Supplementary Material for the paper: Effect of Transformations of Numerical Parameters in Automatic Algorithm Configuration

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1 Geometric cooling with a short temperature length

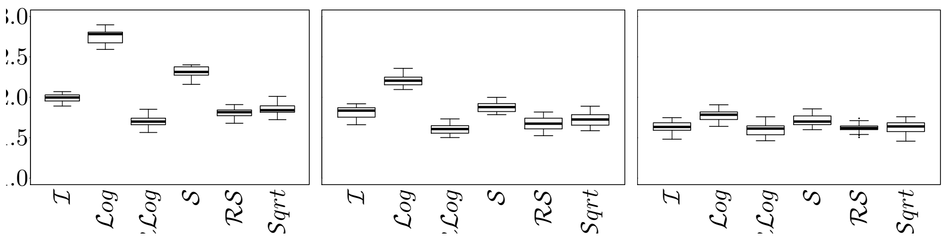

Figure 1: Average Relative Percentage Deviation values obtained by the different transformations for a short temperature length with respect to the best known solutions. The three plots show the results obtained, respectively, with a budget of 125, 500 and 2000 experiments.

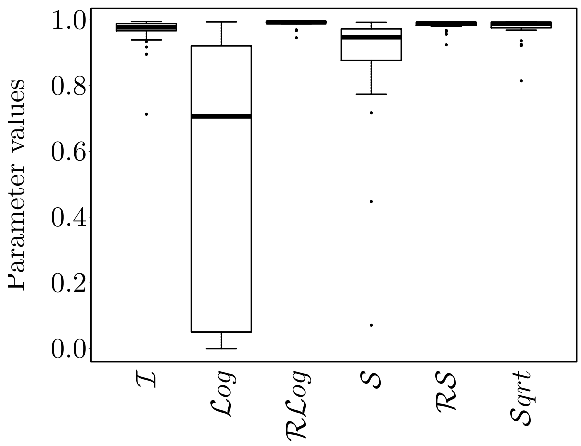

Figure 2: Parameter values obtained by irace with a budget of 125 experiments for a short temperature length.

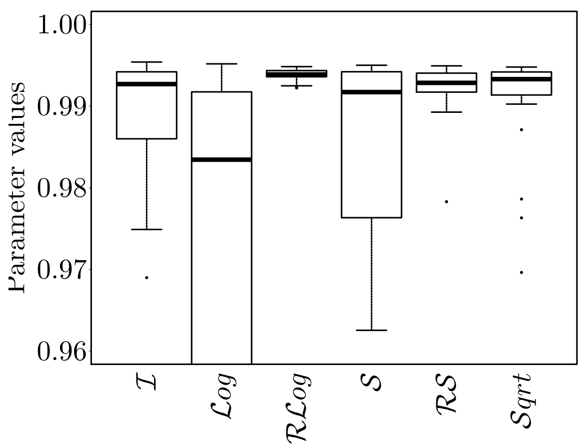

Figure 3: Parameter values obtained by irace with a budget of 500 experiments for a short temperature length.

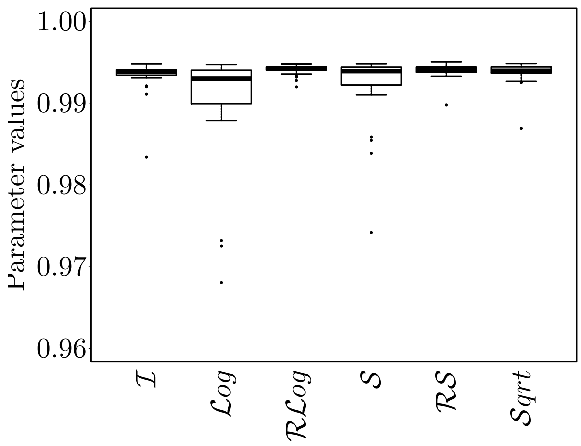

Figure 4: Parameter values obtained by irace with a budget of 2000 experiments for a short temperature length.

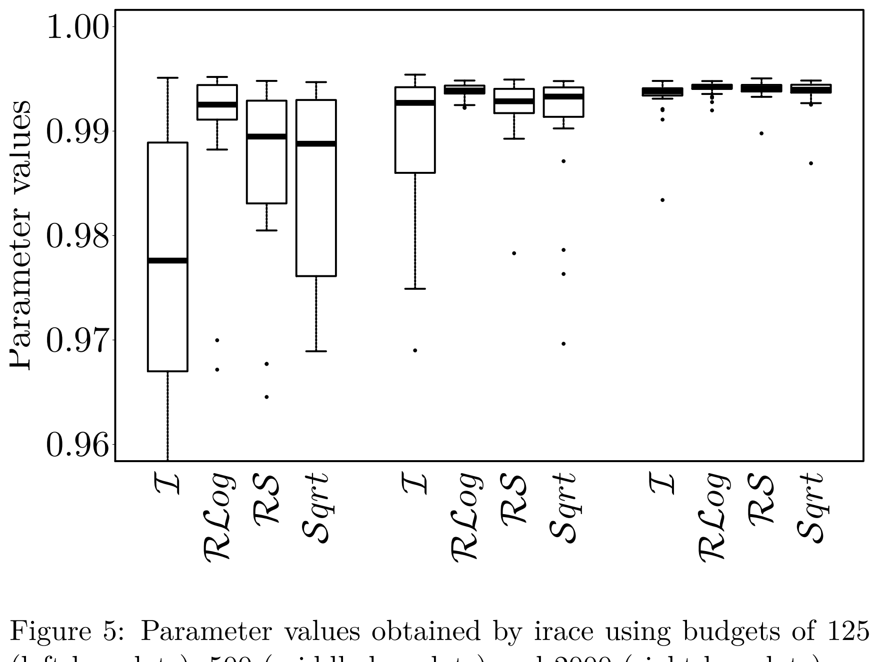

Figure 5: Parameter values obtained by irace using budgets of 125 (left boxplots), 500 (middle boxplots) and 2000 (right boxplots) experiments for a short temperature length.

2 Geometric cooling with a high temperature length

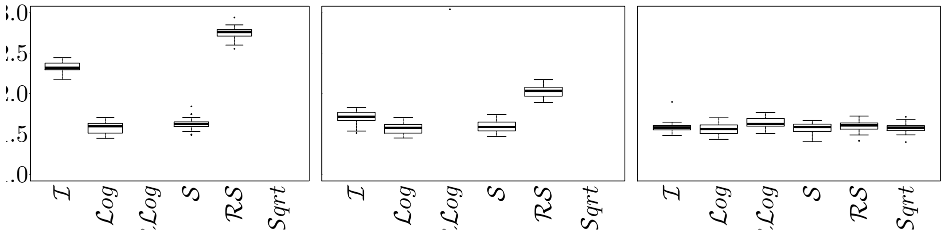

Figure 6: Average Relative Percentage Deviation values obtained by the different transformations for a high temperature length with respect to the best known solutions. The three plots show the results obtained, respectively, with a budget of 125, 500 and 2000 experiments.

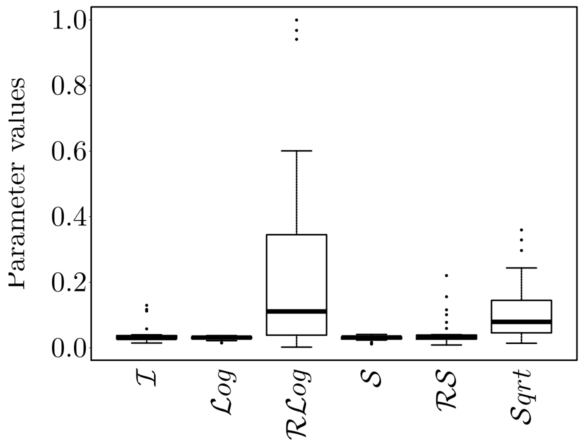

Figure 7: Parameter values obtained by irace with a budget of 125 experiments for a high temperature length.

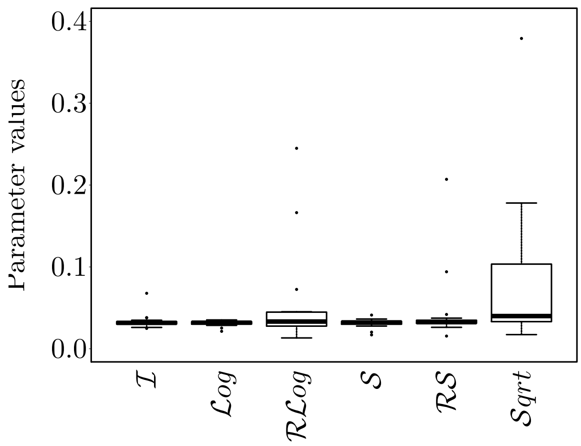

Figure 8: Parameter values obtained by irace with a budget of 500 experiments for a high temperature length.

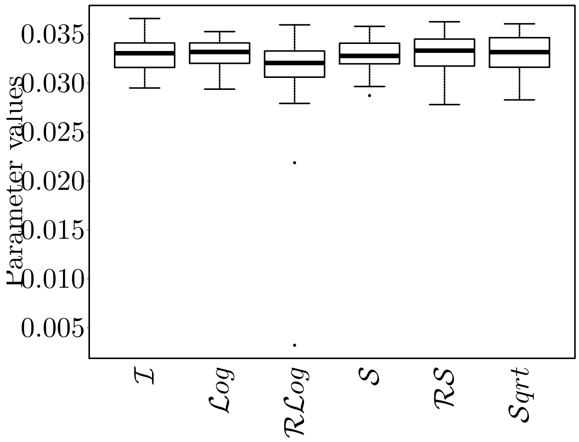

Figure 9: Parameter values obtained by irace with a budget of 2000 experiments for a high temperature length.

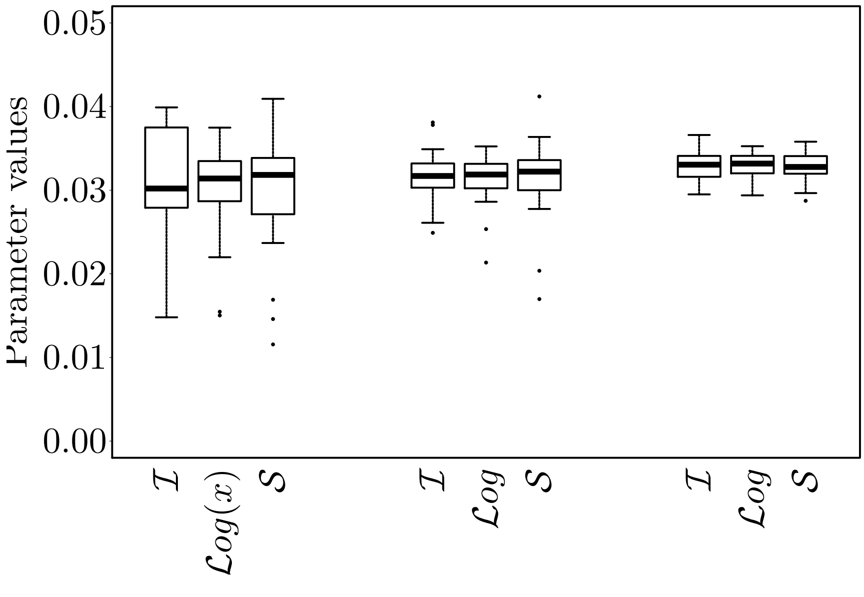

Figure 10: Parameter values obtained by irace using budgets of 125 (left boxplots), 500 (middle boxplots) and 2000 (right boxplots) experiments for a high temperature length.

3 Effect of the logarithmic transformation in SMAC

We performed experiments with the SMAC configurator on five configuration scenarios from ACLib. The configuration is performed on two versions of the scenarios; first defining real and integer parameters (SMAC) and second, using the default parameter definition given by ACLib that defines some of these parameters as logarithmic integer and real (SMAC log based on expert knowledge. The first three scenarios involve configuring the CPLEX solver considering 74 parameters, the Lingeling scenario considers configuring the Lingeling SAT-solver with 323 parameters and the SPEAR SAT solver that has 26 parameters. Figure 11 gives the PAR 10 performance obtained when configuring the two versions of the scenarios with SMAC using 20 executions of the SMAC procedure, that is, repeating each configuration run 20 times.

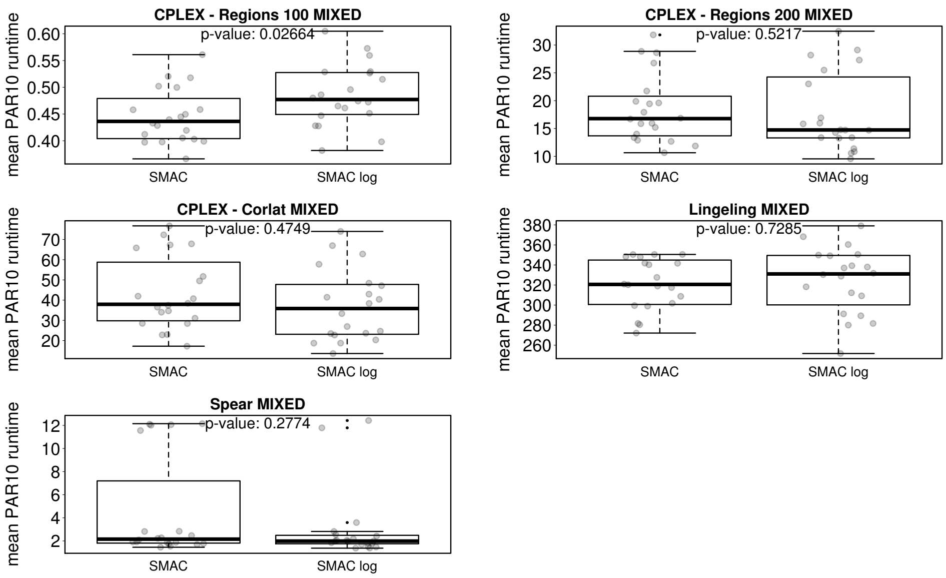

Figure 11: PAR 10 mean performance of 20 executions of SMAC on the CATS100, CATS200, Corlat, Lingeling and Spear scenarios with and without logarithmic parameter transformations.

Applying logarithmic transformations in these scenarios does not lead to significantly better results across all the benchmarks and even more, it produces significantly worse performance for the CATS 100 scenario (according to a Wilcoxon test). These results show that applying a logarithmic transformations to parameter domains, even when based on expert knowledge, is not a straight forward task and it does not necessarily lead to improved performance.

One may assume that using appropriate logarithmic transformations may, however, speed-up the convergence of the configuration process. To further analyse this, Figure 12 shows the performance of the incumbent configuration averaged across the 20 executions of SMAC. Maybe surprisingly, the scenario versions using the logarithmic transformation do not obtain better performance during the configuration process and, thus, we can conclude that transformations used in these scenarios are nor useful for the configuration process.

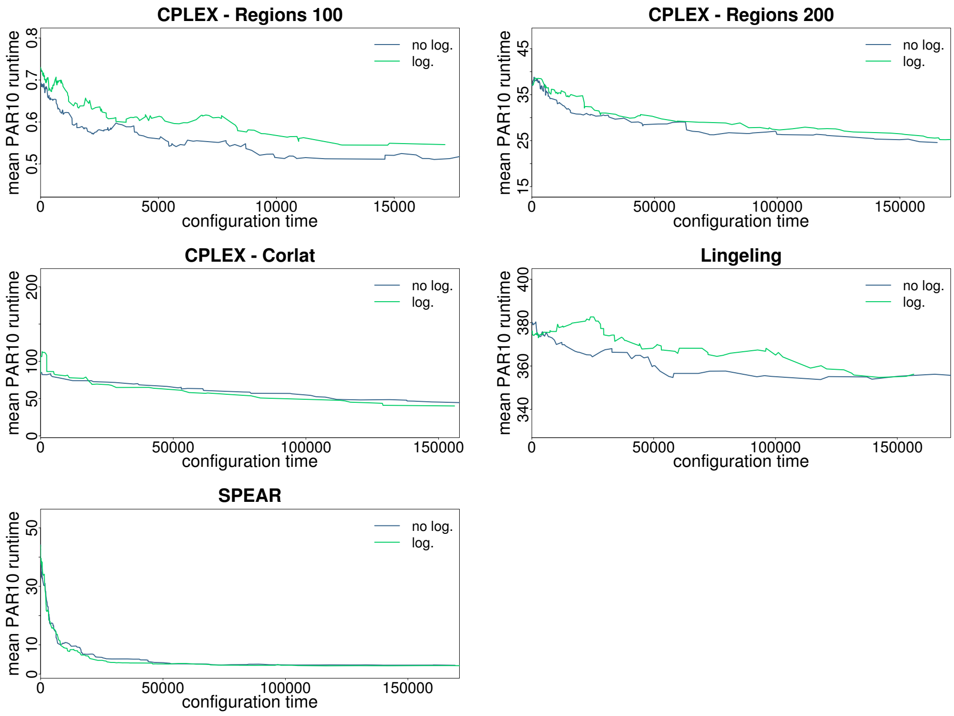

Figure 12: PAR 10 mean performance of the incumbent measured across 20 executions of SMAC on the CATS100, CATS200, Corlat, Lingeling and Spear scenarios with and without logarithmic parameter transformations.