raSAT 0.3 and raSAT 0.4 (exp) for SMT-COMP 2016

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raSAT is an SMT solver for polynomial constraints. It consists of a simple iterative approximation refinement, called **raSAT** loop [2], which is an extension of the standard Interval Constraint Propagation with Testing and the application of the Intermediate Value Theorem (IVT).

raSAT 0.3

In comparison with **raSAT 0.2**, **raSAT 0.3** possesses the improvement in the phase of contracting variables' intervals from the constraint (backward propagation). As a result, the ability of detecting UNSAT has been enhanced.

raSAT 0.4 (exp)

From the experiments, we observe that **raSAT 0.2** performs better than **raSAT 0.3** in determining satisfiability of polynomial constraints. This is because "heavy" intervals decomposition in **raSAT 0.2** results in speedy appearance of small variables' intervals which consequently make the result of Interval Arithmetic more precise. In order to cooperate the ability of detecting unsatisfiability of **raSAT 0.3** and the ability of detecting satisifiability of **raSAT 0.2**, **raSAT 0.4** is a parallel combination of those two versions. The combination is done via a Python script. In addition, **raSAT 0.2** in this combination has been enhanced with the revision of the application of the IVT.

Utilized packages

raSAT takes advantages from the following packages/libraries.

- **miniSAT**[3] as the back-end SAT solver.
- **iRRAM** for confirmation of SAT instances.
- The library in [1] for round-down/up in each Interval Arithmetics.
- The OCaml parser for SMT-LIB 2.0 scripts from `http://smtlib.cs.uiowa.edu/utilities.shtml`.

[3] http://minisat.se/

Package Distribution

Source code and precompiled versions of **raSAT** can be downloaded from `http://www.jaist.ac.jp/~s1310007/raSAT/`.

References

[1] Alliot, J.M., Gotteland, J.B., Vanaret, C., Durand, N., Gianazza, D.: Implementing an interval computation library for OCaml on x86/amd64 architectures. In: ICFP. ACM (2012)

[2] Khanh, T.V., Ogawa, M.: Smt for polynomial constraints on real numbers. Electronic Notes in Theoretical Computer Science 289(0), 27 – 40 (2012), third Workshop on Tools for Automatic Program Analysis (TAPAS' 2012)