WBO-Inc-22 combines the following algorithms:

- 1) SATLike local search [2] for inprocessing.
- 2) The unweighted component uses Mrs. Beaver [6], enhanced by the following two heuristics from Sect. 4.1 in [4]: global stopping condition for OBV-BS and size-based switching to complete part.
- 3) The weighted component uses BMO-based clustering [3].
- 4) The Polosat SAT-based local search algorithm [7] replaces the regular SAT invocations in both the unweighted and weighted components.

We adjusted some of the low-level parameters of the aforementioned algorithms to the benchmarks from the two latest MaxSAT Evaluations.

The main innovation this year is the development and integration of our new open-source SAT solver Intel® SAT Solver (IntelSAT) [5], available at [10]. IntelSAT is optimized for applications which generate many mostly satisfiable incremental SAT queries, such as unweighted anytime MaxSAT, for which IntelSAT's performance was specifically optimized [5].

We submitted three versions of TT-Open-WBO-Inc-22, the difference being the underlying SAT solver:

- 1) TT-Open-WBO-Inc-22 (I): with IntelSAT.
- 2) TT-Open-WBO-Inc-22 (IS): with IntelSAT, tuned for shorter invocations.
- 3) TT-Open-WBO-Inc-22 (G): with Glucose 4.1 [1].

REFERENCES

- [1] G. Audemard and L. Simon. On the Glucose SAT solver. *Int. J. Artif. Intell. Tools*, 27(1):1840001:1–1840001:25, 2018.
- [2] S. Cai and Z. Lei. Old techniques in new ways: Clause weighting, unit propagation and hybridization for maximum satisfiability. *Artif. Intell.*, 287:103354, 2020.
- [3] S. Joshi, P. Kumar, S. Rao, and R. Martins. Open-wbo-inc: Approximation strategies for incomplete weighted maxsat. *J. Satisf. Boolean Model. Comput.*, 11(1):73–97, 2019.
- [4] A. Nadel. Anytime weighted MaxSAT with improved polarity selection and bit-vector optimization. In *FMCAD 2019*, pages 193–202.
- [5] A. Nadel. Introducing Intel(R) SAT Solver. In *SAT 2022*. To appear.
- [6] A. Nadel. Solving MaxSAT with bit-vector optimization. In *SAT 2018*, pages 54–72, 2018.
- [7] A. Nadel. On optimizing a generic function in SAT. In *2020 Formal Methods in Computer Aided Design, FMCAD 2020, Haifa, Israel, September 21-24, 2020*, pages 205–213. IEEE, 2020.
- [8] A. Nadel. Polarity and variable selection heuristics for SAT-based anytime MaxSAT. *J. Satisf. Boolean Model. Comput.*, 12(1):17–22, 2020.
- [9] A. Nadel. TT-Open-WBO-Inc-21: an Anytime MaxSAT Solver Entering MSE'21. Department of Computer Science Report Series B. University of Helsinki, 2021.
- [10] A. Nadel. Intel® SAT Solver. https://github.com/alexander-nadel/intel_sat_solver, 2022.