Sparkle Algorithm Portfolio report

Generated by *Sparkle* (version: 0.9.3.2)

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1 Introduction

Sparkle [2] is a multi-agent problem-solving platform based on Programming by Optimisation (PbO) [1], and would provide a number of effective algorithm optimisation techniques (such as automated algorithm configuration, portfolio-based algorithm selection, etc.) to accelerate the existing solvers.

2 SMAC2 Configuration: PbO-CCSAT-Generic on PTN

In this scenario, **SMAC2** (Sequential Model-based Algorithm Configuration) [3] with version 2.10.03 was used for configuration. The Solver PbO-CCSAT-Generic was optimised on training set PTN. The scenario was run 9 times independently with different seeds, yielding 9 configurations. The cutoff time for the solver was set to 60 seconds. The optimised objective is PAR10. Each Configuration was evaluated on the training set to determine the best configuration, e.g. the best PAR10 value on the training set.

2.1 Configurator Settings

The following settings were used for SMAC2:

Setting	Value
number_of_runs	9
solver_calls	100
cpu_time	None
wallclock_time	600
solver_cutoff_time	60
cutoff_length	max
max_iterations	None
sparkle_objective	PAR10
feature_data	None
use_cpu_time_in_tunertime	None

Table 1: Configurator Settings

2.2 Solver & Instance Set(s) Details

The solver PbO-CCSAT-Generic was configured using 23 configurable (hyper)parameters. The configuration space has 14 conditions. The following instance sets were used for the scenario:

- **PTN** (12 instances)

2.3   Comparison of Default and Best Configuration on Training Set PTN

The PAR10 value of the Default Configuration on PTN was **401.6879**. The PAR10 value of the Best Configuration on PTN was **2.3259**. In Figure 1 the results are plotted per instance.
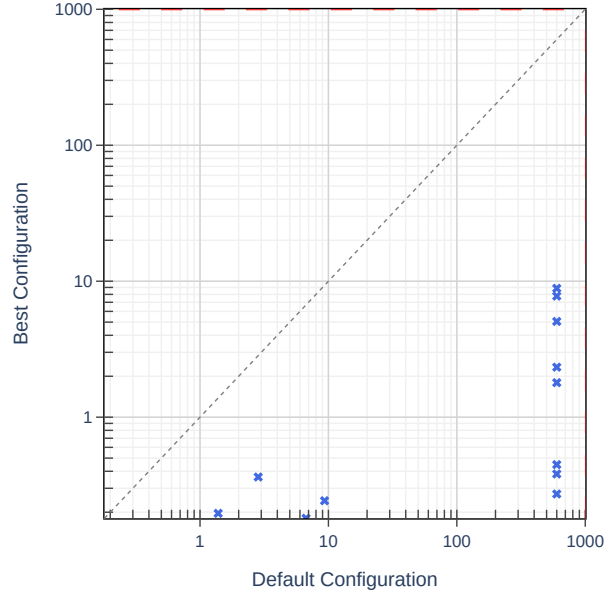

Figure 1: Best vs Default Performance on PTN (PAR10)

The following Solver status were found per instance:

Status	Default	Best	Overlap
SAT	4	12	4
TIMEOUT	8	0	0

Table 2: Status count for the best and default configuration.

2.3.1   Best Configuration Values

The following parameter values were found to be the best on the training set:

Below are the full performance and feature data frames.

Parameter	Value
gamma_hscore2	351
init_solution	1
p_swt	0.20423712003341465
perform_aspiration	1
perform_clause_weight	1
perform_double_cc	0
perform_first_div	0
perform_pac	1
prob_pac	0.005730374136488115
q_swt	0.6807207179674418
sel_clause_div	1
sel_clause_weight_scheme	1
sel_var_break_tie_greedy	4
sel_var_div	2
threshold_swt	32
configuration_id	SMAC2_20250624-1659_7

Table 3: Best found configuration values

References

[1] Holger H. Hoos. Programming by Optimization. *Communications of the ACM*, 55(2):70–80, 2012.

[2] Holger H. Hoos. Sparkle: A pbo-based multi-agent problem-solving platform. Technical report, Department of Computer Science, University of British Columbia, 2015.

[3] Frank Hutter, Holger H. Hoos, and Kevin Leyton-Brown. Sequential model-based optimization for general algorithm configuration. In *Proceedings of the 5th International Conference on Learning and Intelligent Optimization (LION 5)*, pages 507–523, 2011.