TT-Open-WBO-Inc-24: an Anytime MaxSAT Solver Entering MSE'24

Alexander Nadel
Data and Decision Sciences, Technion, Haifa, Israel
Email: alexander.nadel@cs.tau.ac.il

***Abstract*—This document describes the solver TT-Open-WBO-Inc-24, submitted to the four incomplete tracks of MaxSAT Evaluation 2024. TT-Open-WBO-Inc-24 is the 2024 version of our solver TT-Open-WBO-Inc [8], itself based on Open-WBO-Inc [4]. The main innovation in TT-Open-WBO-Inc-24 is the integration of the local search component from NuWLS-c-2023 [3].**

I. Introduction

TT-Open-WBO-Inc [8] is our anytime MaxSAT solver, based on Open-WBO-Inc [4]. Mostly similarly to the previous year's version [10], TT-Open-WBO-Inc-24 combines the following algorithms:

1) NuWLS-c-2023 local search [3] for preprocessing (the only significant change from the previous year's version, based on the 2022 version of NuWLS-c).
2) The unweighted component uses Mrs. Beaver [6], enhanced by the following two heuristics from Sect. 4.1 in [5]: global stopping condition for OBV-BS and size-based switching to complete part.
3) The weighted component uses BMO-based clustering [4].
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 latest MaxSAT Evaluation. Additionally, we fixed several bugs unearthed by running the regression, provided by MaxSAT Evaluation 2024 organizers. As a result, TT-Open-WBO-Inc now works correctly on unsatisfiable instances and instances without any soft clauses.

We submitted two versions of TT-Open-WBO-Inc-24, the difference being the underlying SAT solver:

1) TT-Open-WBO-Inc-24(I): with IntelSAT [9].
2) TT-Open-WBO-Inc-24(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] J. Berg, M. Järvisalo, R. Martins, and A. Niskanen, editors. *MaxSAT Evaluation 2023: Solver and Benchmark Descriptions*. Department of Computer Science Series of Publications B. Department of Computer Science, University of Helsinki, Finland, 2023.
[3] Y. Chu, S. Cai, and C. Luo. Nuwls-c-2023: Solver description. In Berg et al. [2].
[4] 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.
[5] A. Nadel. Anytime weighted MaxSAT with improved polarity selection and bit-vector optimization. In *FMCAD 2019*, pages 193–202.
[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. Introducing Intel(R) SAT solver. In K. S. Meel and O. Strichman, editors, *25th International Conference on Theory and Applications of Satisfiability Testing, SAT 2022, August 2-5, 2022, Haifa, Israel*, volume 236 of *LIPIcs*, pages 8:1–8:23. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022.
[10] A. Nadel. TT-Open-WBO-Inc-23: an Anytime MaxSAT Solver Entering MSE'23. In Berg et al. [2].