$\neg$SAT
A Dummy Approach to P vs NP

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Abstract

In this article, will try and introduce a framework for SAT Solving. Under the assumption that the SAT Instance φ is hard to solve, we will try to generate the opposite SAT Instance $\vartheta = 1 - \varphi$. A SAT Instance by definition is the intersection of the negation of partial assignments.

$$\neg\left(\bigwedge\bigvee\right) = \bigvee\bigwedge\neg$$

What is an AND ($\wedge$) statement, if not the assertion that the variables are assigned. What is an OR ($\vee$) statement, if not an AND Statement alongside with dummy variables. How many dummy variables do you need to describe 2^n OR assertions? n suffice.

1 Introduction

1.1 Introducing a simple φ Instance

```
p cnf 2 2
1 -2 0
-1 0
```

$\varphi = \{(0,0)\} \times \{0,1\}^{\mathbb{N}}$

1.2 Introducing a simple $\vartheta = \neg\varphi$ Instance

$\vartheta = \{(1,1),(0,1),(1,0)\} \times \{0,1\}^{\mathbb{N}}$

```
p cnf 2 1
1 2 0
```

Technically, this is very elegant, because as we can see the negation of the unique clause gives the unique solution, without using dummy variables. But rest assured, a SAT Instance is way more complex than this.

But let's not cheat and use 3 as a dummy variable.

```
p cnf 3 3
-1 3 0
2 3 0
1 -3 0
```

$\vartheta = \{(1, 1, \cdot), (0, 1, \cdot), (1, 0, \cdot)\} \times \{0, 1\}^{\mathbb{N}}$ This was made possible without relying on previous knowledge on the initial φ solution set, and so long you ignore the assignation of x_3, the created instance is isomorphic to $\neg\varphi$. If you are being smart, you will not use one dummy variable per clause, but rather $\log(m)$ dummy variables, where the assertion contradiction is to be made on the remainder.

Proposition Let φ be a $K-$SAT instance with n variables and m clauses. There exists a SAT instance ϑ with $n + \lceil \log(m) \rceil$ variables and at most $2^{\lceil \log Km \rceil}$ clauses, where:

$$\varphi = \neg\vartheta$$