

SLIME SAT Solver

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Abstract—A novel rephasing technique via Black-Box HESS algorithm, alternate BOOST Heuristic, and deterministic and simplified variation of techniques described on RelaxedLCMD-CBDLnewTech and DurianSat [1].

I. INTRODUCTION

We improve the restart stage with a reconfiguration of preassigned polarities, via HESS black-box algorithm (Relaxed), in this case with a MaxSAT Oracle, that improve the reassignment of polarities with a approximate MaxSAT solution, based on the current assignment. We replace the pseudo-random calls with the conflicts counter, this allow a deterministic execution on each instance. We improve the BOOST Heuristic from competition 2019 and 2020, with alternate behaviour, i.e. this alternate the zone of execution according the stage of the solver VSID or not-VSID. We add a parameter "massive" used on the SLIME Cloud, that produce a initial random assignment of polarities.

II. METHODS

A. HESS black-box algorithm

HESS black-box algorithm use the "The Monty Hall Problem" [2] to approximate values from an Oracle, In this case a MaxSAT oracle get a complete assignment and return the number of falsified clauses, for CDCL use the native and learnts clauses.

B. HESS ^o1 order (Relaxed)

- Create an initial boolean array $\rho(bit_0, bit_1 \dots bit_{n-1})$ based on current assignment
- Set the current value to ∞ , and i to 0.
- Change the state of i -th boolean variable
- Get $Oracle(\rho)$
 - 1) less than current value, reassign and retain the current assignment, and continue with next variable.
 - 2) if greater, change the variable to original state, and continue with next variable.
 - 3) if equal, reassign the polarities to ρ , and exit.
- Continue with execution of CDCL.

C. Experimental Evaluation

We select a small set of cryptography related instances (Combined SLS and CDCL instances at the SAT Competition 2020, Mate Soos) [1], and add "The State of The Art SAT Solver" Kissat-sc2020, RelaxedLCMD-CBDLnewTech-sc2020

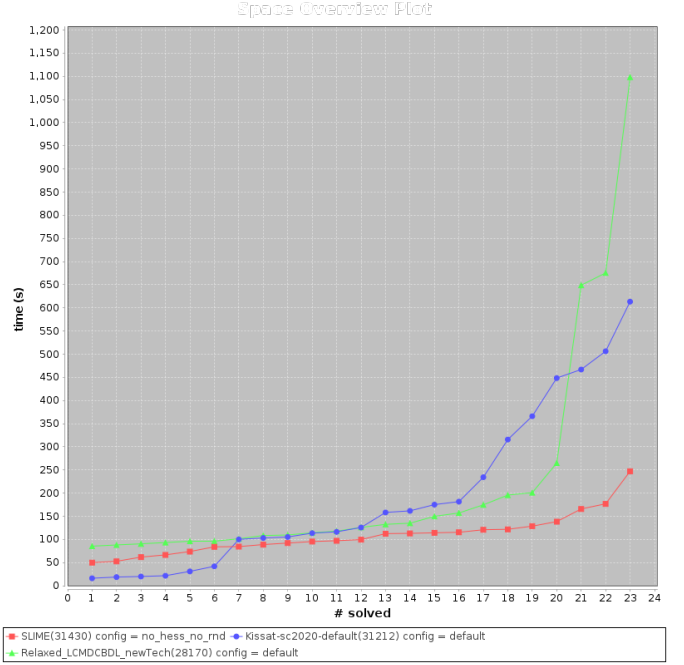


Fig. 1.

with SLIME deterministic and without HESS (presented on the competition 2021), to evaluate the performance and pure state difference.

III. SLIME CLOUD

Consist on a MPI implementation of SLIME where all nodes with hess no-deterministic configuration compete for the solution, can generate certificates for UNSAT.

The no-deterministic indicates that the initial polarities are random assigned.

REFERENCES

- [1] Balyo, T., Froleys, N., Heule, M. J. H., Iser, M., Järvisalo, M., Suda, M. (Eds.) (2020). Proceedings of SAT Competition 2020: Solver and Benchmark Descriptions. (Department of Computer Science Report Series B; Vol. B-2020-1). Department of Computer Science, University of Helsinki.
- [2] Weisstein, Eric W. "Monty Hall Problem." From MathWorld—A Wolfram Web Resource. <https://mathworld.wolfram.com/MontyHallProblem.html>