Boolector at the SMT Competition 2016

Aina Niemetz, Mathias Preiner, and Armin Biere

Institute for Formal Models and Verification
Johannes Kepler University, Linz, Austria

***Abstract*—This paper serves as solver description for our SMT solver Boolector, entering the SMT Competition 2016 in two different configurations. We only list important differences to earlier version of Boolector in the SMT Competition 2015 [3]. For further information we refer to [2] or source code.**

Overview

This year's version of Boolector incorporates several new features compared to the version that entered the SMT competition in 2015. First, it now has experimental support for quantified bit-vectors, enabling participation in the BV and UFBV divisions of competition main track.

We further added an additional bit-vector engine implementing a novel propagation-based local search approach [4]. This approach allows to determine satisfiability and and attempts to find a model via propagating assignments from the outputs to the inputs without the use of a SAT solver.

For all engines requiring a SAT solver as backend we use an internal version of our SAT solver Lingeling, which is identical to the version submitted to the SAT competition 2016 (version bbc).

Configurations

This year, two configurations were submitted: *Boolector* and *Boolector preprop*. For both configurations, we enabled *unconstrained optimization*.

Boolector

This configuration of Boolector enters the QF_BV, QF_UFBV, QF_ABV, QF_AUFBV, BV, and UFBV divisions of the main track.

Boolector preprop

This configuration of Boolector will enter the QF_BV division of the main track and combines the bit-blasting engine and the propagation engine within a sequential portfolio, with the propagation engine as a preprocessing step prior to the bit-blasting engine [4].

The propagation engine is configured to terminate after 1000 propagations (refered to as "backtracing steps" in [4]), i.e., if no satisfying assignment was found within 1000 propagation steps, the bit-blasting engine is used as a fallback. As a consequence, in case of unsatisfiable benchmarks, the propagation engine may produce some runtime overhead. However, we expect the runtime improvement on satisfiable benchmarks to outweigh the overhead on unsatisfiable ones.

Copyright

Boolector has been originally developed by Armin Biere and Robert Brummayer at the FMV institute of the Johannes Kepler University Linz. Since 2009 it was maintained and extended by Armin Biere. Since 2012 it is maintained and extended by Armin Biere, Aina Niemetz, and Mathias Preiner.

License

For the competition version of Boolector we use the same license scheme as introduced in 2013 for our SAT solver Lingeling [1]. It allows the use of the software for academic, research and evaluation purposes. It further prohibits the use of the software in other competitions or similar events without explicit written permission. Please refer to the actual license, which comes with the source code, for more details.

References

[1] A. Biere. Lingeling, Plingeling and Treengeling entering the SAT Competition 2013. In A. Belov, M. Heule, and M. Järvisalo, editors, *Proc. of SAT Competition 2013*, volume B-2013-1 of *Department of Computer Science Series of Publications B, University of Helsinki*, pages 51–52, 2013.

[2] Aina Niemetz, Mathias Preiner, and Armin Biere. Boolector 2.0. *JSAT*, 9:53–58, 2015.

[3] Aina Niemetz, Mathias Preiner, and Armin Biere. Boolector at the SMT competition 2015. Technical report, FMV Reports Series, Institute for Formal Models and Verification, Johannes Kepler University, Altenbergerstr. 69, 4040 Linz, Austria, 2015.

[4] Aina Niemetz, Mathias Preiner, and Armin Biere. Precise and Complete Propagation Based Local Search for Satisfiability Modulo Theories. In *Computer Aided Verification - 28th International Conference, CAV 2016, Toronto, Canada, July 17-23, 2016. to appear*, 2016.

https://doi.org/10.35011/fmvtr.2016-1
Technical Report 16/1, June 2016, FMV Reports Series
Institute for Formal Models and Verification, Johannes Kepler University
Altenbergerstr. 69, 4040 Linz, Austria