November 22, 2021

PROPOSAL: SAT SOLVER

1. PROJECT NAME & TEAM MEMBER

Short Project Name: BoolSat

Member: Kenneth Kiprotich, UNI: kk3302

2. PROJECT: PARALLELIZING SAT SOLVER

The Boolean Satisfiability Problem involves determining whether variables of a given Boolean formula can be replaced using Boolean values True or False in a way that satisfies the Boolean formula, i.e. leads the Boolean formula to evaluate to True. If the Boolean evaluates to true, it is SAT. Otherwise it is UNSAT.

3. ALGORITHM

There are existing algorithms for determining Boolean Satisfiability. One of the more common ones is the DPLL algorithm, which is a backtracking based search algorithm for determining satisfiability of Boolean formula presented in Conjunctive Normal Form. I plan to implement a Haskell version of the existing DPLL and find way(s) to parallelize it.

4. PARALLELISM IDEA(S)

A tree diagram for the solution structure of DPLL is shown on the right side of this page. One idea is to parallelize the recursive call at the branching points in the tree. It seems that this technique merely makes sure the DPLL searches are done in parallel but does not necessarily reduce the number of searches. I will assess to see whether this will still improve performance anyway, and try to improve upon it in other ways while conducting the project.