

# Efficiency of SAT solvers

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## 1 Introduction

## 2 Best Solver

### 2.1 Experimental protocole

We have a set of SAT solver that use different method. Because we want to solve formula as fast as possible while having the correct answer we want to have a classement of those solvers to know which one we may use. To make our classement we are using the following protocole :

- For each solver we use the data set of formula : samplingfm
- We measure how long they take to solve all the formula
- We check if all their answers are corrects. If a solver have wrong answers he will not be considered in the classement.
- Then we do a classement of the mean of time taken to solve a formula. The most efficient solver is the one which's taking the less time.

### 2.2 Results

## 3 Presence of Bugs

### 3.1 Experimental Protocole

In the previous experiment we've not consider the solvers that gave a wrong answer because we wanted to always have a correct answer. But maybe some of those solvers are more efficient and have just a bug in some corner cases. First we want to know if the solvers are consistent ie they always gave the same answer for a formula. Next we want to know if they gave the correct answer. We used the followings protocoles :

Consistent : For each solvers we are trying to know if they are consistent, if they always give the same response for a given formula. For that we basically run the solver several time on the same formula and watch if it always return the same.

Correct : For each solvers we want to know if it gives the right answer. To know the correct answer we should use a proofed solver but it may take a lot of time. We rather compute the answer of all the other solver and assume that the majority is right. This solution is natural because most of those solvers have been tested a lot and designed separately so the probability that they all gave the wrong answer on the same formula is really low.

### **3.2 Results**

## **4 Performance deviation**

### **4.1 Experimental Protocole**

### **4.2 Results**

## **5 Harder SAT formula**

### **5.1 Experimental Protocole**

Up to here we have consider formula as an homogeneous set but some formula are harder than other to solve. It may be interesting to know which formula are harder and how solver react to them. We consider a formula harder for a solver if it solve time is higher than his mean solve time.

- For each formula we compare it to the mean of solve time. If we take far more time we consider that formula hard for the solver.
- If a formula is hard for a mojority of solver then that formula is considered hard.

### **5.2 Results**