HNCO
Empirical cumulative distribution functions of the runtimes of various black box optimization algorithms

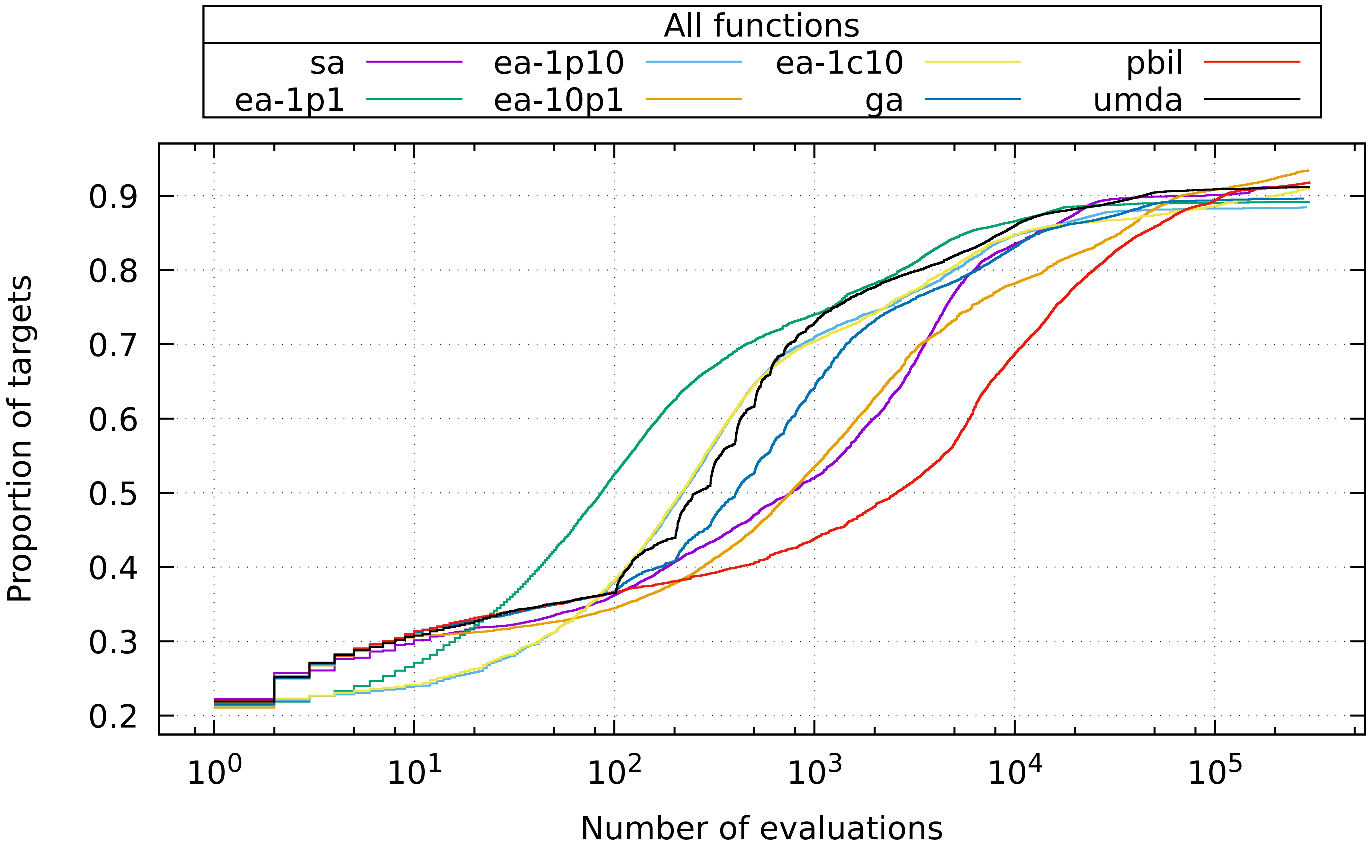
November 22, 2017

Abstract

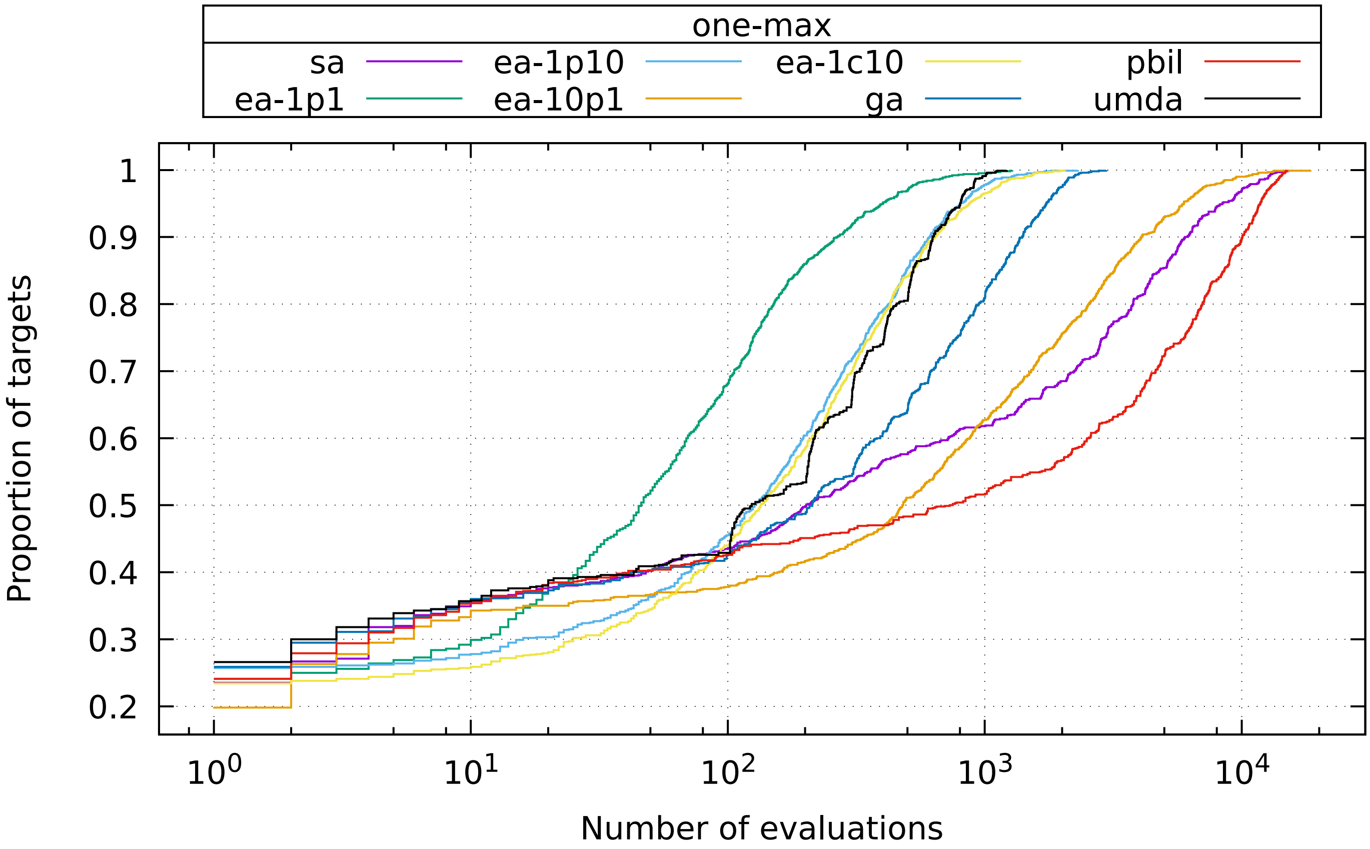
We partly follow the experimental procedure of the COCO framework for the performance assessment of black box optimization algorithms Hansen et al. [2016]. For each objective (or fitness) function considered in the study, 50 equally spaced targets have been computed. Then for each algorithm we plot the proportion of targets reached as a function of the number of evaluations over 20 independent runs. The dimension is fixed at $n = 100$. It should be noted that the linear scale of targets does not fit the function EqualProducts. A logarithmic scale will be made available. For clarity reasons only 8 algorithms (hence 8 colors) are included in the study.

Contents

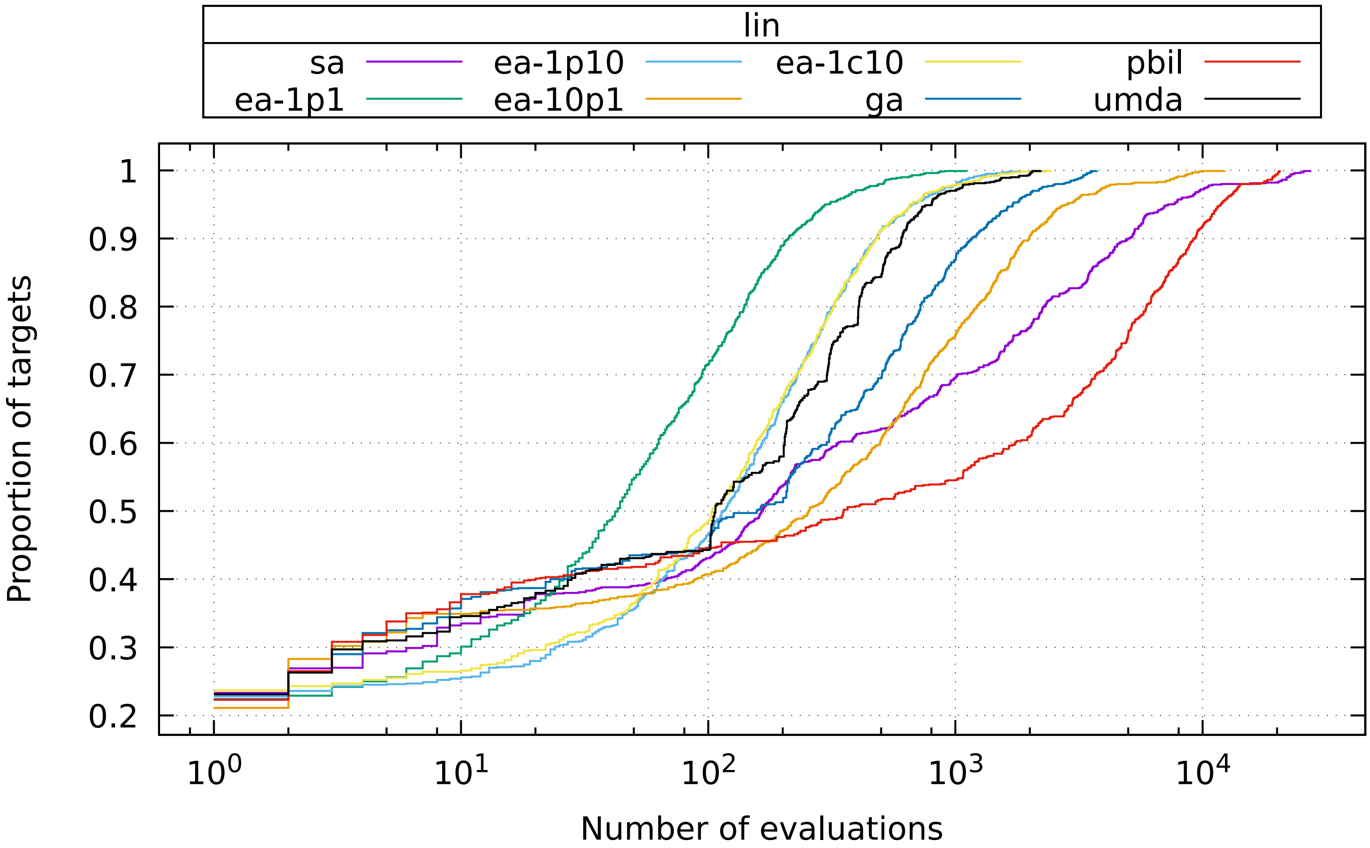
1 All Functions



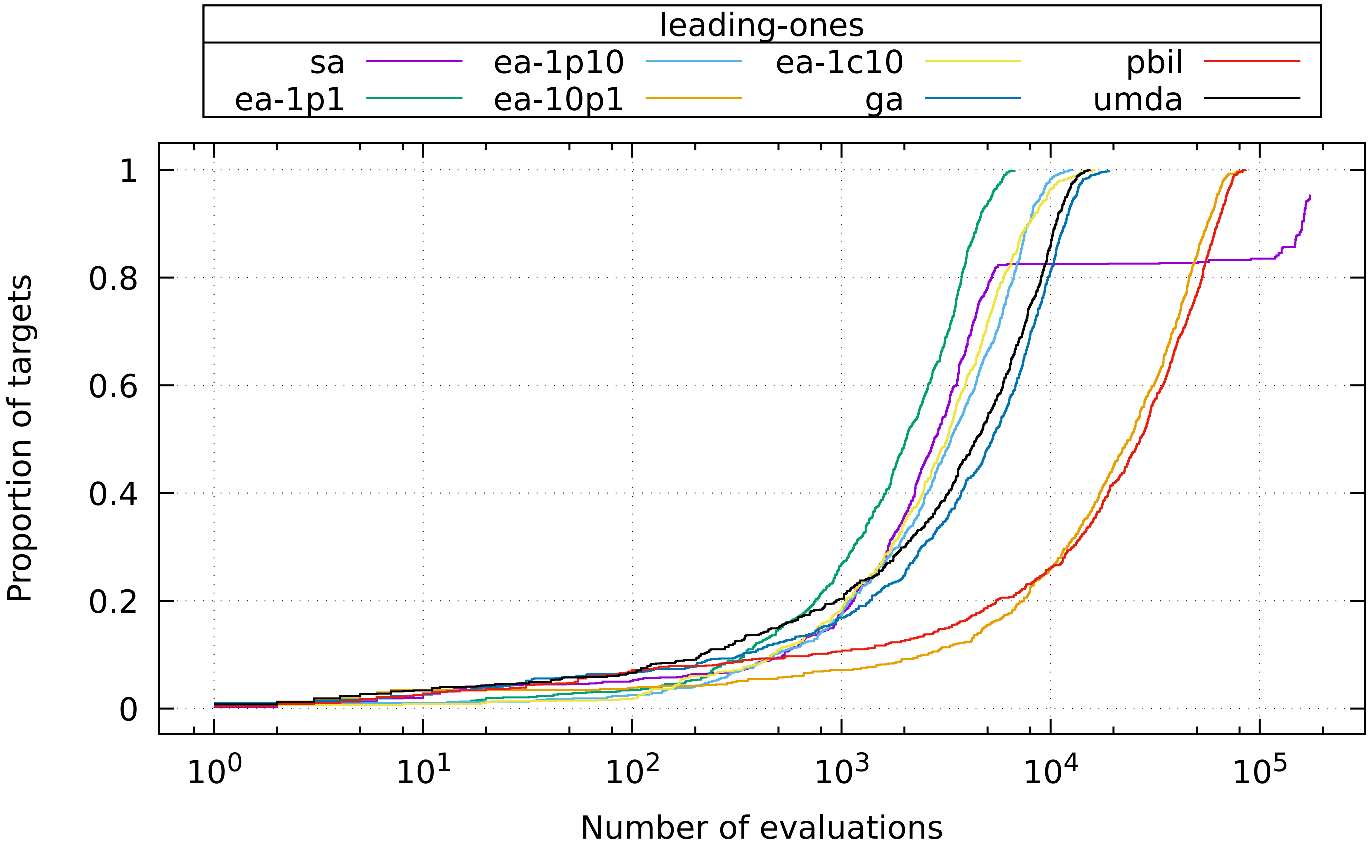
2 Function one-max



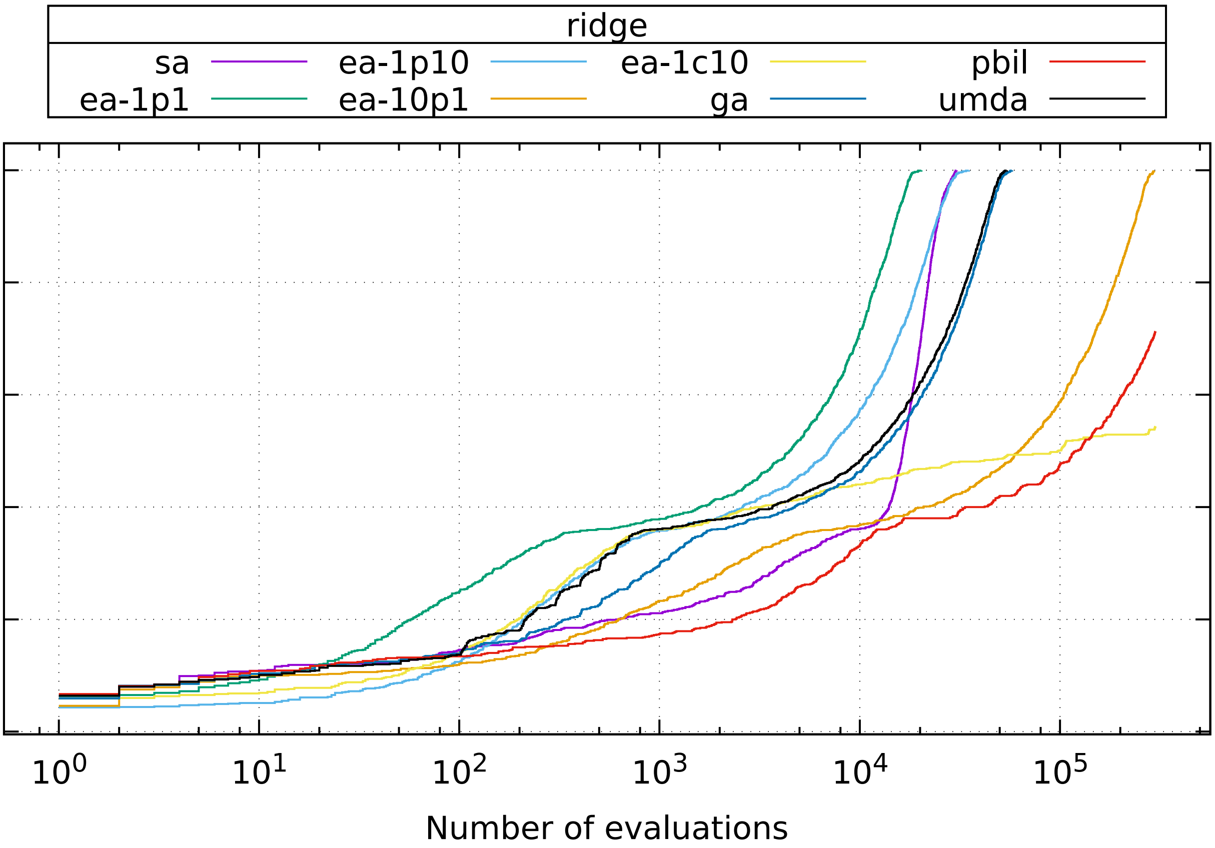
3 Function lin



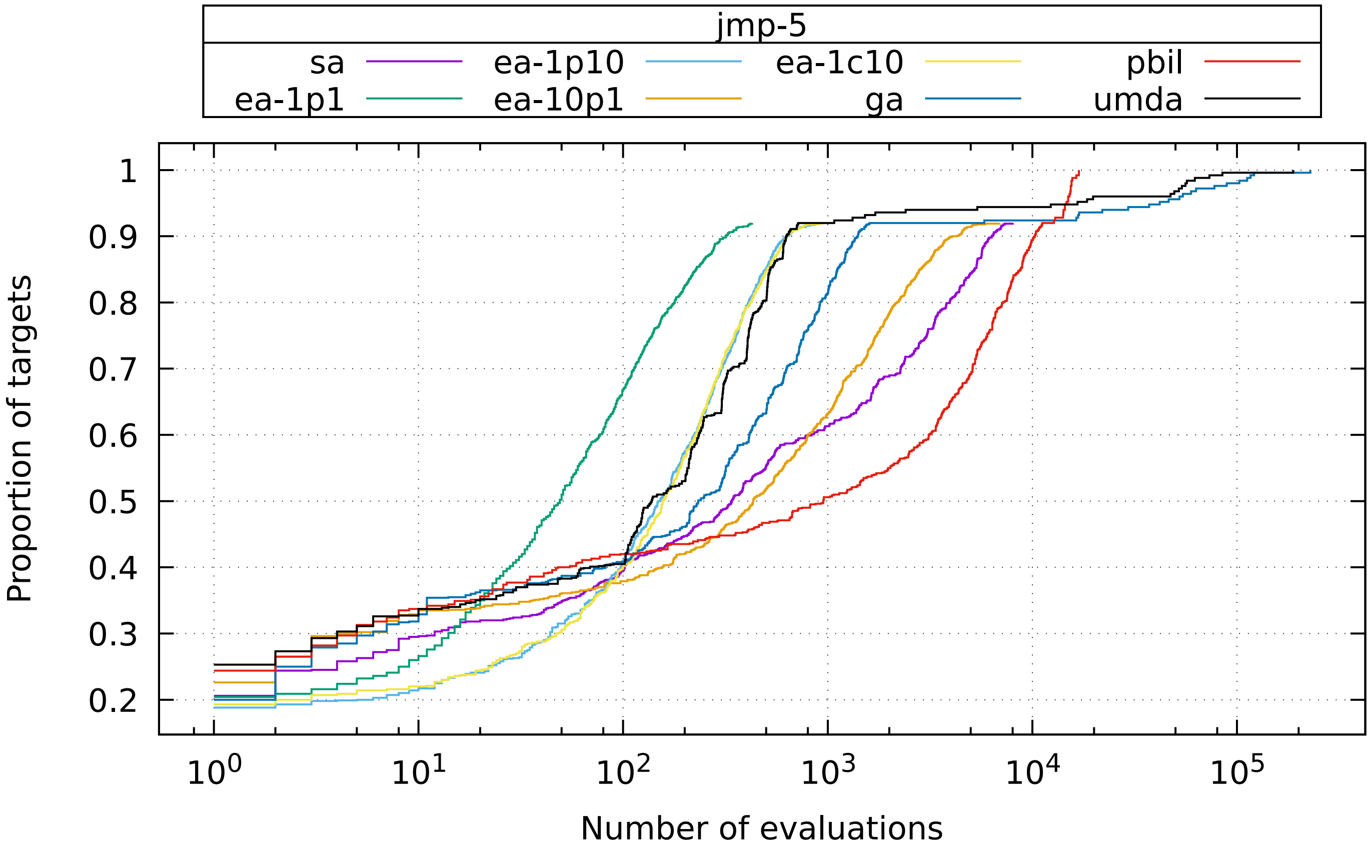
4 Function leading-ones



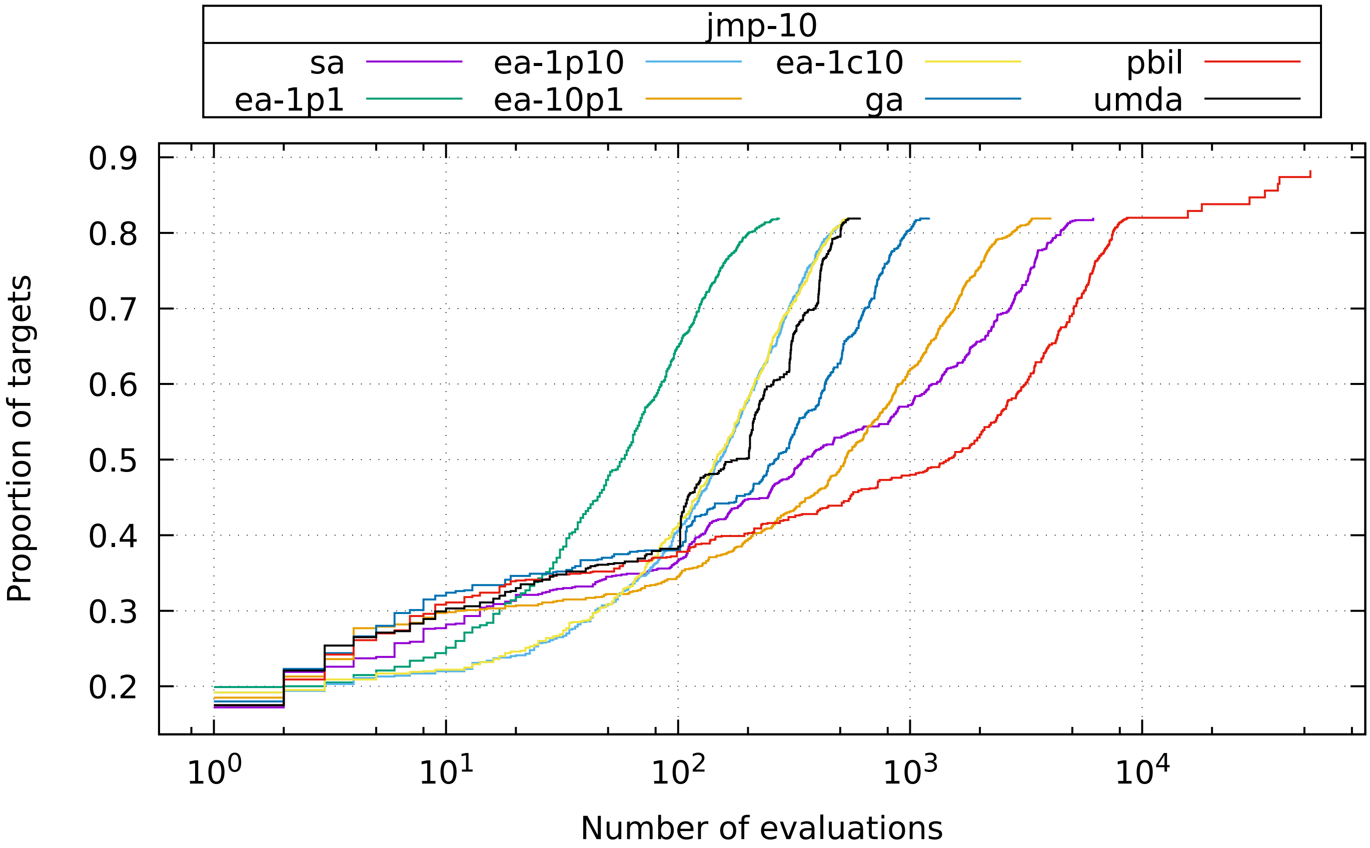
5 Function ridge



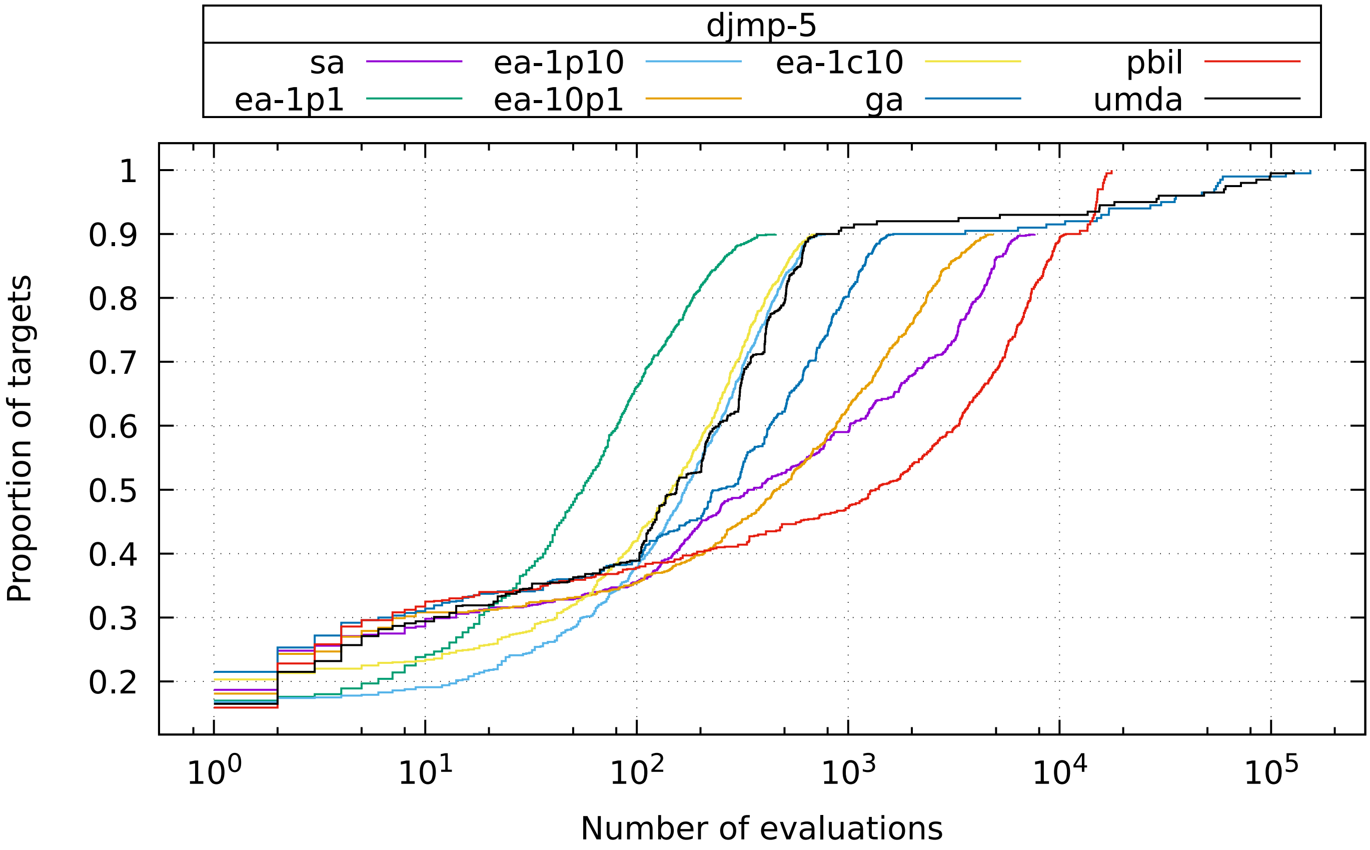
6 Function jmp-5



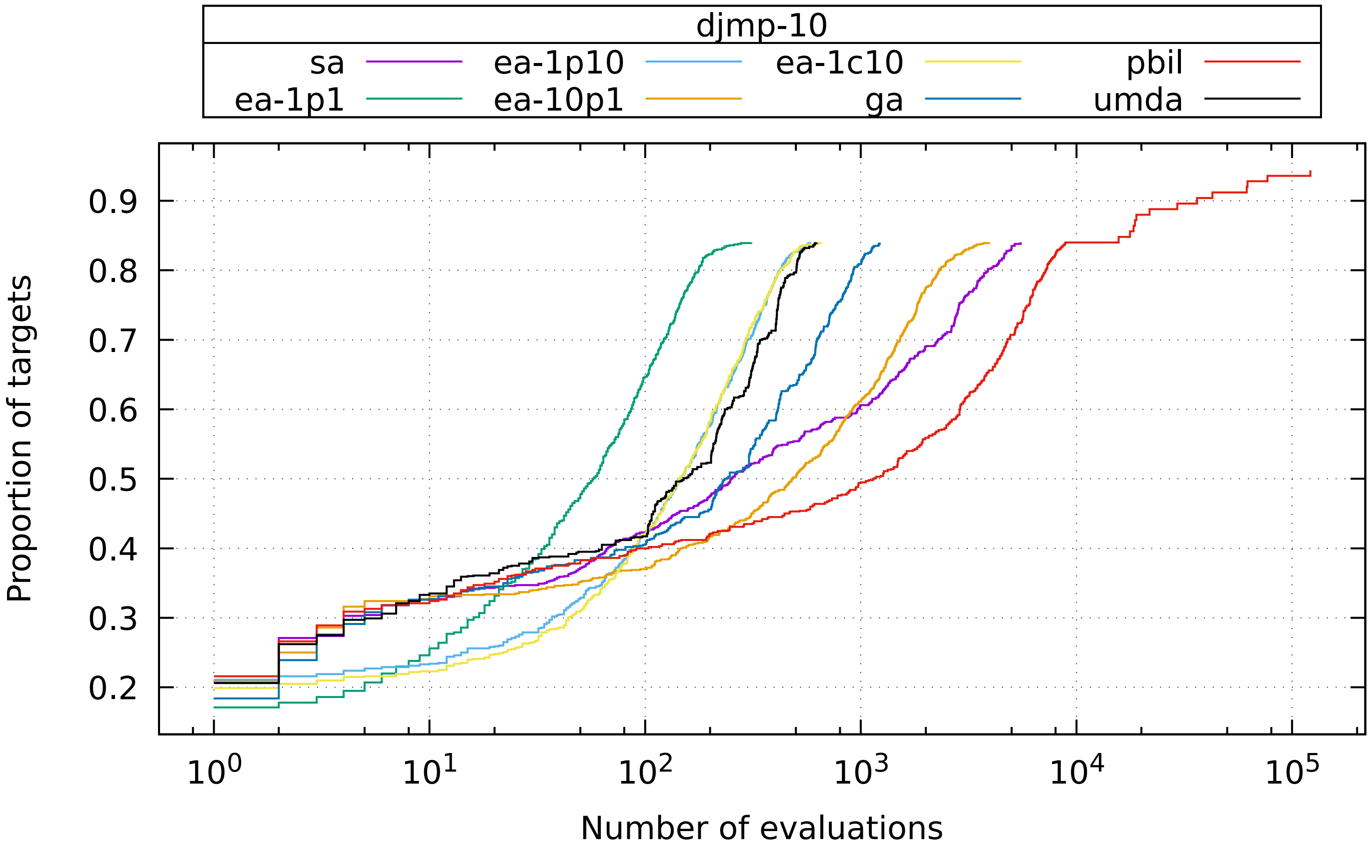
7 Function jmp-10



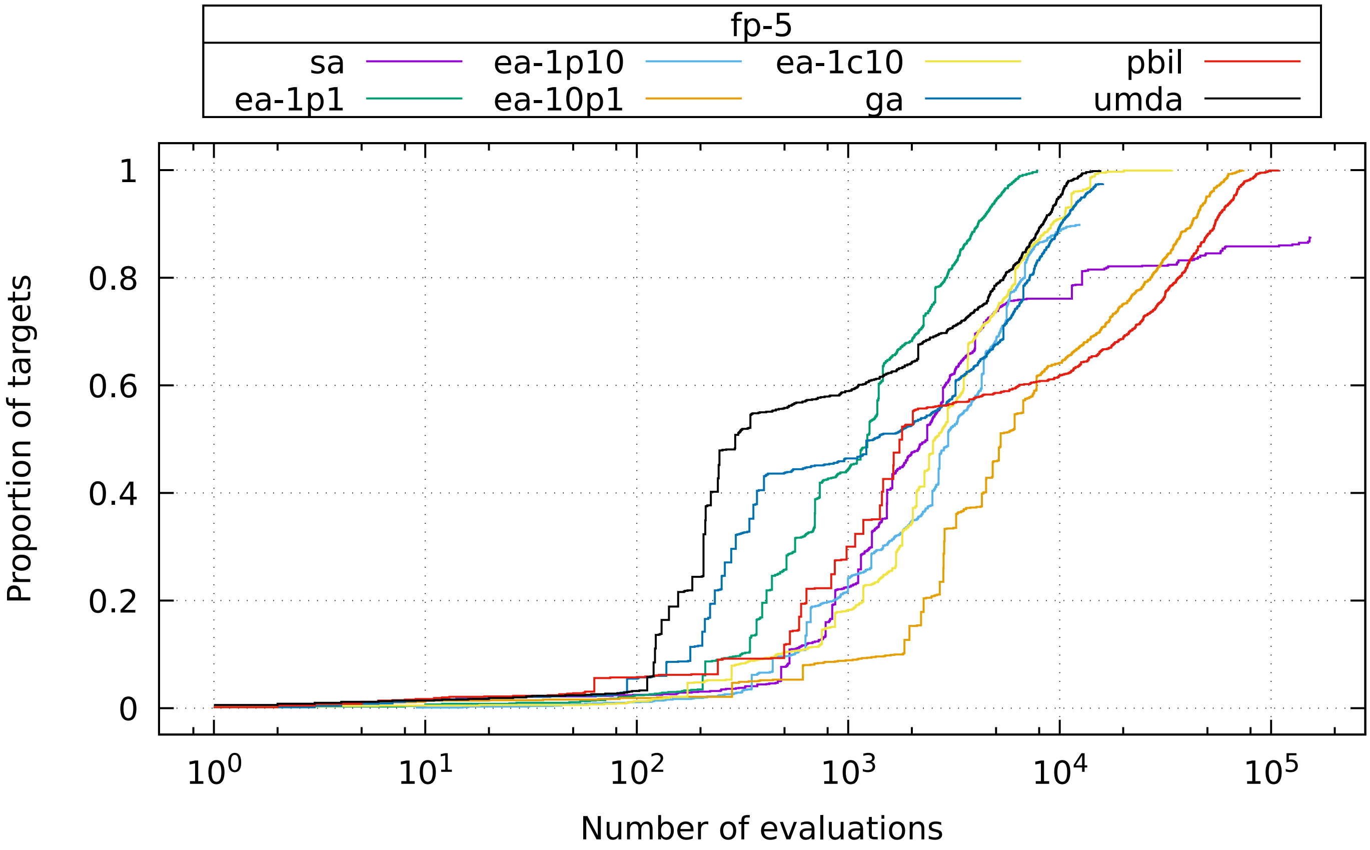
8 Function djmp-5



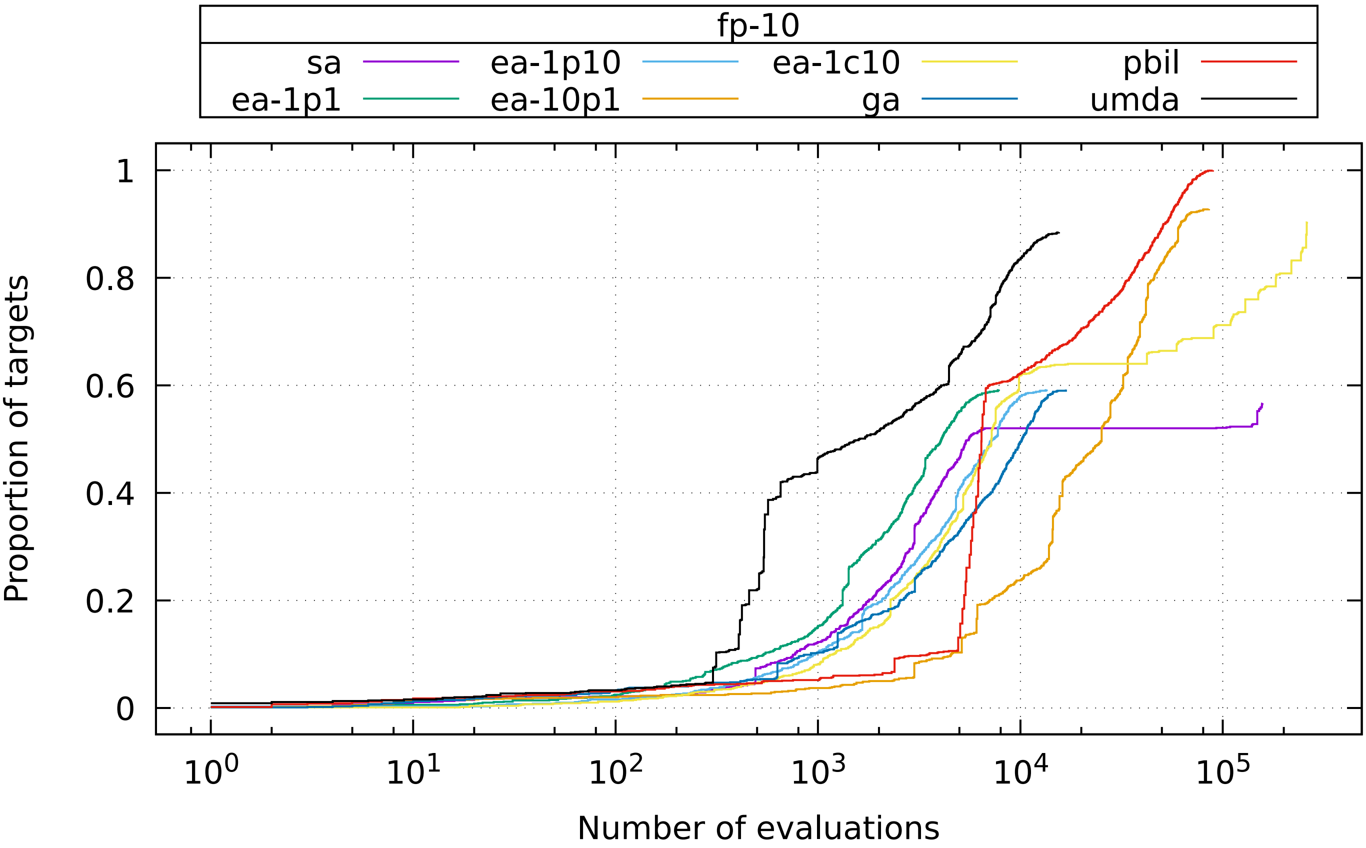
9 Function djmp-10



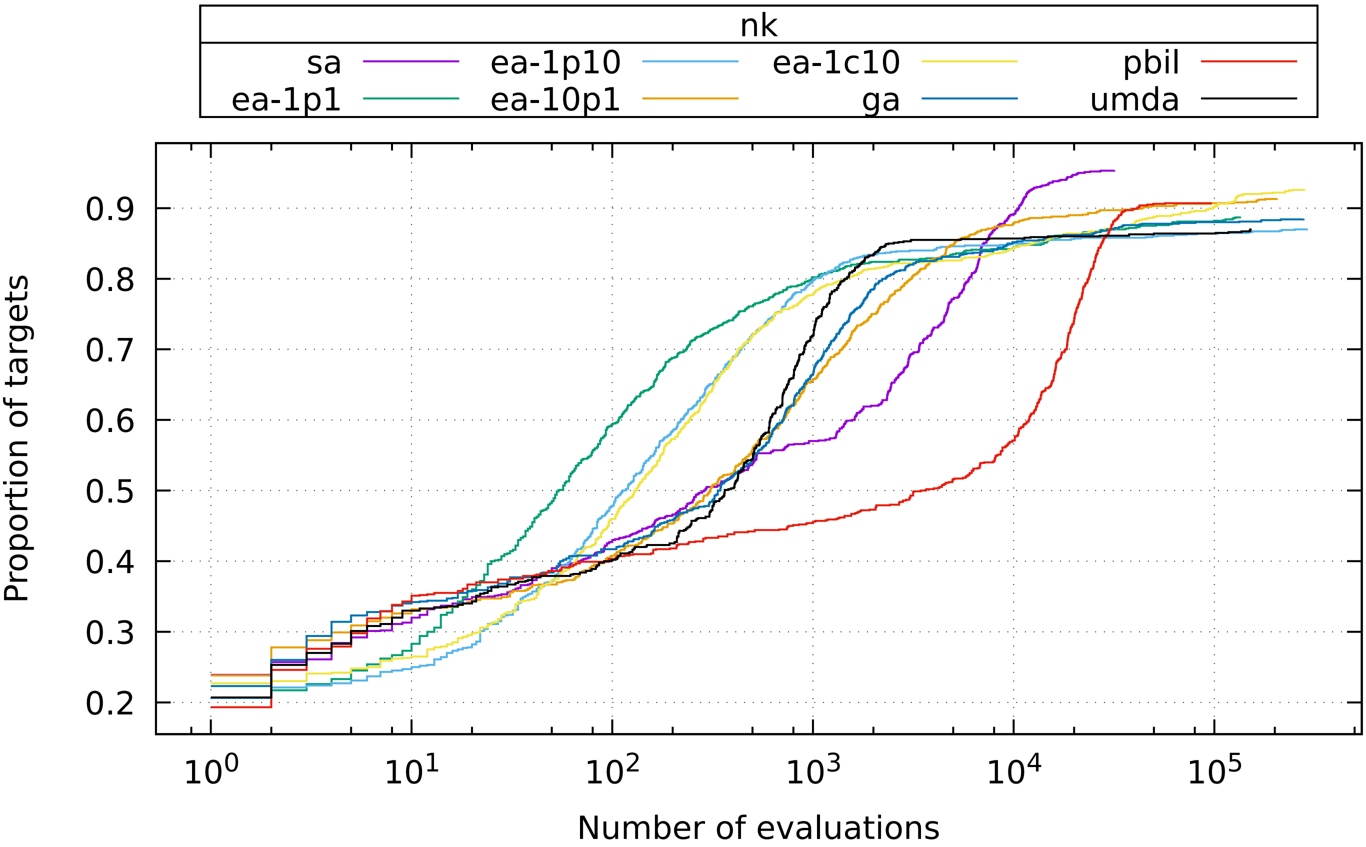
10 Function fp-5



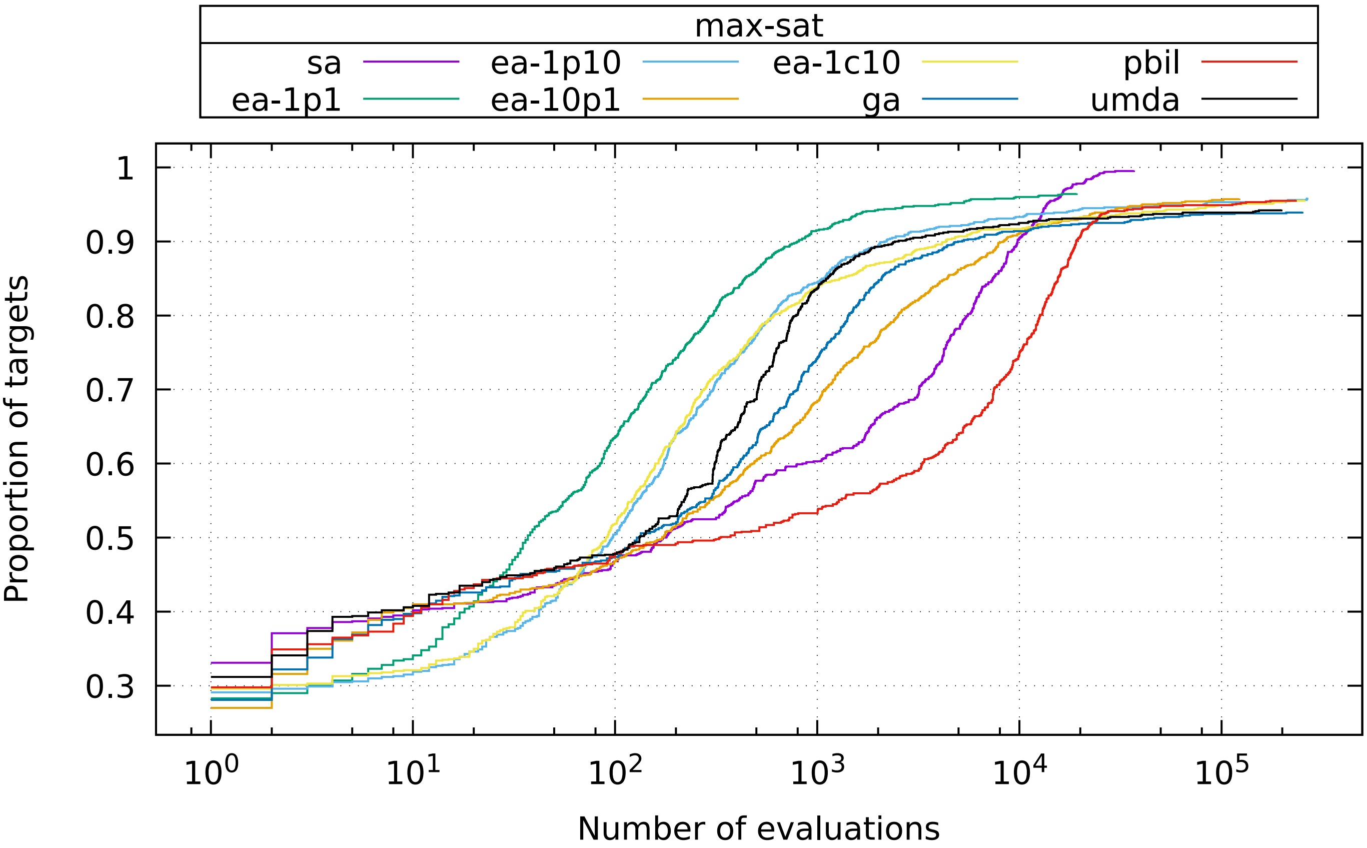
11 Function fp-10



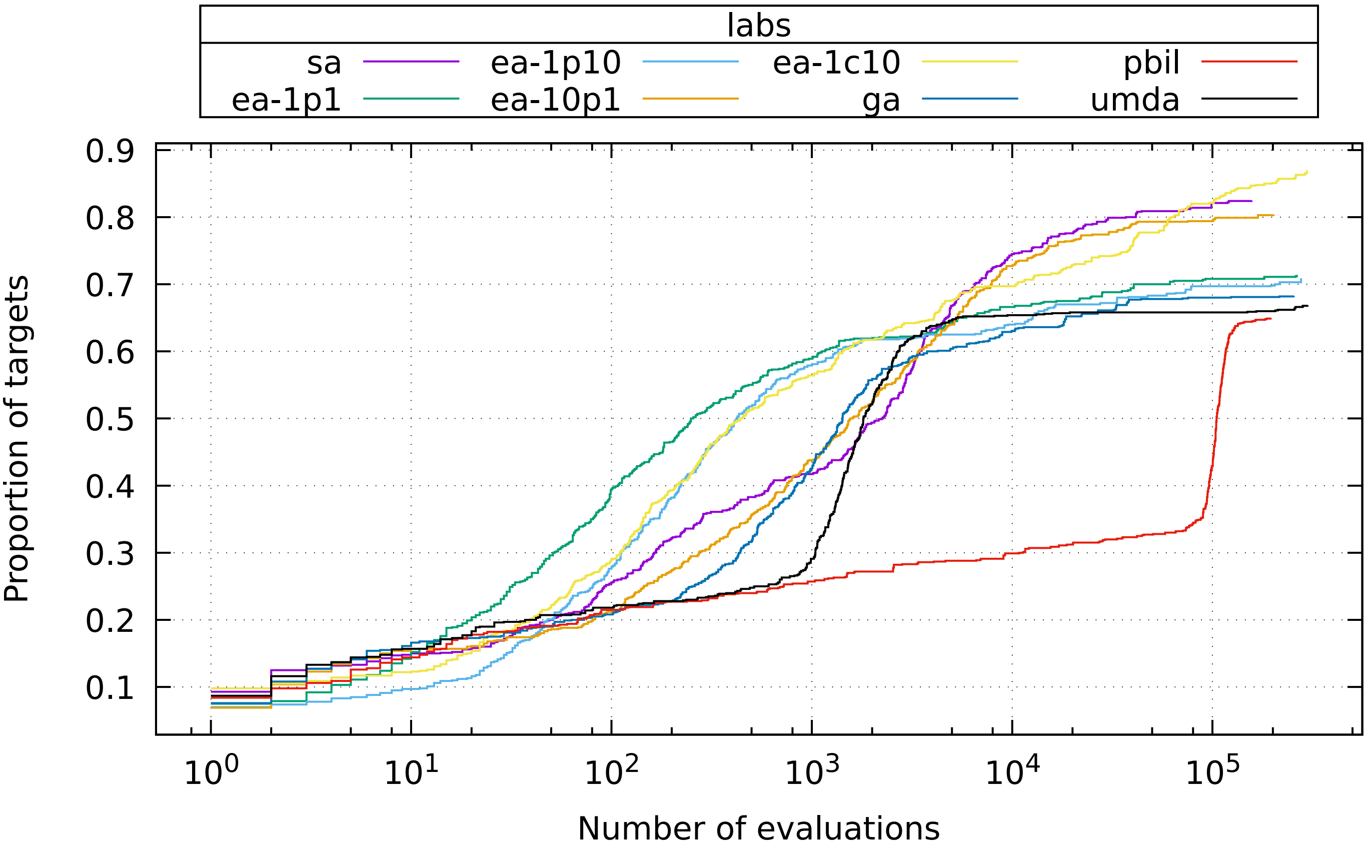
12 Function nk



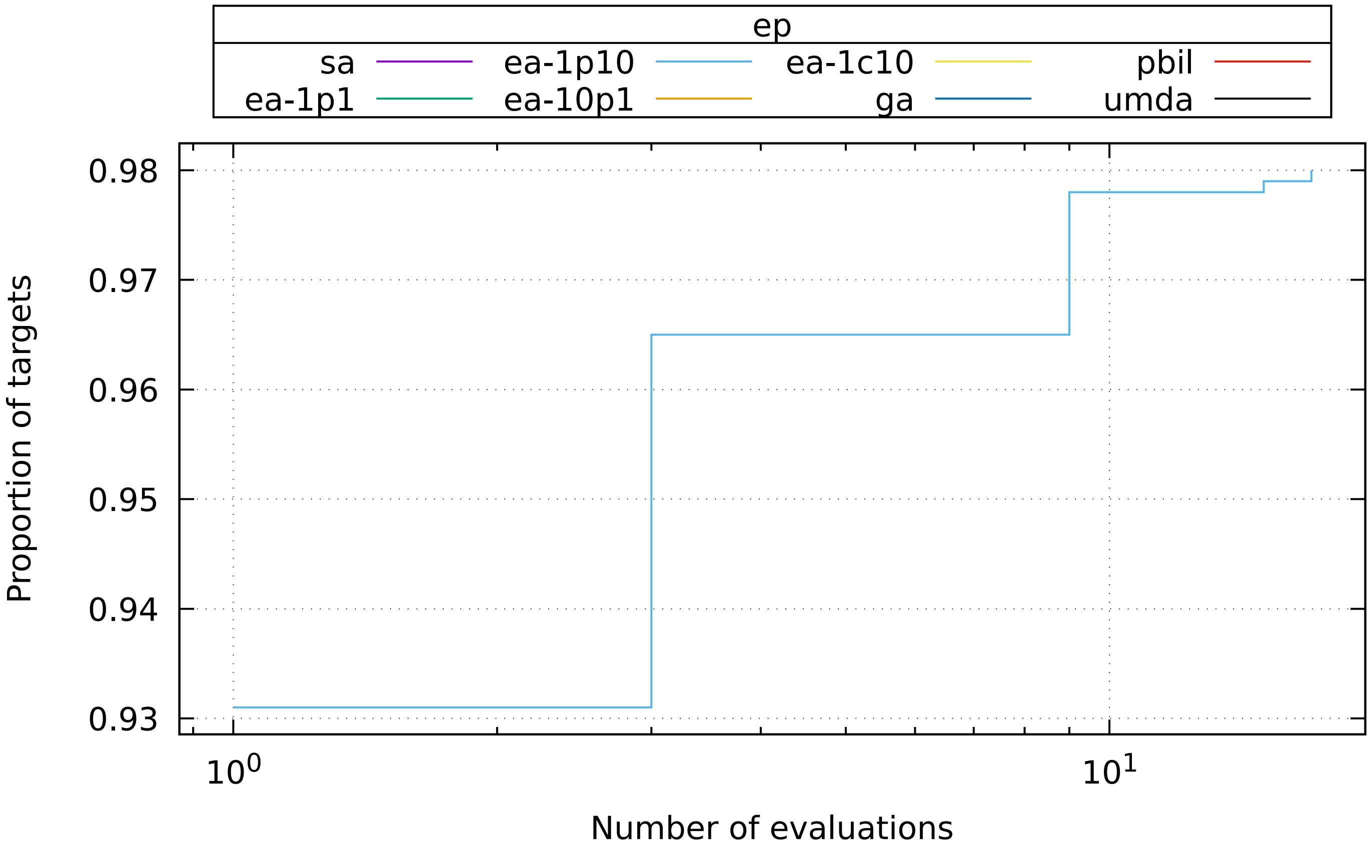
13 Function max-sat



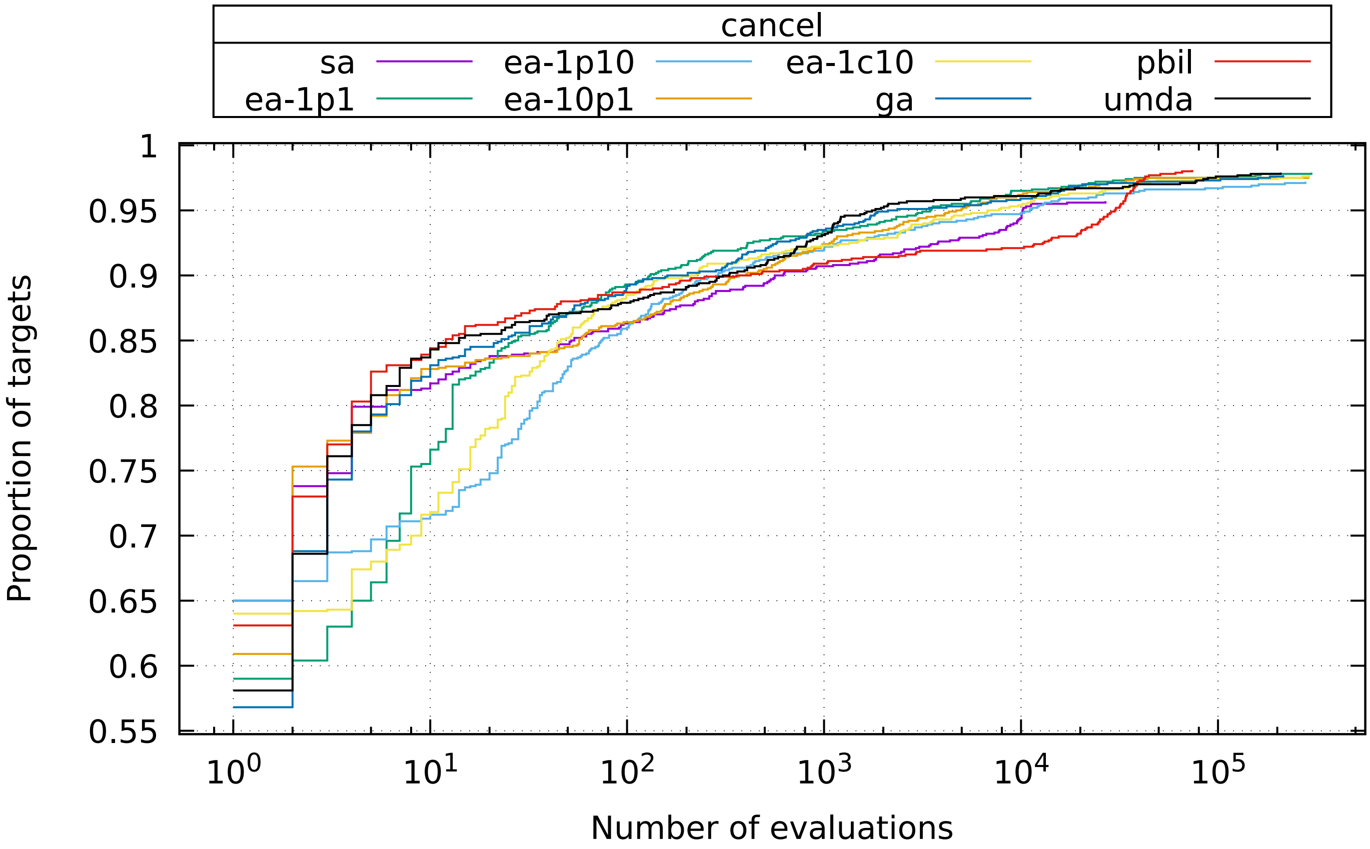
14 Function labs



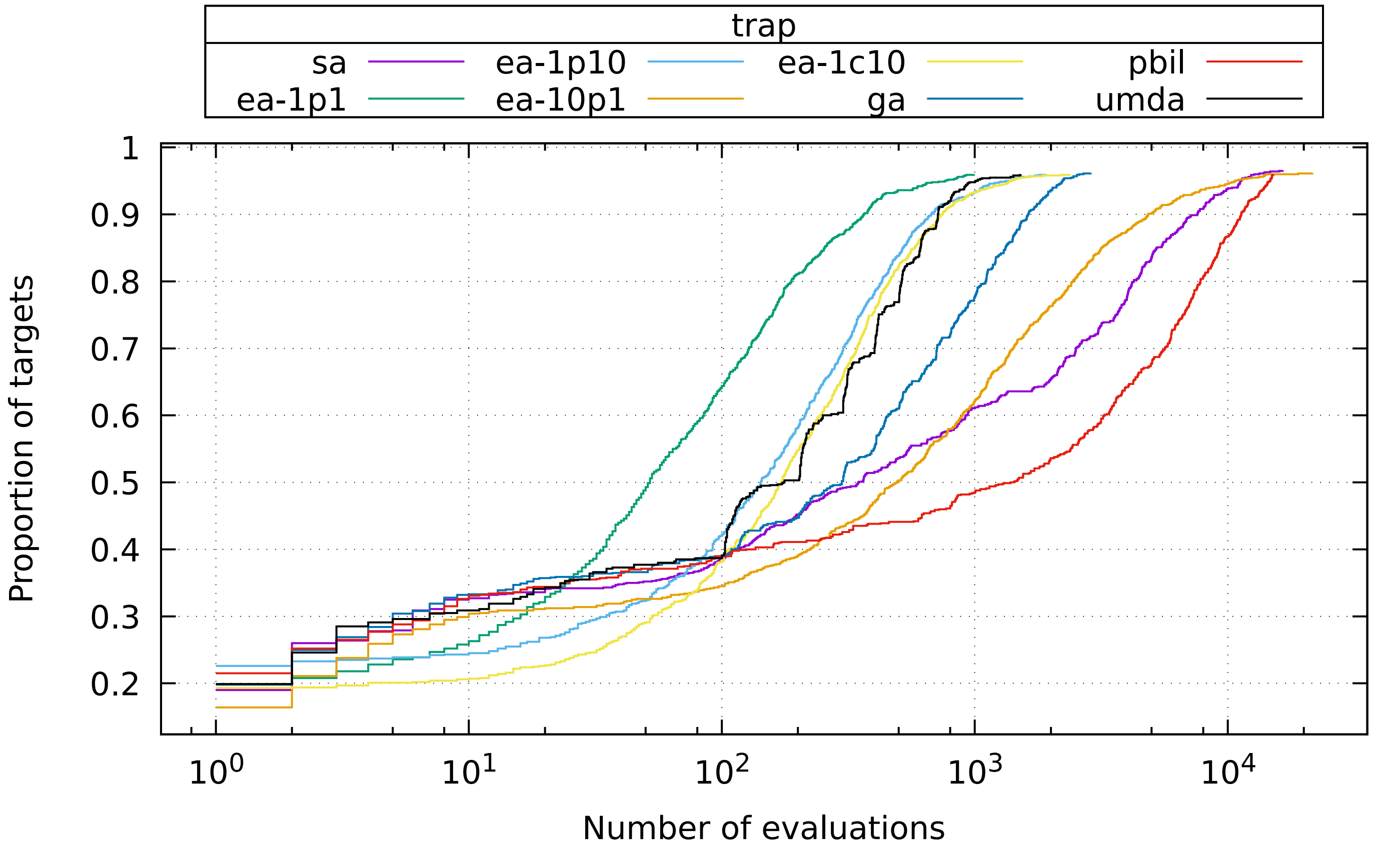
15 Function ep



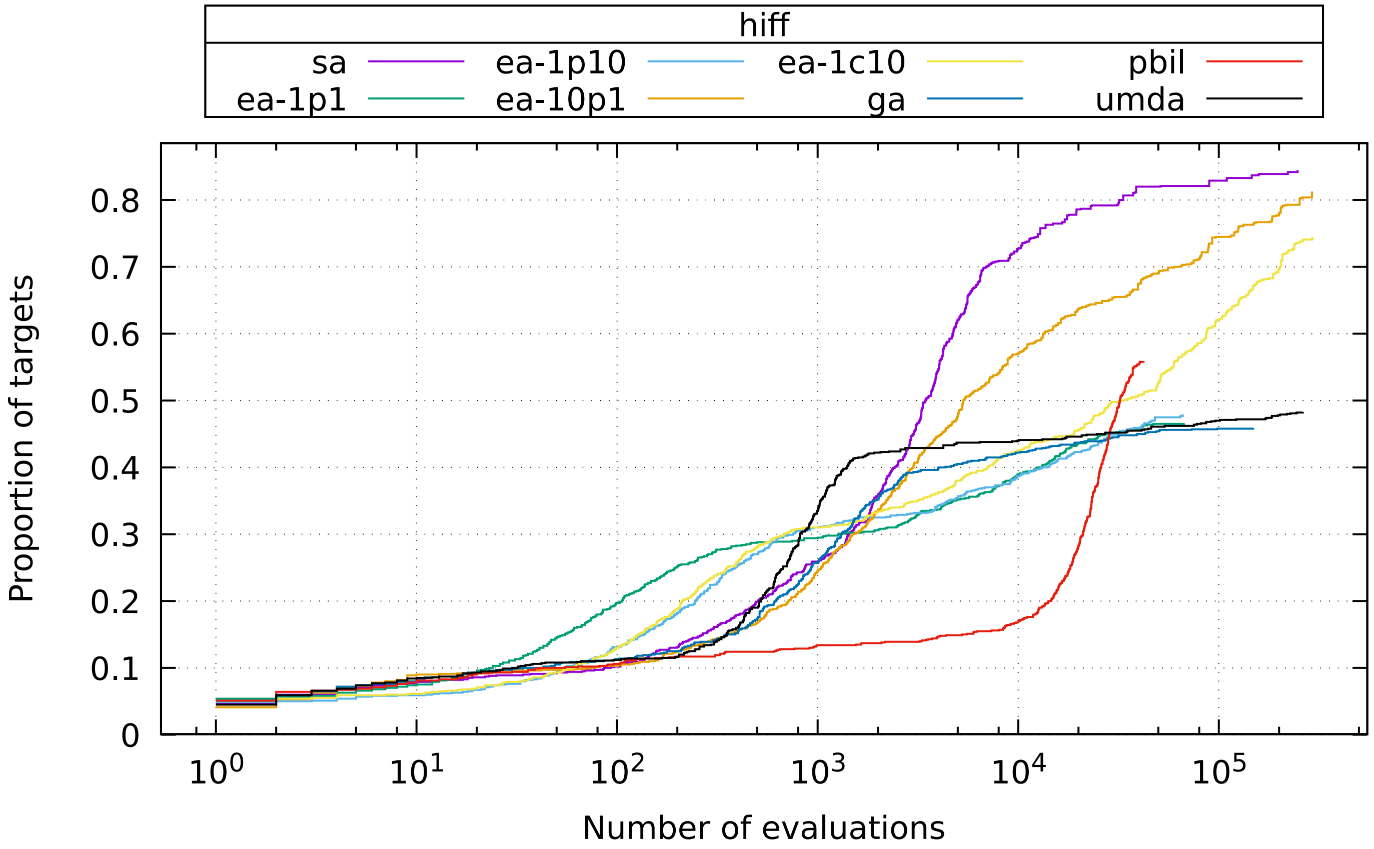
16 Function cancel



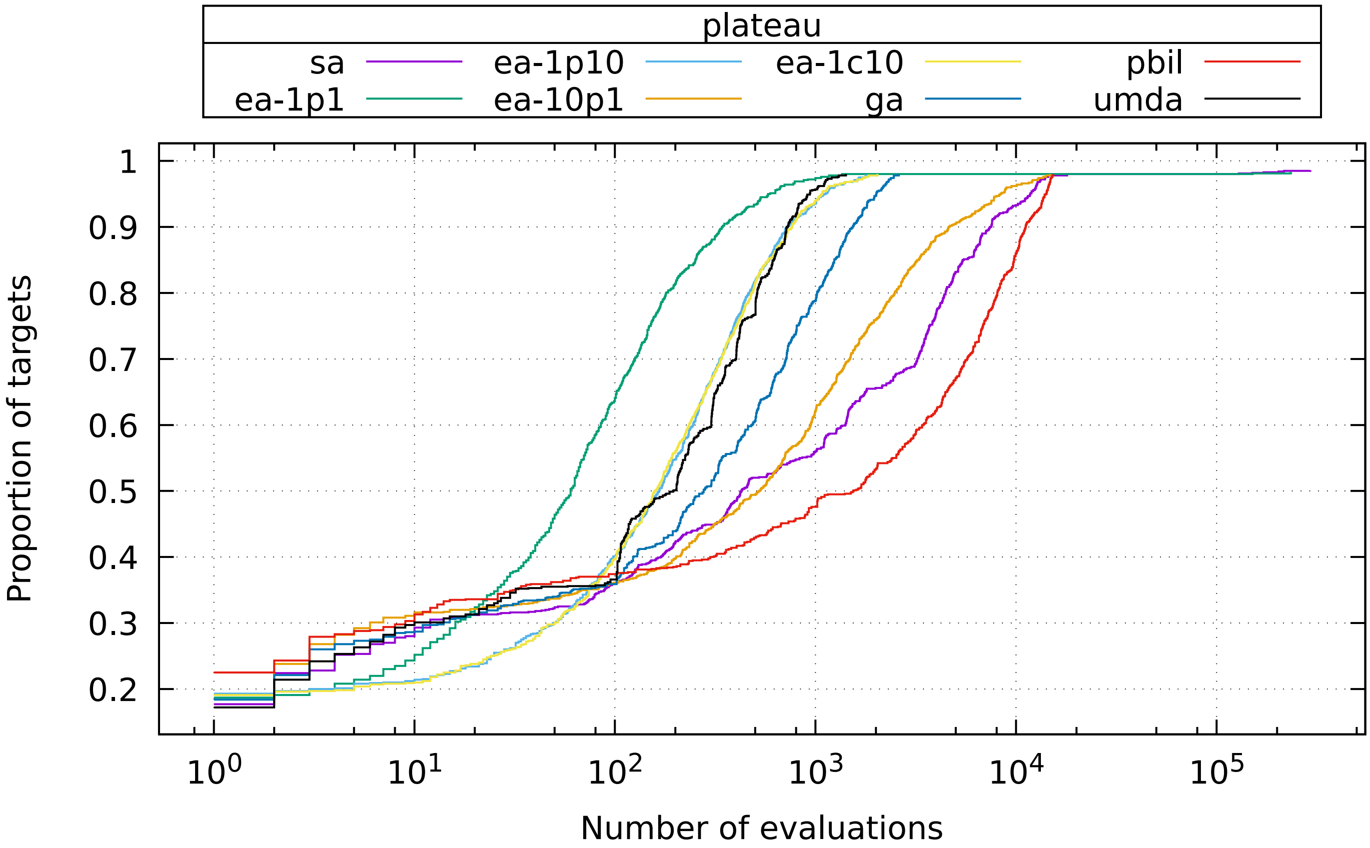
17 Function trap



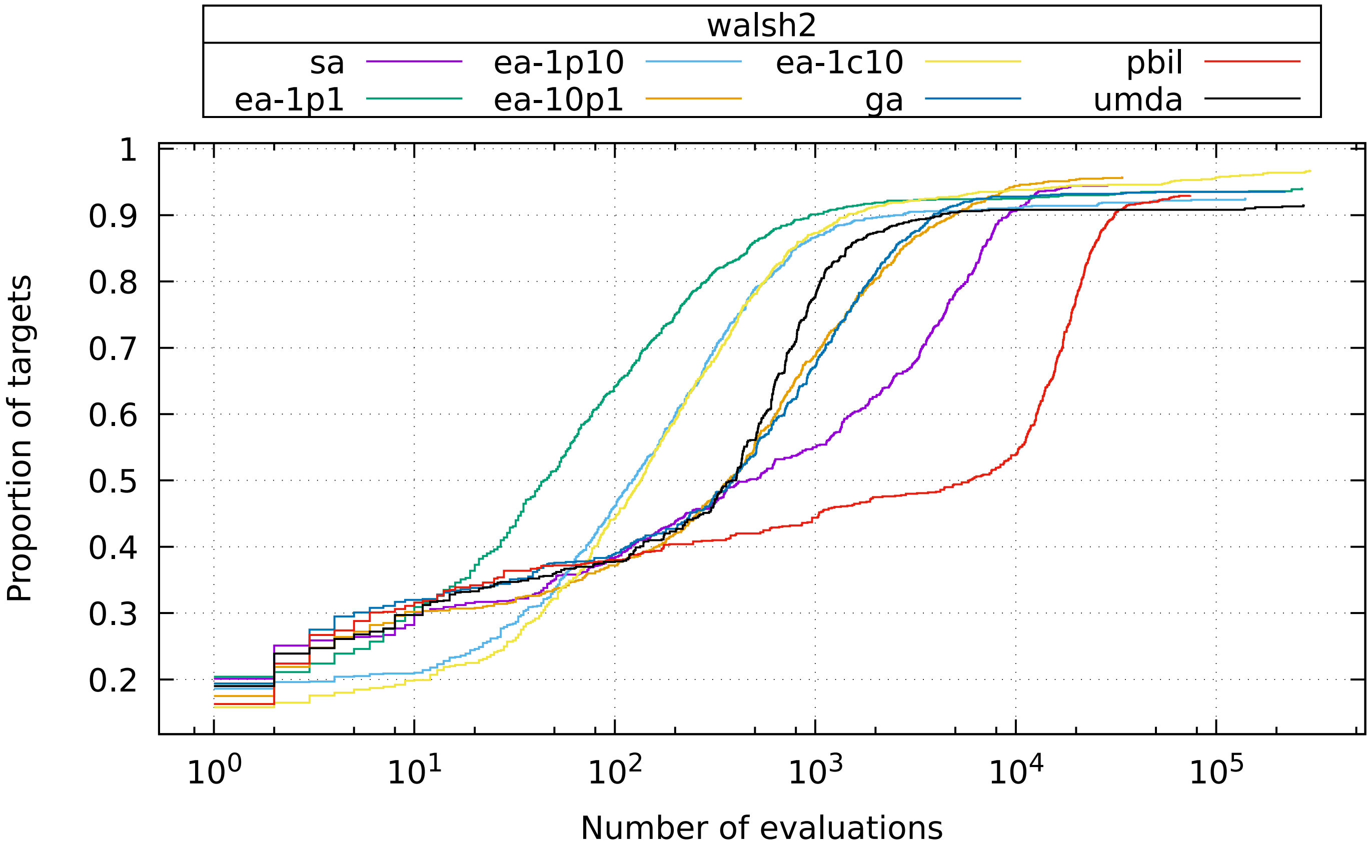
18 Function hiff



19 Function plateau



20 Function walsh2



References

Nikolaus Hansen, Anne Auger, Dimo Brockhoff, Dejan Tusar, and Tea Tusar. COCO: performance assessment. *CoRR*, abs/1605.03560, 2016. URL http://arxiv.org/abs/1605.03560.

A Plan

```
{
    "exec": "hnco",
    "opt": "--log-improvement --map 1 --map-random -s 100 -i 0 -b 300000",
    "num_runs": 20,
    "num_targets": 50,
    "parallel": true,
    "results": "results",
    "graphics": "graphics",
    "report": "report",
    "functions": [
        {
            "id": "one-max",
            "opt": "-F 0 --stop-on-maximum",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "lin",
            "opt": "-F 1 -p instances/lin.100",
            "col": ">{{\\nprounddigits{2}}}N{2}{2}"
        },
        {
            "id": "leading-ones",
            "opt": "-F 10 --stop-on-maximum",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "ridge",
            "opt": "-F 11 --stop-on-maximum",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "jmp-5",
            "opt": "-F 30 --stop-on-maximum -t 5",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "jmp-10",
            "opt": "-F 30 --stop-on-maximum -t 10",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "djmp-5",
            "opt": "-F 31 --stop-on-maximum -t 5",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "djmp-10",
            "opt": "-F 31 --stop-on-maximum -t 10",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "fp-5",
            "opt": "-F 40 --stop-on-maximum -t 5",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "fp-10",
            "opt": "-F 40 --stop-on-maximum -t 10",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "nk",
            "opt": "-F 60 -p instances/nk.100.4",
            "col": ">{{\\nprounddigits{2}}}N{1}{2}"
        },
        {
            "id": "max-sat",
            "opt": "-F 70 -p instances/ms.100.3.1000 --cache",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "labs",
            "opt": "-F 80",
            "col": ">{{\\nprounddigits{2}}}N{1}{2}"
        },
        {
            "id": "ep",
            "opt": "-F 90 -p instances/ep.100",
            "reverse": true,
            "logscale": true,
            "col": ">{{\\nprounddigits{1}}}N{1}{1}"
        },
        {
            "id": "cancel",
            "opt": "-F 100 -s 99",
            "reverse": true,
            "col": ">{{\\nprounddigits{2}}}N{1}{2}"
        },
        {
            "id": "trap",
            "opt": "-F 110 --stop-on-maximum --fun-num-traps 10",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "hiff",
            "opt": "-F 120 --stop-on-maximum -s 128",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "plateau",
            "opt": "-F 130 --stop-on-maximum",
            "col": ">{{\\nprounddigits{0}}}N{3}{0}"
        },
        {
            "id": "walsh2",
            "opt": "-F 162 -p instances/walsh2.100 --cache",
            "col": ">{{\\nprounddigits{2}}}N{3}{2}"
        }
    ],
    "algorithms": [
        {
            "id": "sa",
            "opt": "-A 200 --sa-rate 1.05 --sa-num-trials 10"
        },
        {
            "id": "ea-1p1",
            "opt": "-A 300"
        },
        {
            "id": "ea-1p10",
            "opt": "-A 310 --ea-mu 1 --ea-lambda 10"
        },
        {
            "id": "ea-10p1",
            "opt": "-A 310 --ea-mu 10 --ea-lambda 1"
        },
        {
            "id": "ea-1c10",
            "opt": "-A 320 --ea-mu 1 --ea-lambda 10"
        },
        {
            "id": "ga",
            "opt": "-A 400 --ea-mu 100"
        },
        {
            "id": "pbil",
            "opt": "-A 500 -r 5e-3"
        },
        {
            "id": "umda",
            "opt": "-A 600 -x 100 -y 10"
        }
    ]
}
```

B Default parameters

```
# algorithm = 100
# bm_mc_reset_strategy = 1
# bm_num_gs_cycles = 1
# bm_num_gs_steps = 100
# bm_sampling = 1
# budget = 10000
# bv_size = 100
# ea_lambda = 100
# ea_mu = 10
# fun_name = noname
# fun_num_traps = 10
# fun_prefix_length = 2
# fun_threshold = 10
# function = 0
# ga_crossover_probability = 0.5
# ga_tournament_size = 10
# hea_binary_dynamics = 0
# hea_delay = 10000
# hea_num_par_updates = 1
# hea_num_seq_updates = 100
# hea_rate_strategy = 0
# hea_reset_period = 0
# hea_sampling_method = 0
# hea_time_constant = 1000
# hea_weight = 1
# learning_rate = 0.001
# map = 0
# map_input_size = 100
# map_path = nopath
# neighborhood = 0
# neighborhood_iterator = 0
# noise_stddev = 1
# num_iterations = 0
# num_threads = 1
# path = nopath
# population_size = 10
# pv_log_num_components = 5
# radius = 2
# rls_patience = 50
# sa_initial_acceptance_probability = 0.6
# sa_num_transitions = 50
# sa_num_trials = 100
# sa_rate = 1.2
# scaled_mutation_probability = 1
# seed = 0
# selection_size = 1
# target = 100
# print_default_parameters
# last_parameter
# exec_name = hnco
# version = 0.7
# Generated from hnco.json
```