

UNIVERSITAT DE LLEIDA
Escola Politècnica Superior
Grau en Enginyeria Informàtica
Aprenentatge i Raonament Automàtic

Primer parcial

Joaquim Picó Mora
PraLab2

Professorat : R.Bejar
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1 Introduction

This document will explain the strategies has been used in order to make a Local Search SAT Solver. Firstly, to take an idea of how SAT should work we organised the project in different modules and classes. When we saw more or less how SAT should perform we start implementing the SAT in a single file in order to make it faster and don't waste time importing modules. In the next part, it will be explained the different strategies that we studied and found and the chosen one to compete in the SAT race

2 Studied Strategies

The studied strategies were Walk-SAT and GSAT. Even though they were useful to understand how an incomplete SAT works, our curiosity helps us to find new ones.

Our first implementation was the Walk-Sat that we've seen in the class. As it was our first implementation we weren't able to compare it with any other, so we decided to implement gsat in porpouse to see wich one of the two performs better.

After this we seen that our implementation of WalkSAT was the way better than the GSAT one.

Once we already implemented the two types of SATS that we seen in class, we start searching for a strategy that performs better than this both, and we found one quite interesting.

This new one was a combination of the Walksat Random restarts strategy with the functionaity of the GSAT. And that makes a lot of sense for us becouse we thought that GSAT probably was slower due to he stucs a lot more in local minimas than WalkSAT do. This strategy is called Random Walk GSAT.

Next in the graphic bellow we will show how the three strategies perform in a set of satisfiable and diferent sized formulas:

3 Chosen Strategies

3.1 GSAT with Random Walk

As it shows the graphic REF, this strategy outperforms the other two, this is because it gets the best things of both others and put it together. Walksat skips better local minimas but it flips randomly the literal to get the next step. And GSAT gets staked more time in local minimas but it choses better the literal to flip. So basically, this strategy skips a lot of local minimas doing a step up and choses better the literal to flip (with the costs related of doing it). Here we will show de pseudocode of the strategy:

```
for i in max_tries:
    for j in max_flips
        if (probability p):
            pick a variable in some unsat clause
            and flip it in the interpretation
        else:
            follow the standard GSAT scheme
            -> Make the best possible move
```

3.1.1 Implementation details

4 Statistics and Heuristics

5 Conclusion