

SLIME SAT Solver

1st Oscar Riveros
Santiago, Chile
oscar.riveros@gmail.com

Abstract—A “on the fly” version of HESS algorithm for Multi-armed bandit style selection of rephasing, dual search algorithm, full remove of randomness on sequential and cloud version, based on SLIME sc2021 [1].

I. INTRODUCTION

We create an on the fly version of HESS [1] algorithm, this allow an optimization of the rephasing states. We create a dual search phase of the solver, one more simple and other more complex, this are called according if the VSIDS heuristic is running. The DISTANCE heuristic is now parametric, on the experiments, DISTANCE work well with cryptographic instances, but not with generics. For the cloud version the initial polarities are different for every node, on deterministic way, also the rank of the node is influencing on the execution. On this version is added an optional parameter for sharing learnt clauses between nodes, alternate sharing clauses, and a filter for the size of learnt shared. Several optimizations, and simplifications.

II. METHODS

A. HESS black-box algorithm

HESS black-box algorithm [1] of \varnothing^2 order to approximate values from an Oracle, In this case a “On The Fly” oracle as execution of SLIME and the sequence used to maximize the selection of rephase heuristics like Multi-armed bandit algorithm.

B. HESS \varnothing^2 order (On The Fly)

- Create an initial sequence array $\rho(1, 2 \dots n)$
- Repeat to a final state.
- Set the current value to ∞ .
- Set i to 0 and j to 0.
- increment j , if $j == n$ increment i and put $j = 0$, if $i == n$, put $i = 0$ and $j = 0$. (two for loops)
- invert the array from $\min(i, j)$ to $\max(i, j)$
- Get *oracle()* (call the search algorithm, and use the current order of the array for select the bandit)
 - 1) less than current value, reassign and retain the current assignment, and continue with next increment.
 - 2) if greater, change the array to original state, and continue with next increment.
 - 3) if equal, continue with next increment.
- Continue with execution and repeat from step 2.

C. Experimental Evaluation

The default version of SLIME solve the 80% of the entire Crypto Track 2021 (a set of cryptography instances) at 18000 seconds at www.starexec.org cluster.

III. SLIME CLOUD

Consist on a MPI implementation of SLIME where all nodes compete for the solution, can generate certificates for UNSAT.

REFERENCES

- [1] Balyo , T , Froleys , N , Heule , M , Iser , M , Järvisalo , M Suda , M (eds) 2021 , Proceedings of SAT Competition 2021 : Solver and Benchmark Descriptions . Department of Computer Science Report Series B , vol. B-2021-1 , Department of Computer Science, University of Helsinki , Helsinki .