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preSAT: SAT Solver Description

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This document briefly describes preSAT 1.0, a new technique designed to efficiently solve structured CNF formulae. preSAT is based on an original preprocessing technique called revival [1]. This technique aims at producing either sub-clauses or relevant additional clauses for the tested CNF.

To this end, revival heuristically checks whether each clause is minimally (w.r.t. set-theorical inclusion of literals) irredundant. The efficiency of revival relies on its full integration into a modern SAT solver. Hence, its computation benefits from the classical components of modern DPLLs (watched literals, learning scheme, VSIDS-like heuristics, etc.), boosting (sub-)clauses production. However, on some large industrial problems, revival can be time consuming. To avoid losing time in such cases, our pre-processor has a time limit empirically set to 60 seconds. Therefore, even if new sub-clauses could be produced, the CNF is delivered in its current state.

After the application of our revival pre-processor, SatElite [2] is used to even more simplify the formula before running an exhaustive approach. For the complete solver, Rsat [3] has been selected. The addition of revival to this solver is expected to improve its behavior on many benchmarks.

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