Homework Assignment 8
Total Points: 100

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EECS 598-002: Formal Verification of Hardware & Software Systems

Assigned: April 2, 2024
Due: April 9, 2024

Guidelines

- The College of Engineering Honor Code applies to all work in this course.

- The due date is firm. Follow submission instructions (at the end).

Objectives

This assignment explores the potential speedup of SAT solving by adding symmetry-breaking predicates (SBPs) to a CNF formula.

For each of the ten UNSAT CNF files shown here use `shatter` to generate an SBP-augmented variant and report the statistics listed in Table 1 for both the **original and augmented instances**. For the SAT statistics use the `CaDiCal` solver.

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- fdmus_b14_138.cnf
- fdmus_b14_139.cnf
- fdmus_b14_140.cnf
- fdmus_b14_141.cnf

Table 1: Statistics

From the CNF file	From the output of PySAT	From the output of `saucy`
Number of variables	CPU time to solve the instance	Order of the formula's symmetry group
Number of clauses	Number of retsarts	Number of symmetry generators
	Number of conflicts	
	Number of decisions	
	Number of propagations	
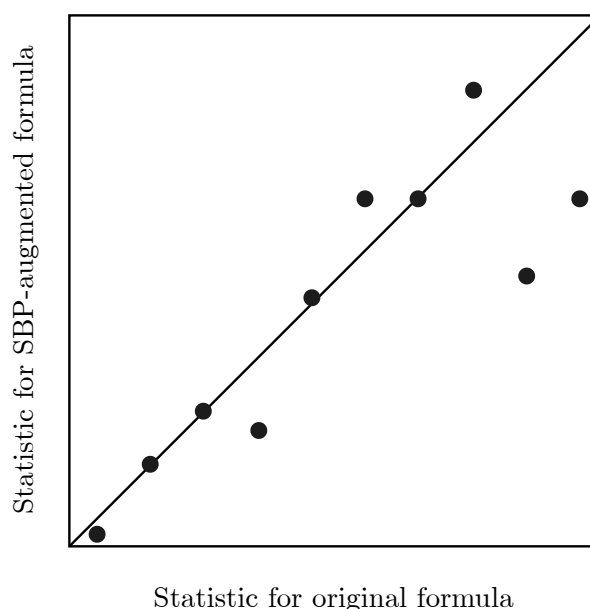
Figure 1: Scatter plot template. Points below (resp, above) the diagonal indicate better (resp. worse) performance for the augmented versus the original formula

Report these statistics in a suitable tabular format as well as scatter plots (for the 5 SAT statistics) as illustrated in Figure 1 and write a short paragraph summarizing your conclusions about the impact of symmetry breaking on SAT solver performance. Note any interesting facts about the original and augmented formulas!

Submission Instructions

1. Create a directory named <your uniquname>_hw8 containing all of your work. This should include all files created by you as well as files generated by running `shatter` and all output produced by PySAT and saucy. The narrative parts of your submission should be typed and saved as PDF files. Handwritten and scanned documents or non-PDF documents ARE UNACCEPTABLE AND WILL NOT BE GRADED.

2. Zip the entire directory using "zip -r <your uniquename>_hw8.zip <your uniquename>_hw8" and upload to Canvas.