Design and evaluation of a parallel SAT solver

Ziqi Feng

April 26th 2023

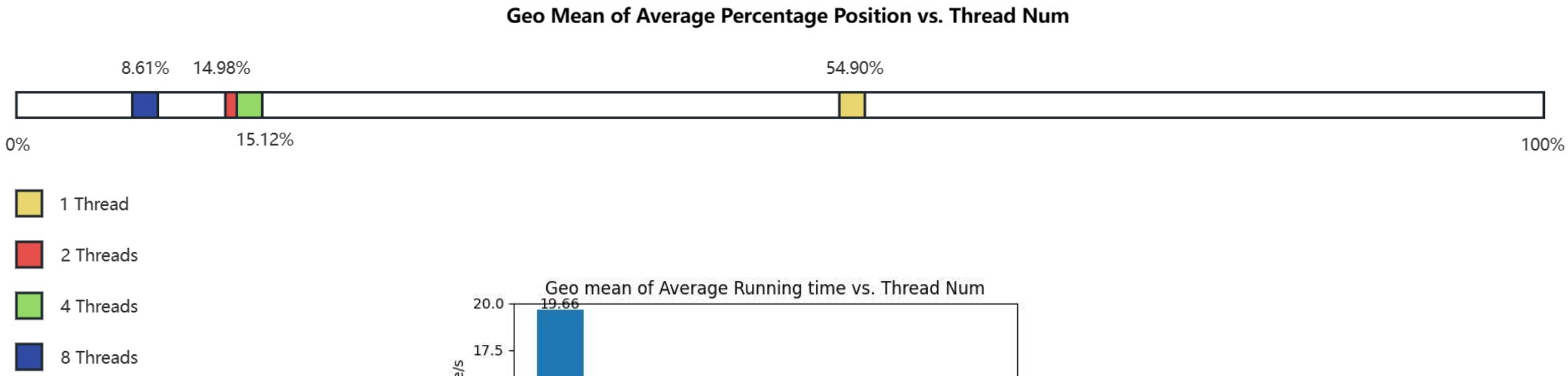
Parallel Algorithm Based on DPLL

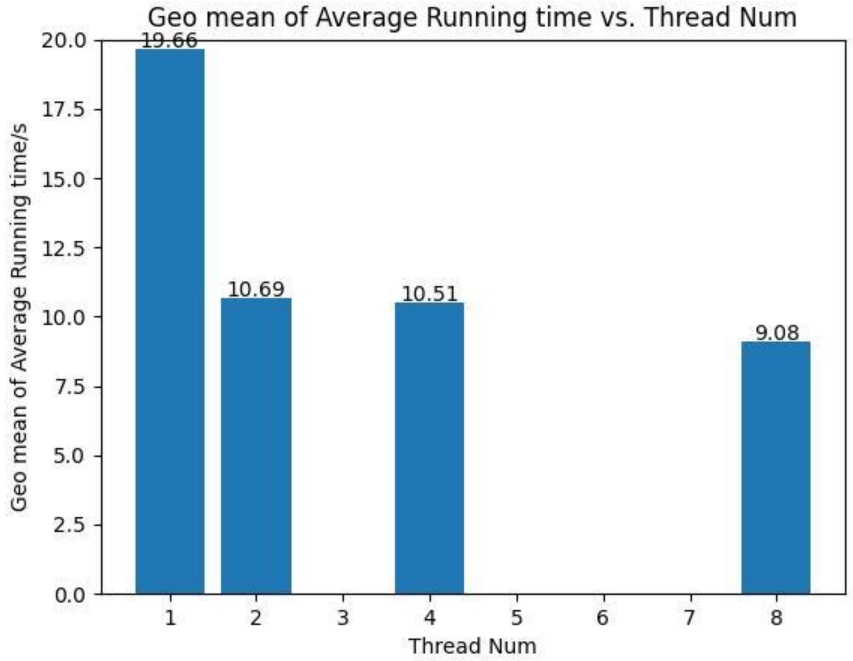
1. Simplify the initial formula using *Unit Propagation* and *Pure literal elimination*.
2. Get one node from the globalist.
3. Push node.right to localList.
4. Construct node.left recursively.
5. If localList is full, append it to the globalList.

Evaluation

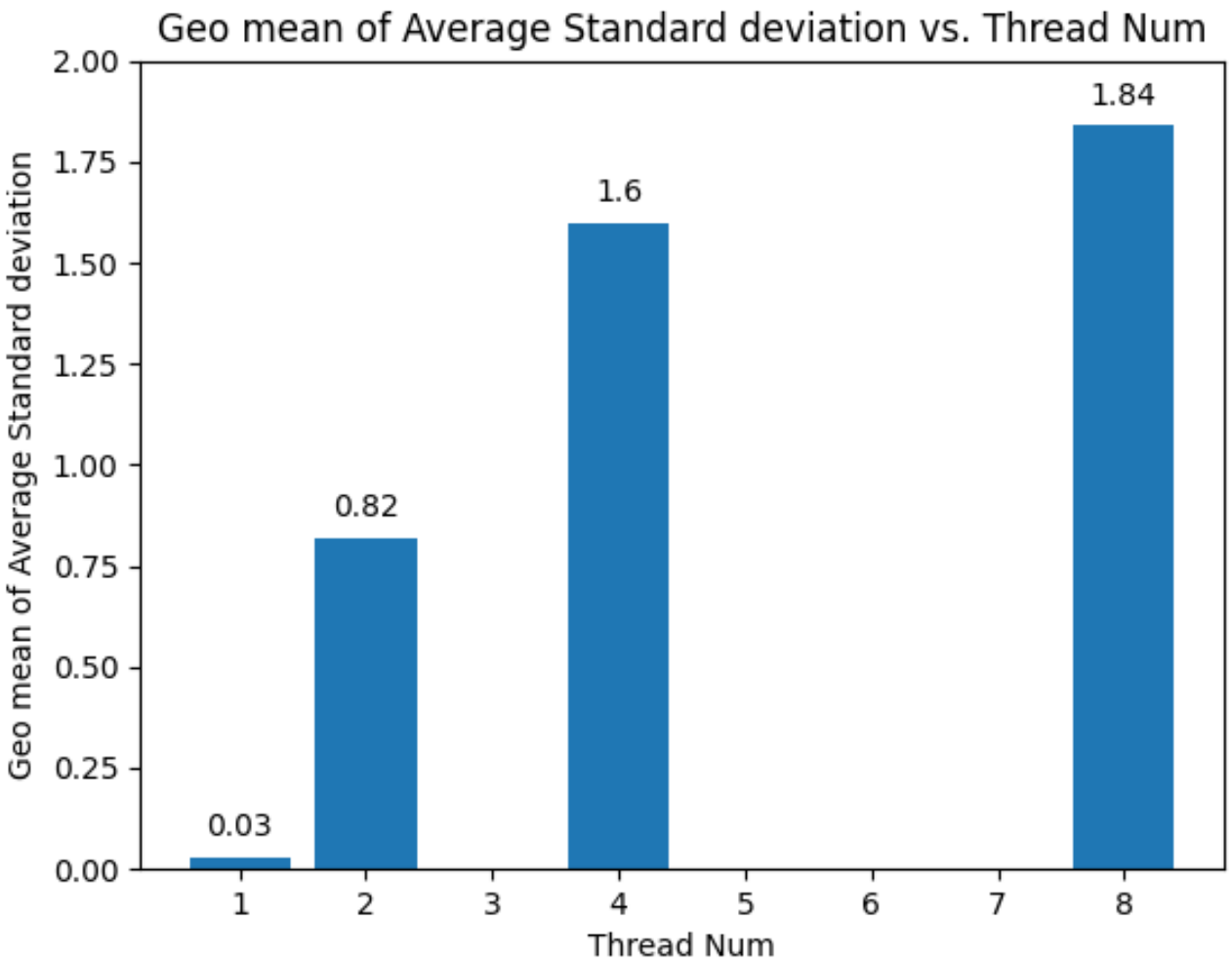
- Test suit: 60 3-SAT problems with 500-700 variables and more than 1500 clauses.
- Thread number: 1, 2, 4, and 8.
- Test round: 30 for each problem with each thread.
- Test environment: CSUG.

Performance results





Performance results



Conclusions

- The parallel design could improve the average performance.
- The parallel solver is not stable in many cases.
- The formula simplification part is also important.