

Z3-Inc-Z3++ in SMT-COMP 2025

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1 Introduction

Z3-Inc-Z3++³ is a derived solver based on Z3 [4]. It belongs to the Z3++ family, which has participated in the SMT-COMP since 2022 [1]. This year, Z3-Inc-Z3++ participates in the incremental track of QF_NIA. The usage is to run “./smtcomp_run_incremental” command in the uploaded archive⁴.

1.1 Technical Innovations

We modify the Z3 solver (version 4.13.4) by adopting the local search procedure as a new tactic. The local search procedure is based on the LocalSMT solver [2, 3, 5], a local search solver dedicated to SMT on arithmetic theories.

We consider that the local search algorithm is specifically suitable for incremental SMT queries, since after a minor modification to the previous formula, a new solution may be found by simply modifying a few variables, and local search can effectively utilize the previous solution, incrementally modifying the current solution.

Specifically, when the original tactics fail to solve the new query in incremental mode, we shall utilize the historical solution generated during previous “(check-sat)” queries. The historical solutions can be applied to generate an initial solution for the local search procedure, while the search information in the local search procedure can be applied to guide the decision heuristic for later queries in the CDCL(T) algorithm [6]. Overall, the search information can be shared between the CDCL(T) procedure and the local search procedure, so as to boost both search procedures. The detailed description about the deep combination can be found in this paper [7].

1.2 Acknowledgments

We would like to thank the contributors of Z3.

³ <https://z3-plus-plus.github.io/>

⁴ <https://zenodo.org/records/15516426/files/new.zip>

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