Project Milestone 7

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1 Progress Report

Things have been both up and down this past milestone period. While I did catch Covid and have been a little unproductive since then, I did obtain some results that are quite meaningful. For one, I found a benchmark used in a Beijing SAT competition, and these seem quite runnable on the machines on Starexec. Also, I found that indeed, some tests run faster even with random switching, and not a targeted optimization.

While some tests seem to run a lot slower, some tests also show a massive performance gain. We can perform statistical analysis on this in the upcoming week, but in short, we found an improvement from 38.79 seconds in some problems to 5.03 seconds. This shows that for certain types of problems, this approach can lead to massive time improvements.

However, also, for other SAT problems, this methodology showed quite a big increase in time. The variance of randomly selecting a new cb value can explain some of this increase in time, as we randomly choose a cb from a certain range, which may not even be close to optimal. In the upcoming week, I will try to gain more evidence for a tighter range, along with different parameters for the range.

Furthermore, I have obtained results from a variety of cb reset timers. I had to work out a bug in my low-level code, which took some time, relating to how YalSAT represented the $(1/cb^{break})$ value. I had to figure out that it only took one branch in a conditional which took a while, and had to modify it to always use $(1/cb^{break})$ value, as it would sometimes use 2 as a default cb. This took a lot of time, but I am very glad to have found this bug.

It is very nice to get some results that are meaningful, especially having results that show an improvement in certain types of problems.

2 Reflection on Initial Plan

I may have to push back a lot, but after discussion with my mentor, I have a very strong grasp on where to proceed. My initial plan may have been too ambitious, and I should have visited my professor earlier.

Major Changes:

I have a strong idea on how to proceed. First, I will create a counter for the number of flips. Then I can measure if it is stuck or not. Then, I can create the random selection. I need to make sure I can measure the number of switches required.

Meeting your Milestone:

I have not met my milestones for this week due to spring break. However, given my new direction, I am sure I can make more progress.

Surprises:

No further surprises.

Revisions to your 07-400 milestones:

I may have to push back many of the milestones.

Resources needed:

I do not need any further resources.