

# PicoSAT and PicoAigerSAT entering the SAT-Race 2008

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April 7, 2008

## Abstract

This note describes features of those version of PicoSAT and PicoAigerSAT, that entered the SAT-Race 2008 affiliated to the SAT'2008 conference in Guangzhou, China.

## PicoSAT Core Solver

In addition to the features described in [1, 2] the PicoSAT core solver version 826, as submitted to the SAT-Race, contains an implementation of failed literals, which is called from the top level simplifier initially and after units are learned. Furthermore large clauses satisfied by literals further up the decision tree are disconnected and dynamically reread as soon they may become unsatisfied.

## PicoSAT Preprocessor

Version 135 of PicoSAT's preprocessor follows the approach taken by Quantor [3], Satellite [4], and MiniSAT [5]. It uses the PicoSAT core solver described above as backend through its library API.

Compared to MiniSAT PicoSAT's preprocessor implements second level signatures as in Quantor. It also applies forward subsumption and shrinking. Forward reasoning is based on the one-watched-literal-scheme as proposed by Lintao Zhang [6]. Another feature is the usage of second level signatures for forward subsumption and shrinking. Finally, we use a budget based heuristic cut off for clause traversal in forward and backward reasoning.

Since the preprocessor needs at least twice as much memory as the PicoSAT core solver, the preprocessor

simply passes the CNF through to the core solver if the input file has more than 4 million clauses.

## PicoAigerSAT

PicoAigerSAT is a trivial implementation of the Tseitin transformation. It uses the AIGER library to read a structural non sequential AIG in AIGER format. No further optimizations are applied. As backend SAT solver the same version of the PicoSAT core solver was used as in the CNF track of the SAT-Race. Since the PicoSAT preprocessor used in the CNF track does not have an API yet, the preprocessor is not used.

## References

- [1] A. Biere. Adaptive restart strategies for conflict driven sat solvers. In *Proc. SAT'08*.
- [2] A. Biere. PicoSAT essentials. Submitted to JSAT.
- [3] A. Biere. Resolve and expand. In *Proc. SAT'04*.
- [4] N. Eén and A. Biere. Effective preprocessing in SAT through variable and clause elimination. In *Proc. SAT'05*.
- [5] N. Eén and N. Sörensson. An extensible SAT-solver. In *Proc. SAT'03*.
- [6] L. Zhang. On subsumption removal and on-the-fly CNF simplification. In *Proc. SAT'05*.