Z3++ at SMT-COMP 2022

Shaowei Cai[1], Bohan Li[1], Jinkun Lin[1], Zhonghan Wang[1], Bohua Zhan[1], Xindi Zhang[1], and Mengyu Zhao[1]

State Key Laboratory of Computer Science
Institute of Software, Chinese Academy of Sciences, Beijing, China

1 Introduction

Z3++ is a derived SMT solver based on Z3-4.8.15[2]. It participates in the Single Query and Model Validation track of QF_LIA, QF_IDL, QF_NIA, QF_BV and QF_NRA logics. A local search algorithm dedicated for integer arithmetic logic is proposed, and it is combined with Z3 using a simple portfolio. QF_BV ... QF_NRA ...

2 Features

In this section, we introduce the features of Z3++ depending on the divisions.

Integer Arithmetic: We developed a novel local search called LA-IA for integer arithmetic, including QF_LIA, QF_IDL and QF_NIA. It is an improved version of LS-IDL [1], which participated in SMT-COMP2021 and won the QF_IDL division. LS-IA directly operates on variables, breaking through the traditional framework. We propose a local search framework by considering the distinctions between Boolean and integer variables. Moreover, we design a novel operator and scoring functions tailored for LIA, and propose a two-level operation selection heuristic. LS-IA is designed as an tactic of Z3. if Z3 fails to determine the instance within certain time limit, LS-IA is called to handle it.

QF_BV:

QF_NRA:

3 Webpage

Further information can be found at

`https://github.com/...`

4 Contributors

Here is respective contribution of authors. Shaowei Cai supervised the whole project. Bohan Li accomplished the local search algorithm for integer arithmetic logics(including QF_IDL, QF_LIA, QF_NIA), and tuned the algorithm to combine with Z3. Jinkun Lin accomplished the QF_BV division. Xindi Zhang participated the discussion and provided important idea in designing local search for

integer arithmetic logics, and participated in QF_BV. Mengyu Zhao, Zhonghan Wang and Bohua Zhan are responsible for the QF_NRA division.

Acknowledgements

This work is supported by

References

1. CAI, S., LI, B., ZHANG, X.: Yicesls on smt comp2021
2. Moura, L.d., Bjørner, N.: Z3: An efficient smt solver. In: International conference on Tools and Algorithms for the Construction and Analysis of Systems. pp. 337–340. Springer (2008)