The Heuristic Theorem Prover SMT-COMP'06 submission

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The primary focus of the Heuristic Theorem Prover has been the development of preprocessing algorithms. There are four primary algorithms which are described in more detail either in [5] or on the author's website at www.fordocsys.com. They are as follows:

- A symmetry breaking algorithm is used to add disjuncts to the problems in the QF_UF division.
- Rewriting is used to incrementally simplify problems in all divisions.
- A unate detection algorithm is used to extract atomic predicates that must be true or false for any solution satisfying a problem.
- Difference logic encoding is used to incremental convert some difference logic portions of problems to boolean logic.

Since the main research contribution of HTP is in the preprocessor. The SMT-COMP entry is configured to pass problems off to either Yices[2], BCLT[4] or MiniSat[3]. MiniSat is used if a problem is fully encoded to boolean logic. Yices is called for problems from the QF_LIA, QF_UFLIA and QF_LRA divisions. BCLT is used for problems from QF_UF and QF_IDL, QF_RDL. The versions of Yices and BCLT are the competition versions from SMT-COMP'05[1]. MiniSat version 1.14 is used. It possible in some cases that the preprocessor will fully solve a problem on its own and that none of these tools will be used. Because the tool hands off problems to Yices and BCLT, it is expected to give incrementally improve performance on these tools in the respective divisions.

References

[1] Clark Barrett, Leonardo de Moura, and Aaron Stump. Smt-comp: Satisfiability modulo theories competition. In *CAV*, volume 3576 of *LNCS*, pages 20–23. Springer, 2005.

[2] Leonardo de Moura. System description: Yices 0.1. Technical report, Computer Science Laboratory, SRI International, 333 Ravenswood Ave., Menlo Park, CA 94062, July 2005. http://fm.csl.sri.com/yices.

[3] Niklas Een and Niklas Srensson. An extensible sat-solver [ver 1.2].

[4] Robert Nieuwenhuis and Albert Oliveras. DPLL(T) with Exhaustive Theory Propagation and its Application to Difference Logic. In *CAV*, volume 3576, pages 321–334, 2005.

[5] Kenneth Roe. The heuristic theorem prover: Yet another smt-modulo theorem prover. In *Int. Conf. on Computer-Aided Verification*, volume LNCS 4144, pages 467–470. Springer, 2006.