

# Understanding the Preprocessing Performance of SAT Solvers

Dependable Systems - Dirk Nowotka

## Project Description

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SAT solving is concerned with checking the satisfiability of propositional formulas. For example, the formula

$$(x_1 \vee \bar{x}_2) \wedge (x_2 \vee \bar{x}_3)$$

can be satisfied by setting  $x_1$  to true, and both  $x_2$  and  $x_3$  to false. The task of a SAT solver is to find a satisfying assignment or prove that none exists. There exists a variety of preprocessing techniques which can be applied to a formula before handing it to a SAT solver, typically coming with a three-letter-abbreviation: BVE (Bounded Variable Elimination), BCE (Blocked Clause Elimination), HTE (Hidden Tautologie Elimination), BVA (Bounded Variable Addition), and sometimes only two letters, e.g. UH (Unhiding). The impact of these techniques depends on the formulas they are run on, in some cases they may even worsen the SAT solvers' performance, whereas the running times may be decreased significantly on other formulas. The question of this topic is: Can we identify a relationship between families of formulas, for example depending on their structure or the content they encode, and the success of different preprocessing techniques on them?

- Get familiar with relevant preprocessing techniques.
- Identify a set of solvers and benchmarks for your experiments.
- Measure the impact of combinations of preprocessing techniques.
- Analyse the results, e.g. using data mining.

## Applicable For

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Bachelorstudents



Masterstudents



## Keywords

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SAT Solving

Preprocessing

## Contact

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