Project Milestone 2

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1   Progress Report

With the start of the semester, I have fallen a little behind on my research. I only very recently reached out to my advisor, and he has not gotten back to me, so I have followed up with him in another email. If this does not work, I will look towards meeting him in office hours to discuss what I have done.

Onto the actual content, I have started reading through the YalSAT code. Since it is written in C, there are many things that are still unclear to me. Even so, I have identified the relevant functions to the scope of my project.

For one, I have identified the important function to my project. On line 1943, we have the function yals_init_weight_to_score_table, one part of which sets the cb variable. As our primary purpose in this project is the manipulation of this variable, I have started testing out various cb values.

For one, setting a very high value for cb causes the SAT solver to hang indefinitely if there is a local optimum. Indeed, by changing this value in the function, we can get our program to hang. Also, by setting the value to 1, we essentially just make it a random swapper. This does seem to be validated in our test runs, where the solver only determines satisfiability after a long interval, and only for small test cases.

Meanwhile, given the original parameters, we can see that the convergence seems to happen quicker than these extreme tests we have tried.

Other than that, I have been attempting to read through some of the code of YalSAT to see how it works beyond this function. Since the code is not well documented and there are a lot of cryptic data structures, this is a bit hard for me, so I will likely talk to my mentor about this.

Some additional things I have been focusing on are looking for other papers to help try to explain some things in the problems. I have found "Improving Implementations of SLS Solvers for SAT and New Heuristics" very helpful (mentioned in previous milestone).

2   Reflection on Initial Plan

Major Changes:

So far, no major changes have been made to my research plan. I intend to still study ProbSAT, and to modify YalSAT in order to improve performance of the stochastic local search

solver. Perhaps I could also investigate another aspect of the YalSAT solver, such as inspecting restarts.

Meeting your Milestone:

So far, I have made progress, but have not hit my milestones. One reason I think this could be is because I haven't been able to fully devote myself to this project due to the semester just starting, but as it continues, I should be able to work more efficiently.

Surprises:

One surprise, as mentioned previously, was that the source code was a little bit hard to understand at time. Furthermore, I have had a hard time with some of my other classes, so it has been hard to pace myself for this class.

Revisions to your 07-400 milestones:

I may have to push back my milestones by one or two weeks due to the slow start I have had. Many of the aspects of the YalSAT program are still unclear to me, so I will discuss this further with my mentor.

Resources needed:

I have obtained the source code for my required resources, and will be looking to modify this. On top of this, I may need more powerful computing hardware, but this will be more important later. For now, I can just run the binaries on my local machine or on the Andrew clusters.