System Description

XSat is a very fast satisfiability solver for constraint solving in the quantifier-free floating-point theory. The design and implementation of this solver, as well as the experimental results, are described in detail in Fu and Su's CAV'16 paper [1].

Usage

The executable files are found in the **bin/** folder.

- make compile IN=\<SMT2-file-name>
- python xsat.py

Numerious configurations can be set. See more information with "python xsat.py --help". In particular, XSat runs in multiprocessing mode, which can be disabled for machines with a single processor.

Dependencies

Xsat's frontend uses Z3 to parse SMT2 files. Its backend uses Python's Scipy optimization library, scipy.optimize.basinhopping.

Configurations

One solver configuration (*starexec_run_default*) was submitted. This runs XSat in benchmark mode, disabling debugging output and solution verification with Z3.

Disclaimer

- We do NOT claim that XSat support all floating-point operations that are specified in the SMT-LIB 2 standard [2]. It was initially designed to solve all the benchmarks in the QF_FP theory that are marked as "unknown" status, which are 214 benchmarks in total. Accordingly, XSat was implemented to support only floating-point operators in those benchmarks, which includes the arithmetic operations below: fp.leq, fp.lt, fp.geq, fp.gt, fp.eq, fp.neg, fp.add, fp.mult, fp.sub and fp.div.
- We do NOT claim that XSat always produce correct satisfiability/unsatisfiability results. This issue is due to optimization backends as discussed in Section 4 of the paper.

References

[1] Zhoulai Fu and Zhendong Su, “XSat: A Fast Floating-Point Satisfiability Solver.” In 28th International Conference on Computer Aided Verification (CAV), 2016

[2] Philipp Ru□mmer and Thomas Wahl. An SMT-LIB theory of binary floating-point arithmetic. In Informal proceedings of 8th International Workshop on Satisfiability Modulo Theories (SMT) at FLoC,

Edinburgh, Scotland, 2010.