

HNCO

Comparison of various black box optimization algorithms

September 14, 2018

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1 Rankings

algorithm	rank distribution									
	1	2	3	4	5	6	7	8	9	10
pbil	10	0	0	2	1	1	2	0	2	1
sa	8	3	2	2	1	0	0	2	0	1
umda	7	2	0	1	1	0	4	0	2	2
ga	6	4	1	2	2	1	0	0	1	2
rls	5	5	1	3	0	1	1	1	1	1
ea-10p1	5	3	3	4	2	2	0	0	0	0
hc	5	3	1	4	1	0	0	1	1	3
ea-1p10	5	2	2	2	0	2	2	1	2	1
ea-1p1	5	2	1	2	0	1	3	4	1	0
ea-1c10	4	3	3	6	0	0	2	1	0	0

2 Function one-max

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	100	100	100	100	100	1	0.000	0.000
hc	100	100	100	100	100	1	0.000	0.000
sa	100	100	100	100	100	1	0.003	0.004
ea-1p1	100	100	100	100	100	1	0.000	0.000
ea-1p10	100	100	100	100	100	1	0.000	0.000
ea-10p1	100	100	100	100	100	1	0.006	0.005
ea-1c10	100	100	100	100	100	1	0.001	0.002
ga	100	100	100	100	100	1	0.011	0.002
pbil	100	100	100	100	100	1	0.063	0.007
umda	100	100	100	100	100	1	0.002	0.004

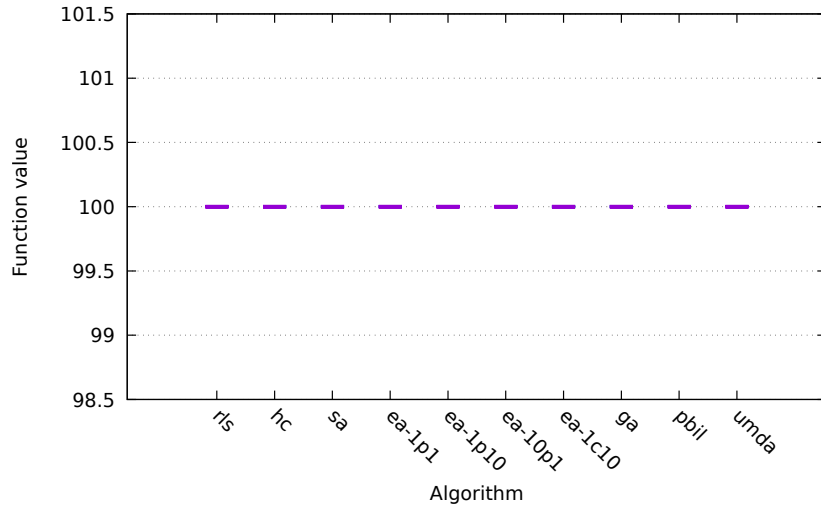


Figure 1: one-max

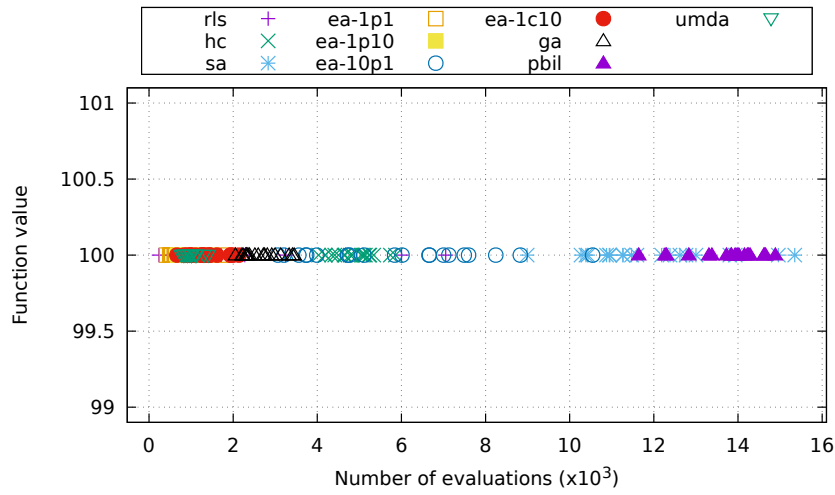


Figure 2: one-max

3 Function lin

algorithm	function value					time (s)		
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	45.03	45.03	45.03	45.03	45.03	1	0.185	0.006
hc	45.03	45.03	45.03	45.03	45.03	1	0.156	0.006
sa	45.03	45.03	45.03	45.03	45.03	1	0.184	0.005
ea-1p1	45.03	45.03	45.03	45.03	45.03	1	0.287	0.006
ea-1p10	45.03	45.03	45.03	45.03	45.03	1	0.310	0.007
ea-10p1	45.03	45.03	45.03	45.03	45.03	1	0.385	0.028
ea-1c10	45.03	45.03	45.03	45.03	45.03	1	0.261	0.002
ga	45.03	45.03	45.03	45.03	45.03	1	1.226	0.020
pbil	45.03	45.03	45.03	45.03	45.03	1	1.252	0.022
umda	45.03	45.03	45.03	45.03	45.03	1	1.243	0.043

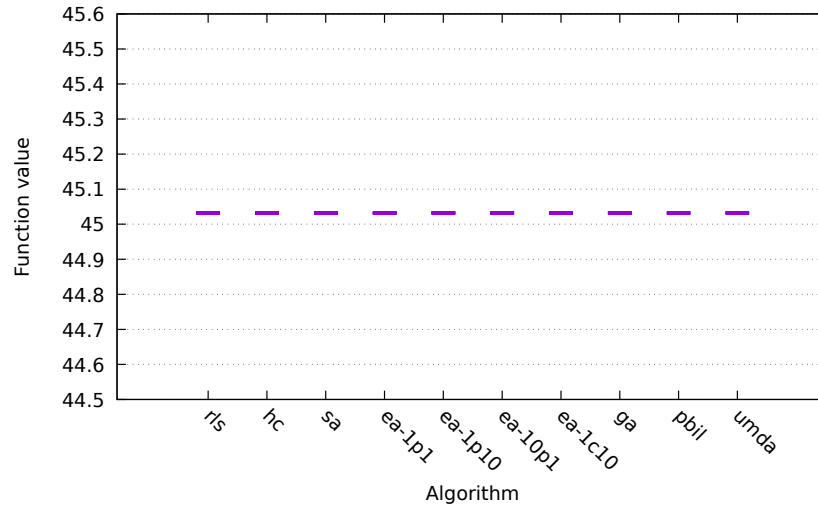


Figure 3: lin

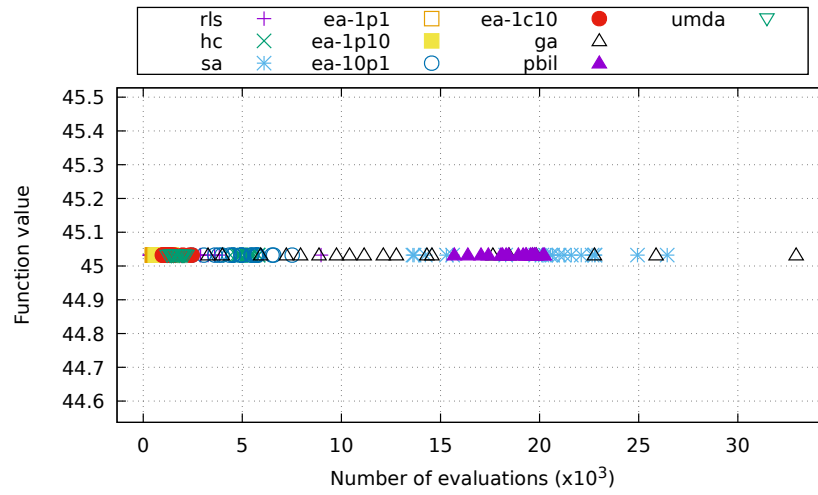


Figure 4: lin

4 Function leading-ones

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	100	100	100	100	100	1	0.006	0.007
hc	100	100	100	100	100	1	0.001	0.002
sa	100	100	100	100	100	1	0.000	0.000
ea-lp1	100	100	100	100	100	1	0.005	0.005
ea-lp10	100	100	100	100	100	1	0.004	0.005
ea-10p1	100	100	100	100	100	1	0.054	0.014
ea-1c10	100	100	100	100	100	1	0.006	0.007
ga	94	95	98	99	100	10	1.291	0.248
pbil	100	100	100	100	100	1	0.393	0.050
umda	100	100	100	100	100	1	0.051	0.015

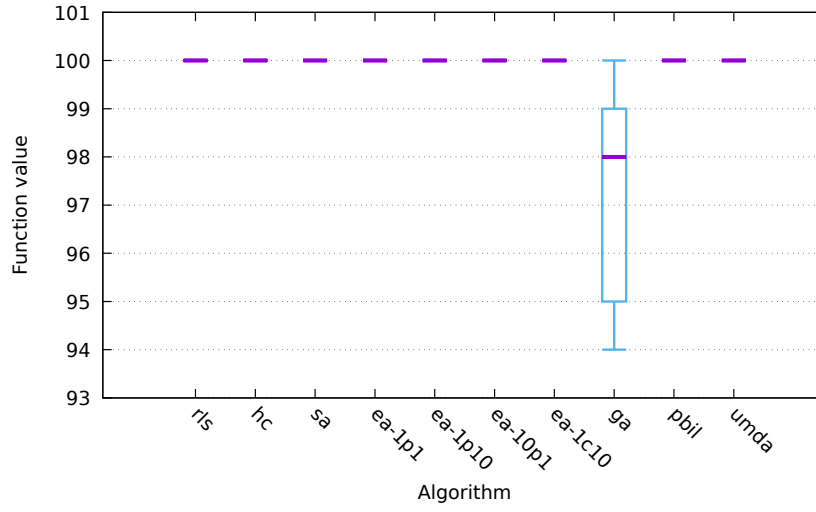


Figure 5: leading-ones

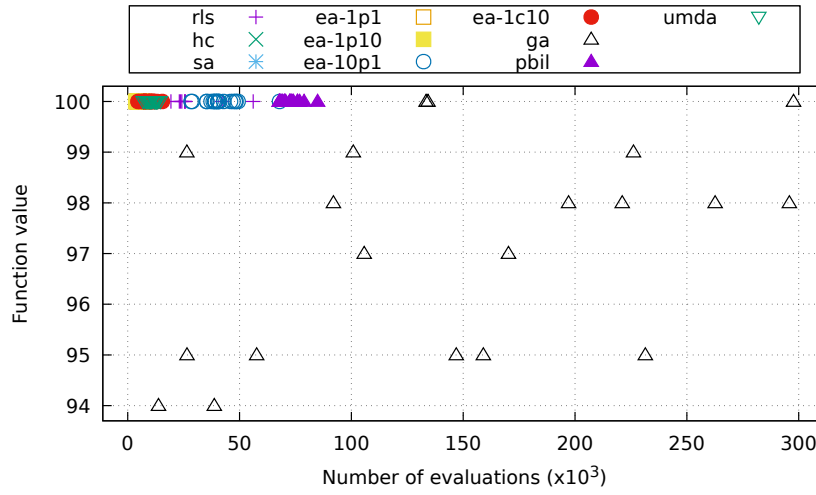


Figure 6: leading-ones

5 Function ridge

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	104	104	105	107	110	9	0.163	0.020
hc	200	200	200	200	200	1	0.004	0.005
sa	200	200	200	200	200	1	0.010	0.003
ea-lp1	200	200	200	200	200	1	0.012	0.004
ea-lp10	200	200	200	200	200	1	0.018	0.004
ea-10p1	200	200	200	200	200	1	0.202	0.026
ea-1c10	118	120	125	130	144	8	0.244	0.007
ga	102	102	103	103	104	10	1.218	0.074
pbil	152	153	154	155	156	7	1.237	0.044
umda	200	200	200	200	200	1	0.205	0.020

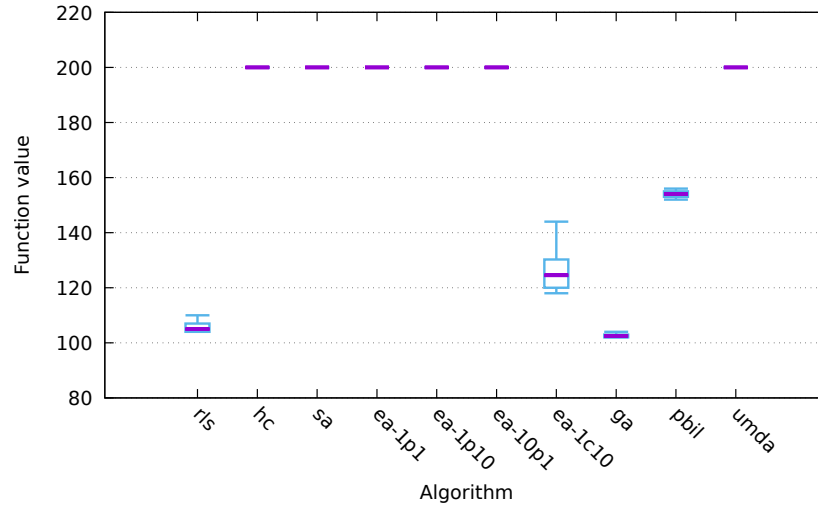


Figure 7: ridge

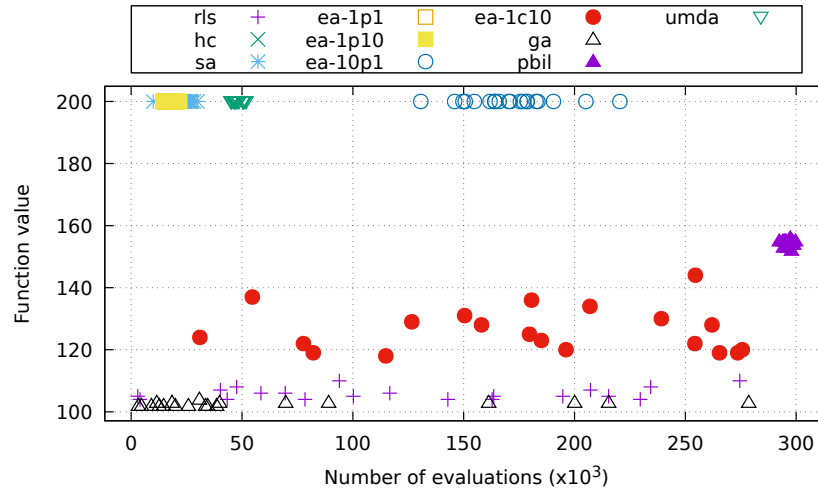


Figure 8: ridge

6 Function jmp-5

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	95	95	95	95	95	4	0.146	0.014
hc	95	95	95	95	95	4	0.125	0.011
sa	95	95	95	95	95	4	0.156	0.011
ea-lp1	95	95	95	95	95	4	0.262	0.024
ea-lp10	95	95	95	95	95	4	0.294	0.037
ea-10p1	95	95	95	95	95	4	0.376	0.085
ea-1c10	95	95	95	95	95	4	0.298	0.058
ga	100	100	100	100	100	1	0.393	0.325
pbil	100	100	100	100	100	1	0.078	0.014
umda	100	100	100	100	100	1	0.198	0.222

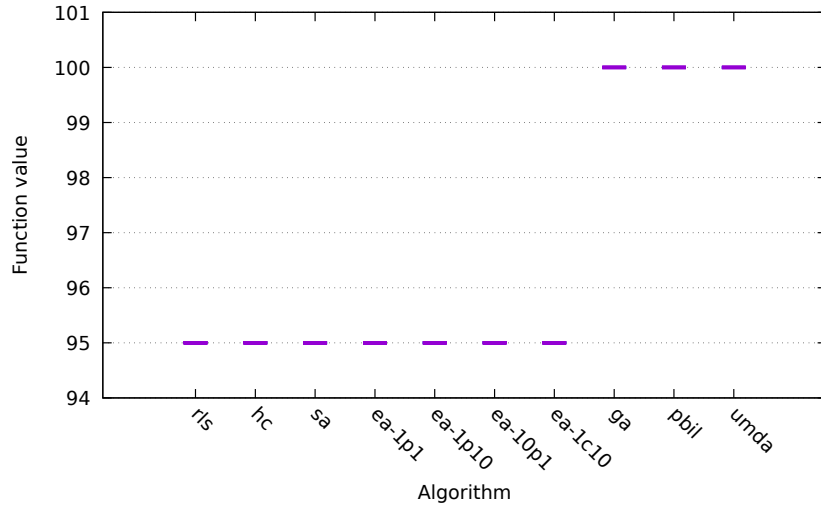


Figure 9: jmp-5

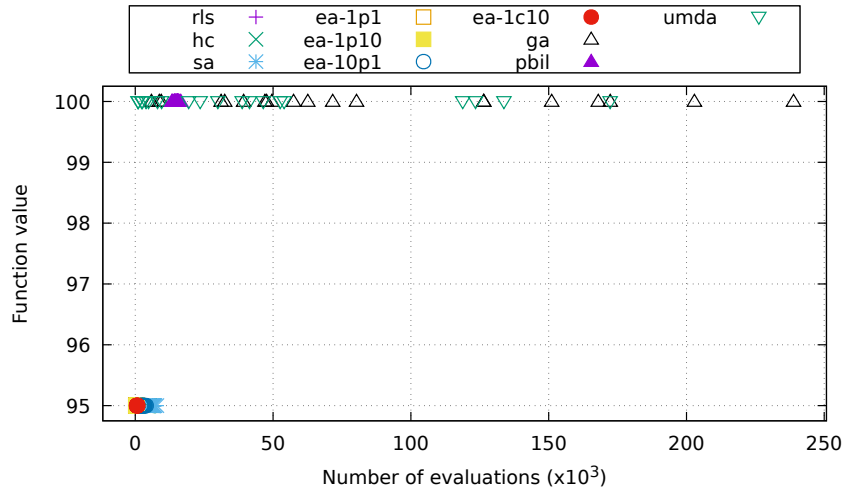


Figure 10: jmp-5

7 Function jmp-10

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	90	90	90	90	90	2	0.155	0.014
hc	90	90	90	90	90	2	0.121	0.003
sa	90	90	90	90	90	2	0.171	0.033
ea-lp1	90	90	90	90	90	2	0.284	0.058
ea-lp10	90	90	90	90	90	2	0.277	0.014
ea-10p1	90	90	90	90	90	2	0.352	0.041
ea-1c10	90	90	90	90	90	2	0.243	0.036
ga	90	90	90	90	90	2	1.192	0.047
pbil	90	90	90	100	100	1	0.939	0.502
umda	90	90	90	90	90	2	1.274	0.066

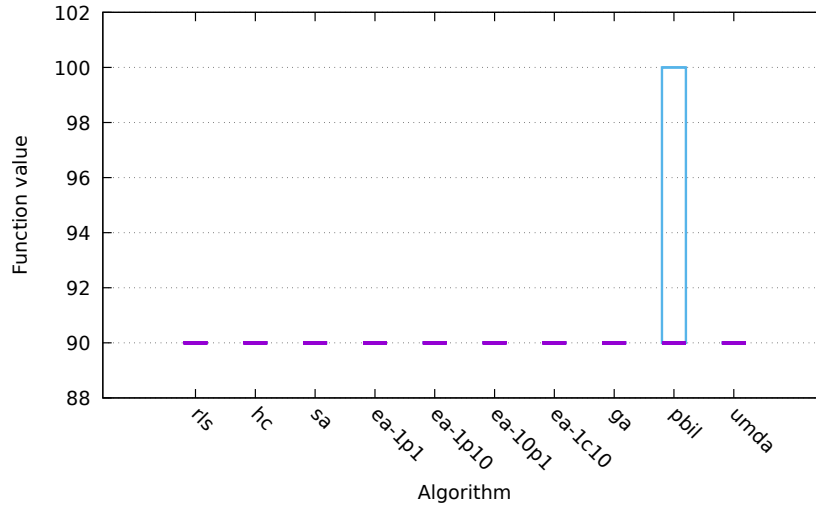


Figure 11: jmp-10

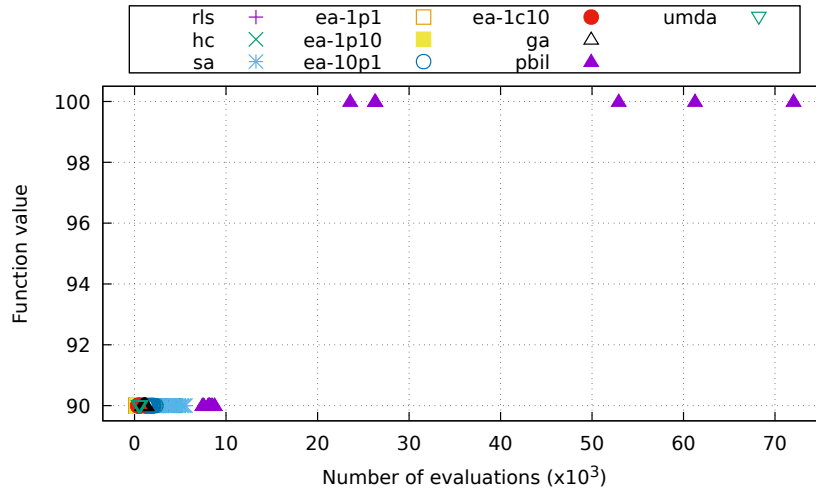


Figure 12: jmp-10

8 Function djmp-5

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	100	100	100	100	100	4	0.166	0.024
hc	100	100	100	100	100	4	0.165	0.038
sa	100	100	100	100	100	4	0.188	0.030
ea-lp1	100	100	100	100	100	4	0.354	0.076
ea-lp10	100	100	100	100	100	4	0.276	0.007
ea-10p1	100	100	100	100	100	4	0.343	0.010
ea-1c10	100	100	100	100	100	4	0.264	0.059
ga	105	105	105	105	105	1	0.542	0.396
pbil	105	105	105	105	105	1	0.079	0.019
umda	105	105	105	105	105	1	0.186	0.159

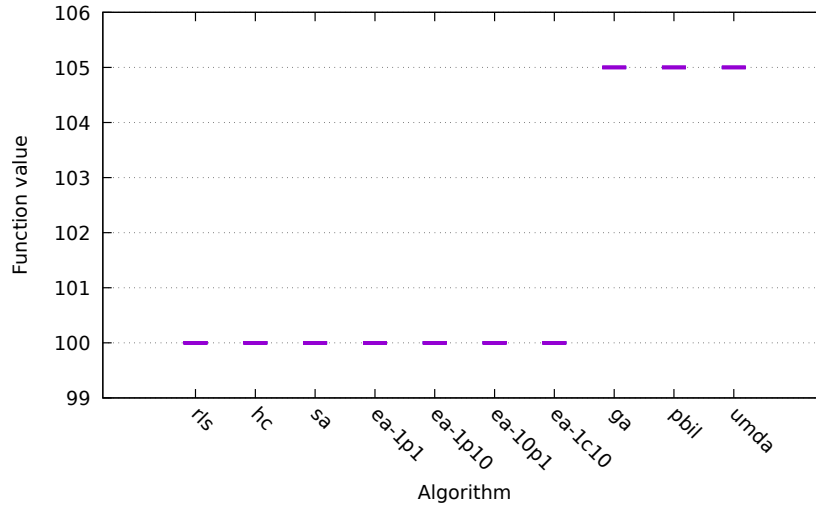


Figure 13: djmp-5

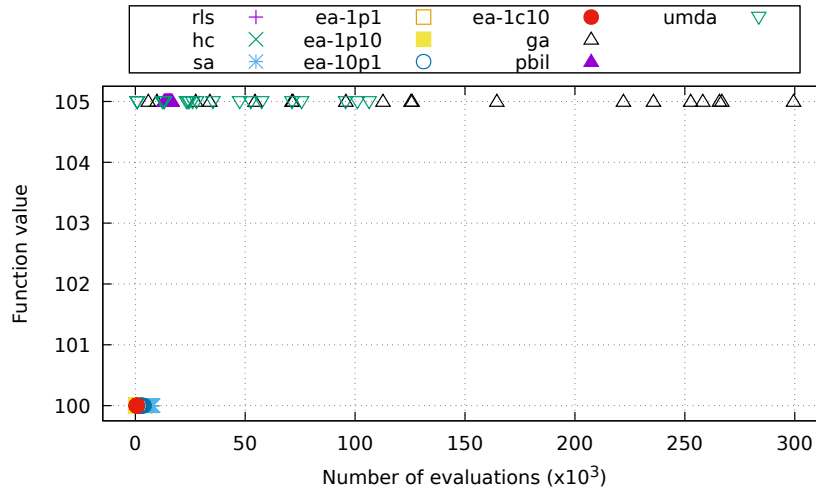


Figure 14: djmp-5

9 Function djmp-10

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	100	100	100	100	100	2	0.159	0.020
hc	100	100	100	100	100	2	0.121	0.006
sa	100	100	100	100	100	2	0.151	0.004
ea-lp1	100	100	100	100	100	2	0.252	0.009
ea-lp10	100	100	100	100	100	2	0.280	0.002
ea-10p1	100	100	100	100	100	2	0.343	0.007
ea-lc10	100	100	100	100	100	2	0.277	0.028
ga	100	100	100	100	100	2	1.404	0.090
pbil	100	100	110	110	110	1	0.597	0.588
umda	100	100	100	100	100	2	1.230	0.017

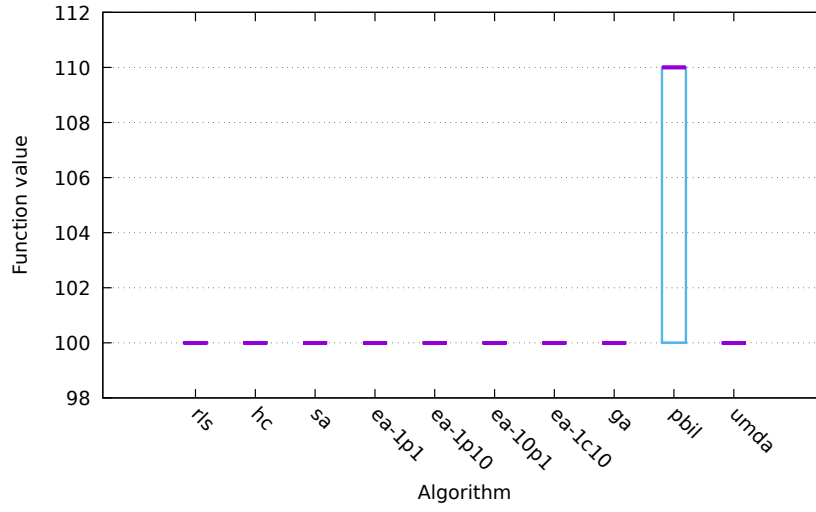


Figure 15: djmp-10

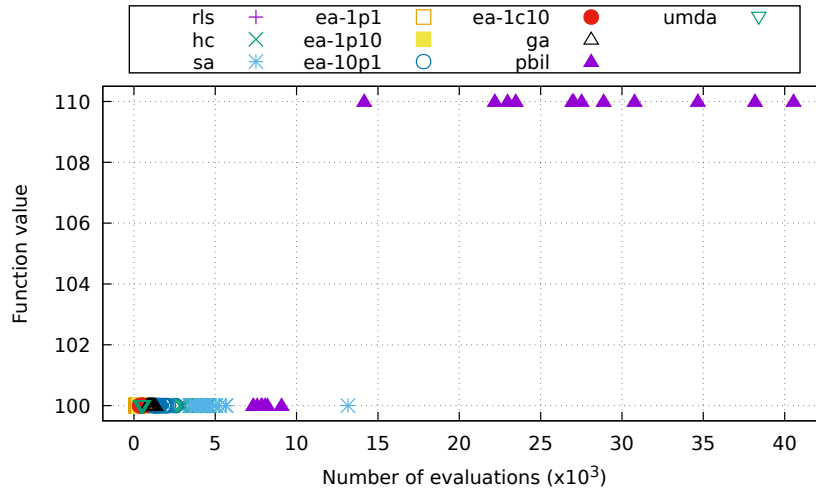


Figure 16: djmp-10

10 Function fp-5

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	194	194	194	194	194	1	0.005	0.009
hc	100	100	100	194	194	10	0.090	0.037
sa	4	100	194	194	194	8	0.058	0.065
ea-lp1	194	194	194	194	194	1	0.001	0.003
ea-lp10	100	194	194	194	194	7	0.016	0.067
ea-10p1	194	194	194	194	194	1	0.044	0.011
ea-1c10	194	194	194	194	194	1	0.005	0.005
ga	187	189	190	191	194	9	1.081	0.274
pbil	194	194	194	194	194	1	0.368	0.037
umda	194	194	194	194	194	1	0.045	0.007

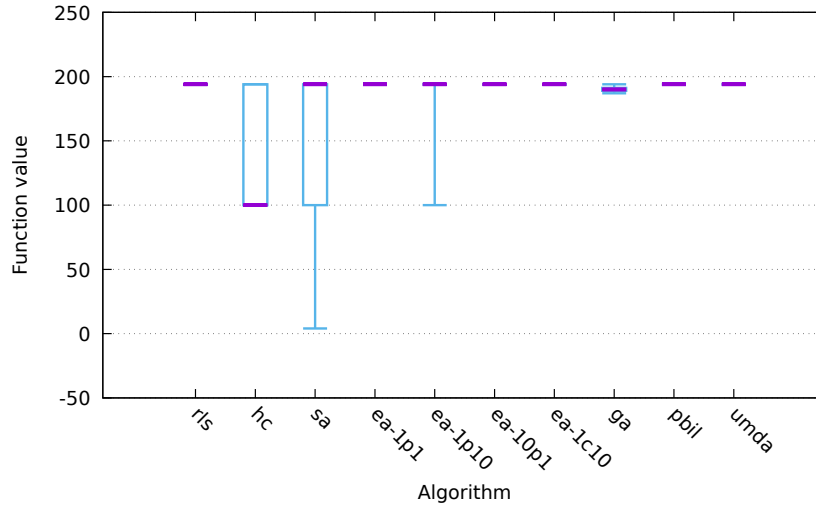


Figure 17: fp-5

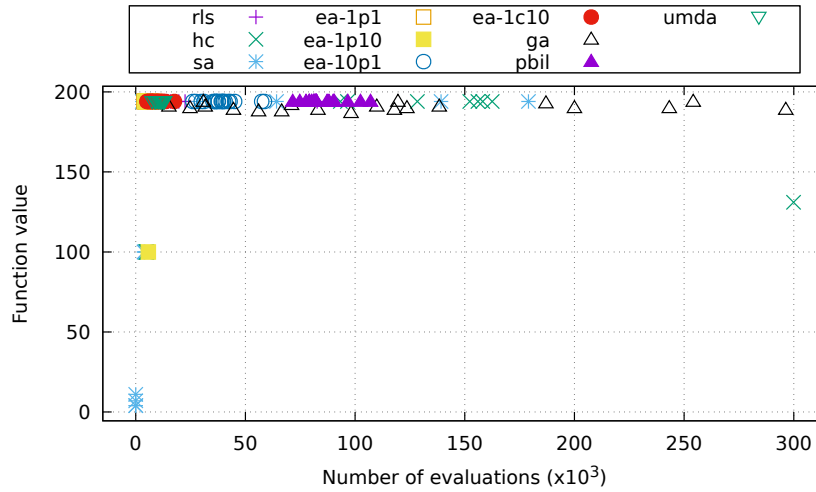


Figure 18: fp-5

11 Function fp-10

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	187	189	189	189	189	2	0.049	0.046
hc	100	100	100	100	100	10	0.120	0.000
sa	3	100	100	189	189	8	0.108	0.068
ea-lp1	100	100	100	189	189	7	0.171	0.127
ea-lp10	100	100	100	100	189	9	0.231	0.119
ea-10p1	100	189	189	189	189	3	0.080	0.090
ea-1c10	100	189	189	189	189	3	0.121	0.094
ga	182	184	186	186	189	6	1.148	0.223
pbil	189	189	189	189	189	1	0.332	0.031
umda	100	167	189	189	189	5	0.340	0.522

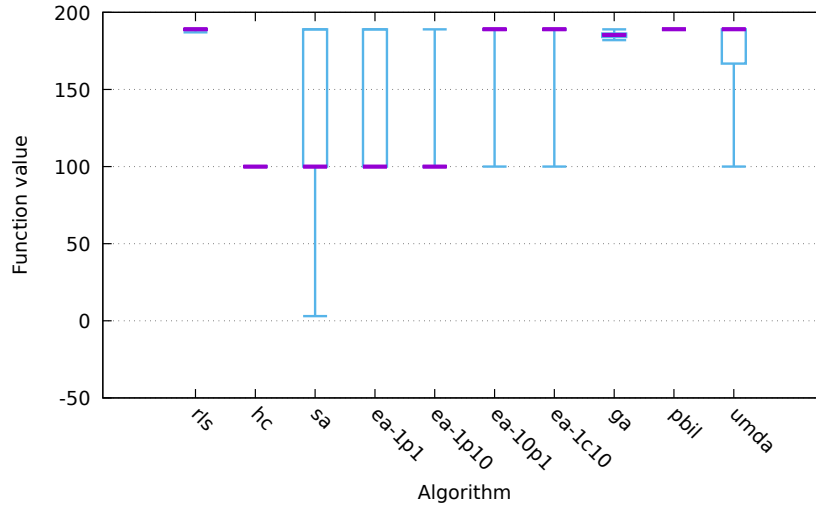


Figure 19: fp-10

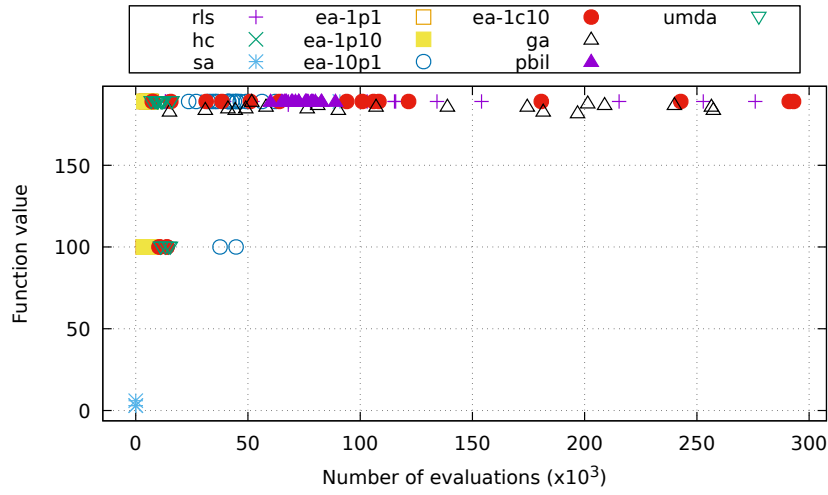


Figure 20: fp-10

12 Function nk

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	0.97	0.98	0.99	1.01	1.03	7	0.628	0.011
hc	0.96	0.97	1.00	1.02	1.05	5	0.579	0.006
sa	1.01	1.03	1.04	1.06	1.10	1	0.711	0.076
ea-1p1	0.87	0.92	0.95	0.98	1.04	8	0.887	0.046
ea-1p10	0.82	0.90	0.94	0.98	1.10	9	0.785	0.031
ea-10p1	0.95	0.98	1.00	1.01	1.06	4	0.855	0.027
ea-1c10	0.96	0.98	1.02	1.04	1.08	3	0.670	0.011
ga	0.96	1.01	1.02	1.05	1.09	2	2.092	0.152
pbil	0.92	0.98	1.00	1.01	1.05	6	1.702	0.027
umda	0.84	0.91	0.94	0.96	1.01	10	1.641	0.027

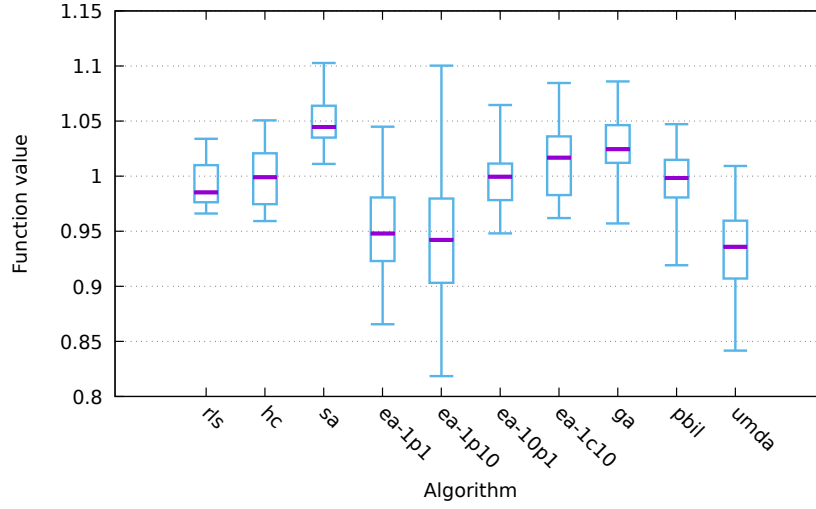


Figure 21: nk

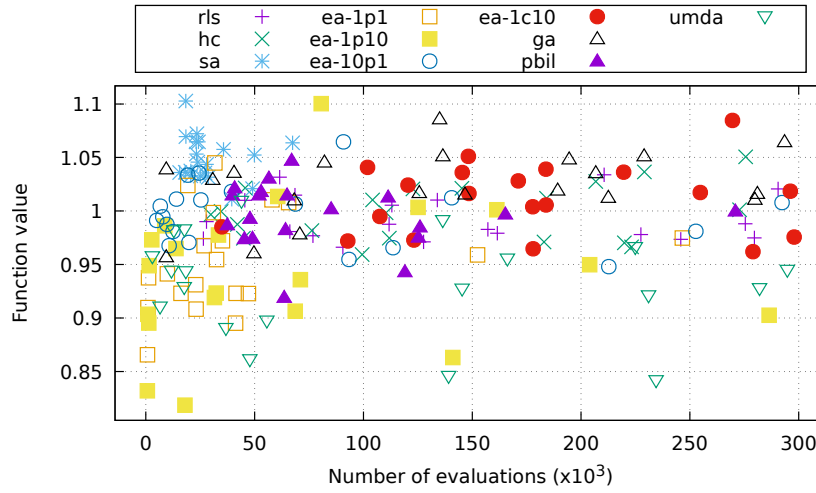


Figure 22: nk

13 Function max-sat

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	970	971	972	972	972	2	3.506	0.053
hc	964	966	967	968	971	10	3.410	0.266
sa	969	972	972	972	972	1	2.991	0.075
ea-1p1	963	965	968	970	972	8	3.502	0.350
ea-1p10	961	967	968	969	972	6	3.505	0.315
ea-10p1	960	968	969	971	972	5	4.373	0.367
ea-1c10	964	969	970	972	972	3	2.964	0.143
ga	964	968	969	972	972	4	5.350	0.132
pbil	965	967	967	967	969	9	4.618	0.347
umda	953	965	968	970	972	7	4.456	0.364

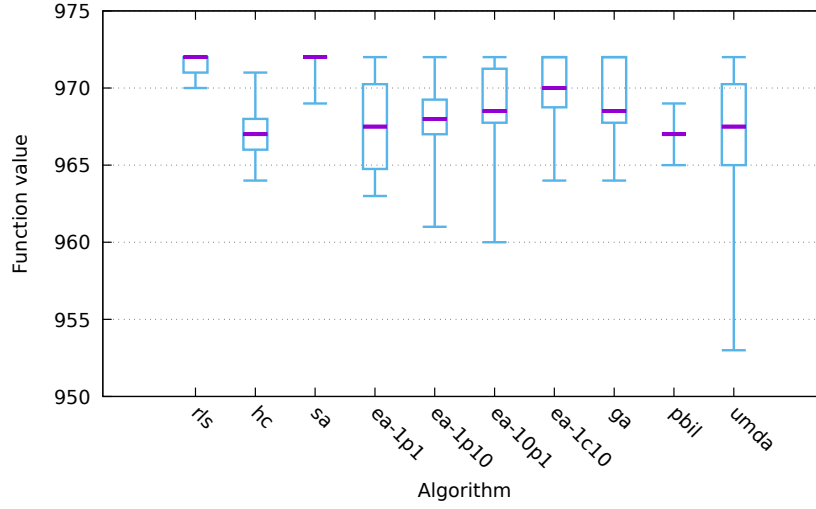


Figure 23: max-sat

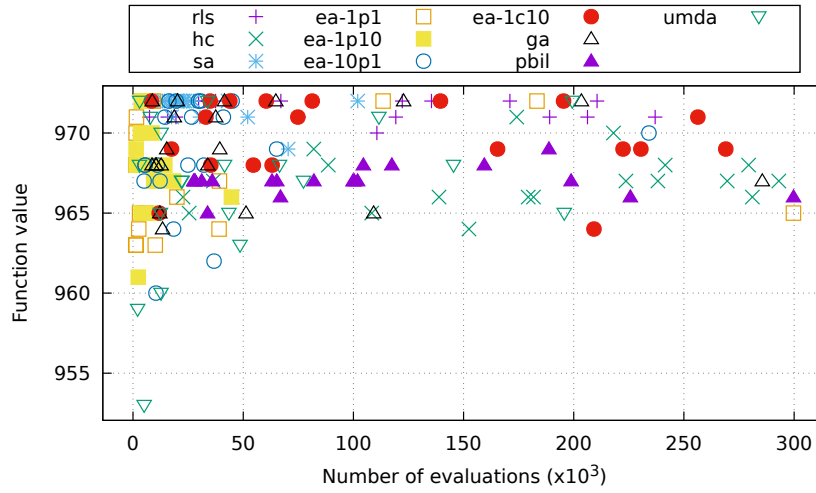


Figure 24: max-sat

14 Function labs

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	4.20	4.44	4.50	4.66	4.99	6	3.543	0.151
hc	4.50	4.60	4.69	5.00	5.45	4	3.506	0.211
sa	4.35	4.63	4.78	4.92	5.29	3	3.624	0.271
ea-1p1	3.84	4.03	4.15	4.34	4.97	8	3.546	0.312
ea-1p10	3.61	4.00	4.19	4.32	4.52	7	3.615	0.237
ea-10p1	4.33	4.55	4.65	4.75	5.26	5	3.697	0.306
ea-1c10	4.55	4.71	4.87	5.14	5.67	2	3.631	0.347
ga	4.62	4.85	4.93	5.09	5.59	1	4.508	0.409
pbil	3.14	3.85	4.04	4.19	4.35	9	4.762	0.330
umda	3.36	3.73	3.98	4.28	4.82	10	4.611	0.332

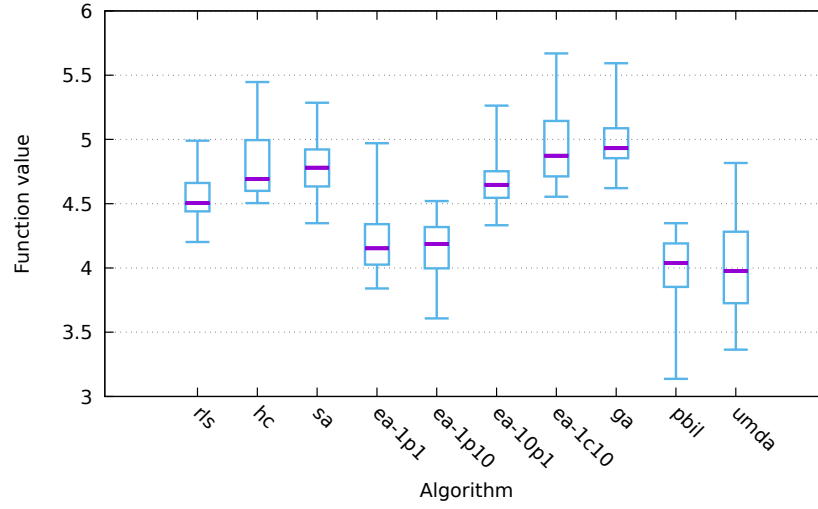


Figure 25: labs

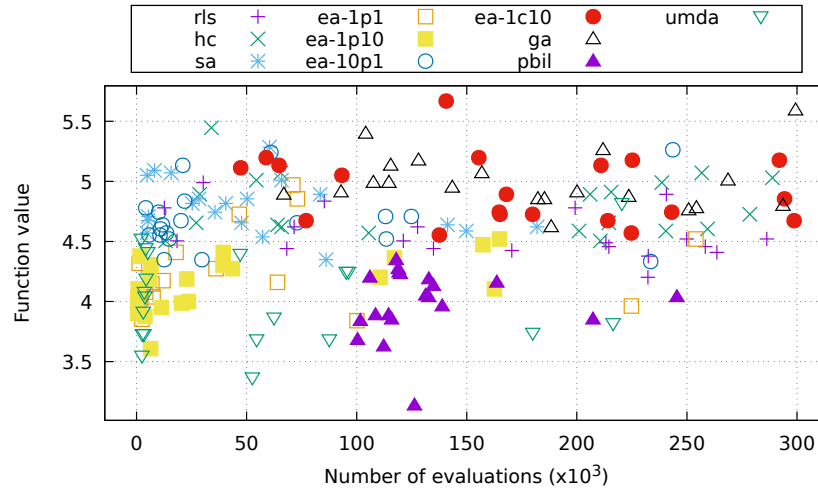


Figure 26: labs

15 Function ep

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	1.5×10^{-32}	9.9×10^{-31}	1.5×10^{-30}	2.8×10^{-30}	9.3×10^{-30}	1	0.206	0.005
hc	1.3×10^{-31}	2.1×10^{-30}	3.7×10^{-30}	8.4×10^{-30}	1.2×10^{-29}	3	0.160	0.000
sa	4.2×10^{-31}	3.6×10^{-30}	4.5×10^{-30}	9.3×10^{-30}	2.9×10^{-25}	5	0.184	0.011
ea-1p1	2.1×10^{-31}	6.9×10^{-30}	1.4×10^{-29}	1.7×10^{-29}	5.0×10^{-29}	8	0.292	0.006
ea-1p10	2.6×10^{-31}	7.3×10^{-30}	3.0×10^{-29}	4.2×10^{-29}	6.8×10^{-29}	10	0.324	0.005
ea-10p1	8.0×10^{-31}	4.0×10^{-30}	7.3×10^{-30}	1.1×10^{-29}	2.1×10^{-29}	6	0.404	0.010
ea-1c10	4.0×10^{-31}	2.1×10^{-30}	7.3×10^{-30}	1.2×10^{-29}	2.2×10^{-29}	7	0.351	0.006
ga	2.7×10^{-31}	1.5×10^{-30}	2.4×10^{-30}	3.4×10^{-30}	1.4×10^{-29}	2	1.493	0.115
pbil	4.6×10^{-31}	2.0×10^{-30}	4.4×10^{-30}	8.6×10^{-30}	2.1×10^{-29}	4	1.457	0.038
umda	1.4×10^{-30}	1.3×10^{-29}	2.6×10^{-29}	5.5×10^{-29}	1.4×10^{-28}	9	1.248	0.019

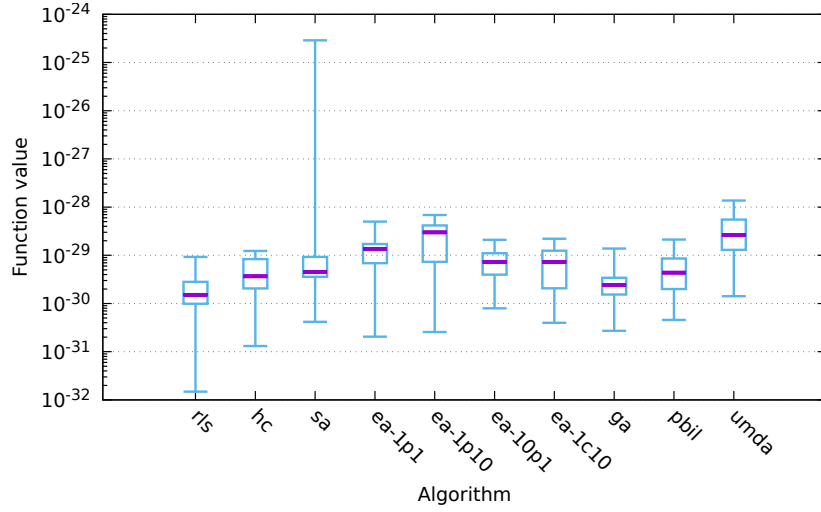


Figure 27: ep

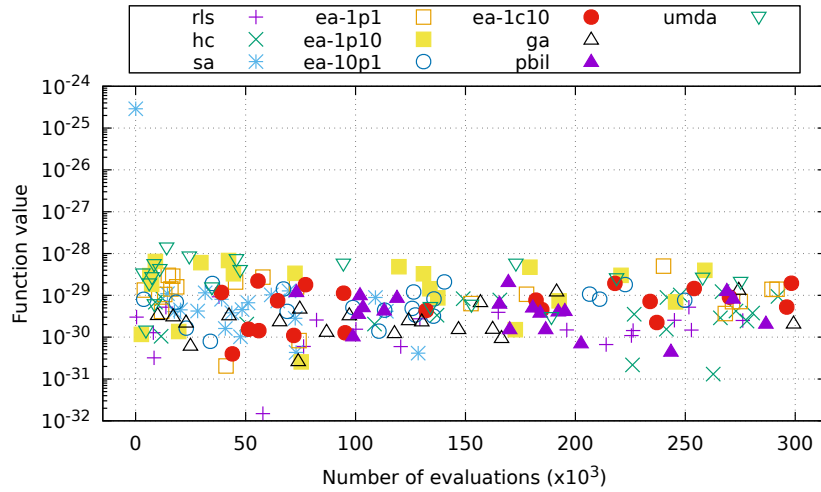


Figure 28: ep

16 Function cancel

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	0.72	1.35	1.52	1.79	2.39	8	0.187	0.005
hc	1.29	1.52	2.03	2.21	2.68	9	0.198	0.007
sa	0.11	1.61	2.29	2.60	2.95	10	0.240	0.000
ea-1p1	0.05	0.25	0.74	1.04	1.65	6	0.379	0.015
ea-1p10	0.05	0.33	0.50	0.88	2.05	3	0.360	0.008
ea-10p1	0.05	0.20	0.37	0.73	1.67	2	0.427	0.016
ea-1c10	0.07	0.34	0.69	0.96	2.61	4	0.271	0.002
ga	0.06	0.39	0.69	1.33	2.64	5	1.222	0.023
pbil	0.05	0.06	0.07	0.11	1.31	1	1.300	0.023
umda	0.16	1.01	1.44	1.73	2.93	7	1.284	0.087

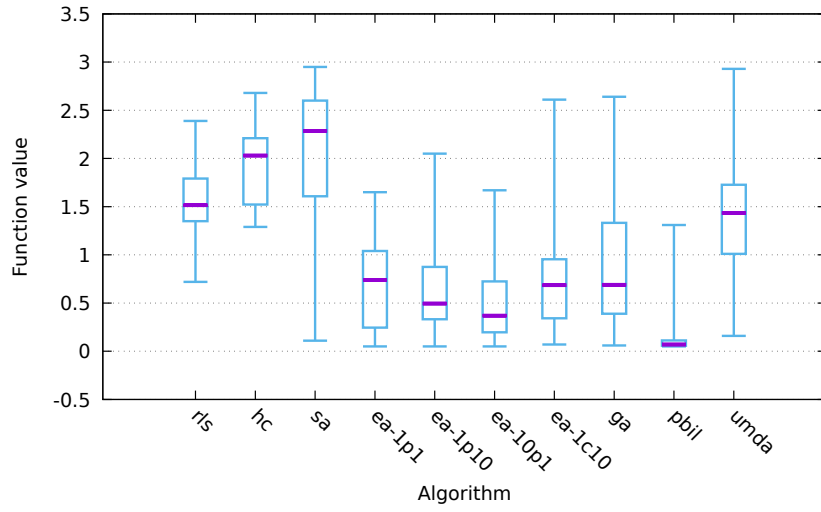


Figure 29: cancel

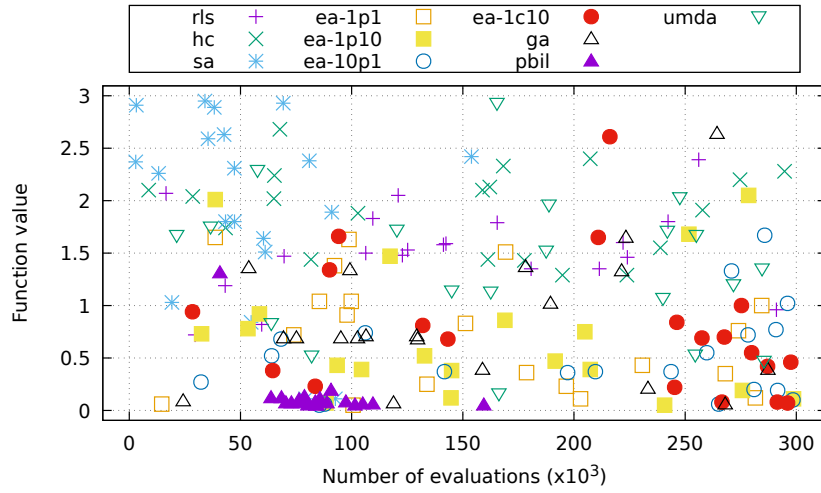


Figure 30: cancel

17 Function trap

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	90	91	91	91	92	2	0.231	0.008
hc	91	91	91	92	92	1	0.199	0.004
sa	90	90	90	90	91	3	0.231	0.014
ea-lp1	90	90	90	90	90	7	0.333	0.005
ea-lp10	90	90	90	90	91	3	0.351	0.003
ea-10p1	90	90	90	90	91	3	0.394	0.007
ea-1c10	90	90	90	90	90	7	0.269	0.004
ga	90	90	90	90	91	3	1.208	0.017
pbil	90	90	90	90	90	7	1.457	0.142
umda	90	90	90	90	90	7	1.318	0.071

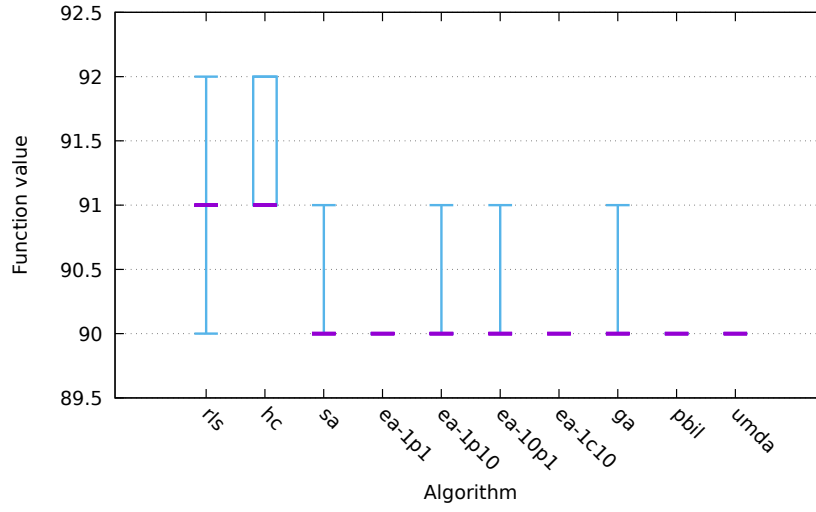


Figure 31: trap

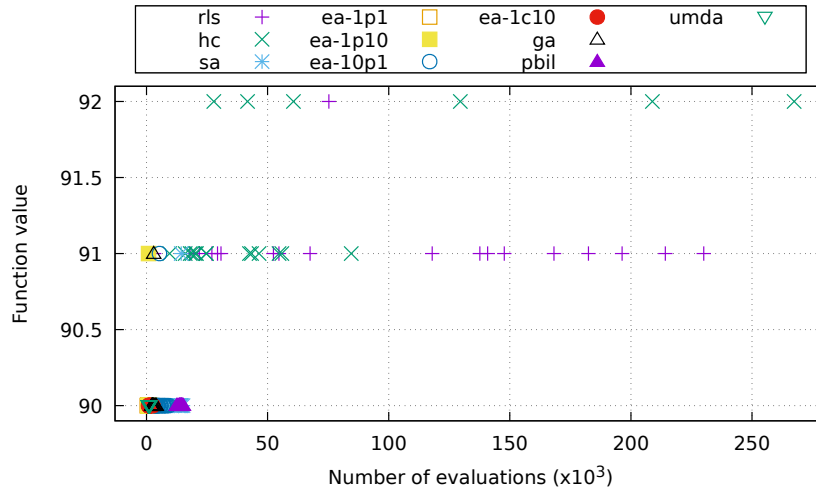


Figure 32: trap

18 Function hiff

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	400	410	415	428	464	10	0.511	0.006
hc	472	487	498	510	540	8	0.489	0.007
sa	640	672	704	752	832	2	0.639	0.016
ea-1p1	448	470	492	520	568	9	0.668	0.010
ea-1p10	432	478	504	530	576	6	0.706	0.022
ea-10p1	544	640	704	736	832	3	0.992	0.097
ea-1c10	600	632	656	682	776	4	0.772	0.016
ga	708	720	770	776	832	1	1.869	0.030
pbil	476	520	544	578	648	5	2.237	0.171
umda	440	484	502	524	560	7	1.904	0.034

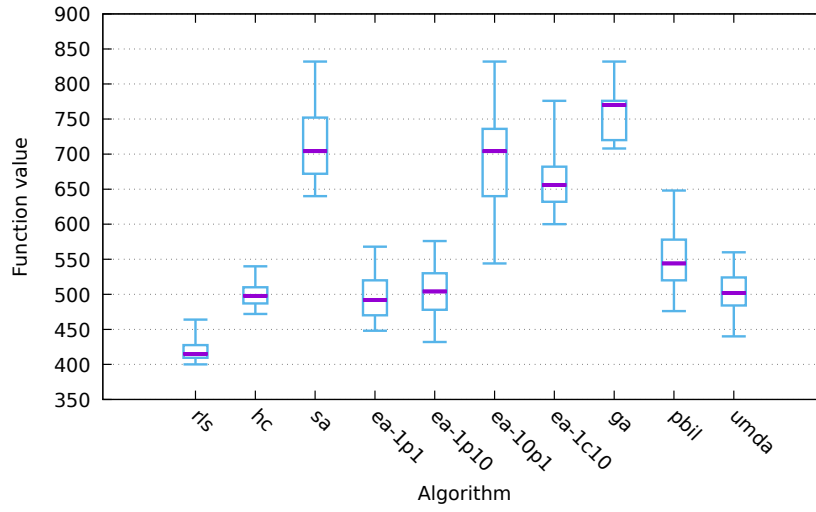


Figure 33: hiff

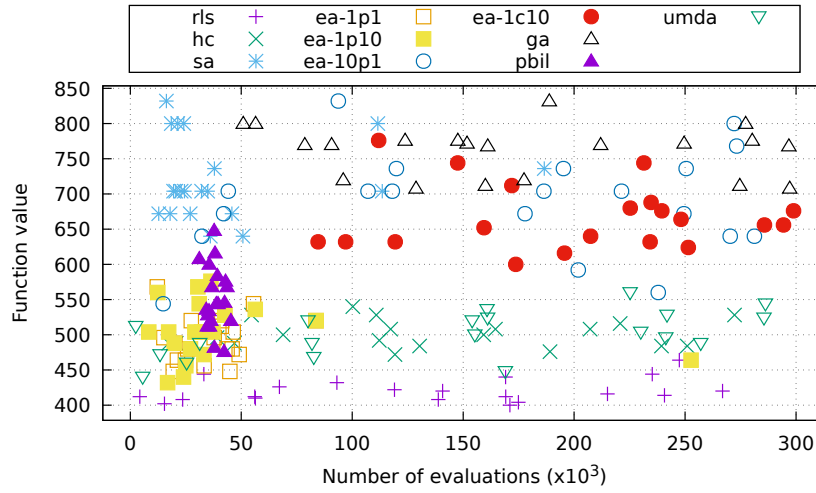


Figure 34: hiff

19 Function plateau

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	101	101	101	101	101	4	0.149	0.003
hc	101	101	101	101	101	4	0.127	0.005
sa	101	101	101	101	102	1	0.172	0.039
ea-lp1	101	101	101	101	102	3	0.331	0.054
ea-lp10	101	101	101	101	102	1	0.345	0.069
ea-10p1	101	101	101	101	101	4	0.400	0.010
ea-1c10	101	101	101	101	101	4	0.278	0.004
ga	101	101	101	101	101	4	1.212	0.033
pbil	101	101	101	101	101	4	1.237	0.023
umda	101	101	101	101	101	4	1.209	0.017

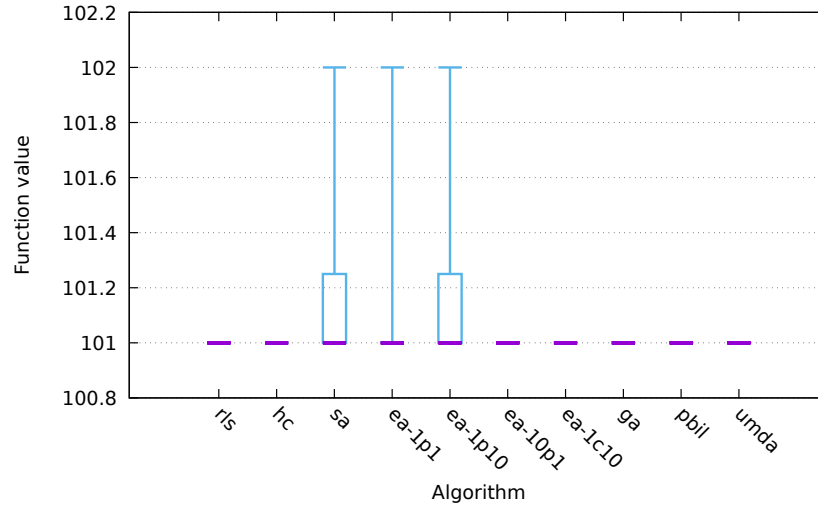


Figure 35: plateau

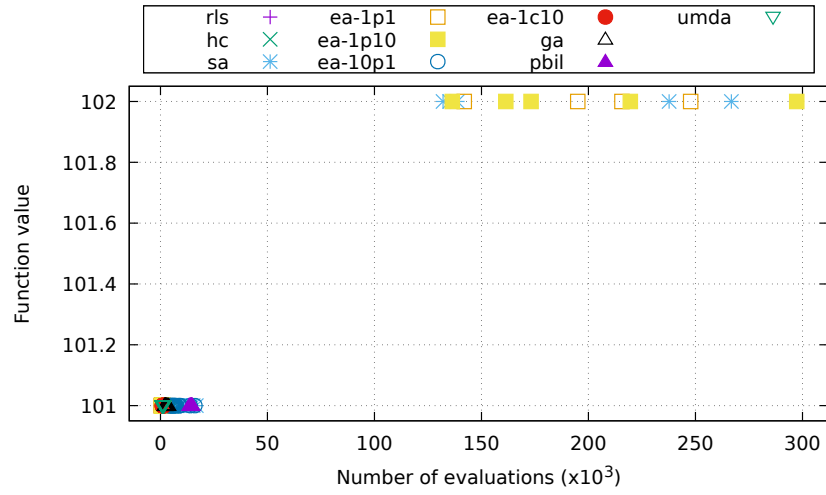


Figure 36: plateau

20 Function walsh2

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	694.42	700.64	706.00	712.74	720.04	3	3.347	0.208
hc	700.78	709.84	714.58	720.39	721.22	2	3.033	0.119
sa	698.68	713.69	716.97	720.24	721.22	1	3.534	0.217
ea-1p1	611.34	651.46	673.43	688.51	705.43	7	3.624	0.200
ea-1p10	596.31	649.75	669.56	688.04	716.57	8	3.587	0.172
ea-10p1	653.24	686.42	696.83	703.15	715.23	6	4.125	0.303
ea-1c10	658.55	688.13	703.12	714.08	720.24	4	3.353	0.119
ga	682.78	698.23	702.22	713.69	721.22	5	5.147	0.149
pbil	623.15	659.15	664.80	686.26	710.76	10	4.595	0.175
umda	604.84	646.33	667.65	682.12	699.03	9	4.272	0.163

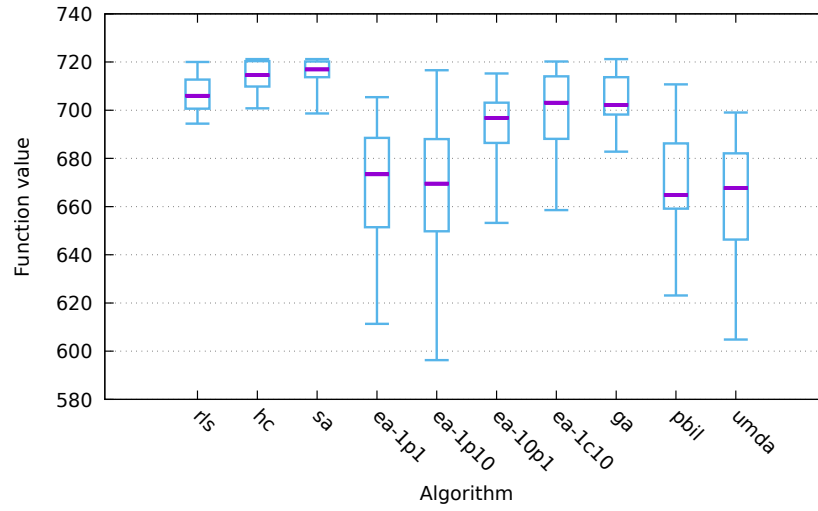


Figure 37: walsh2

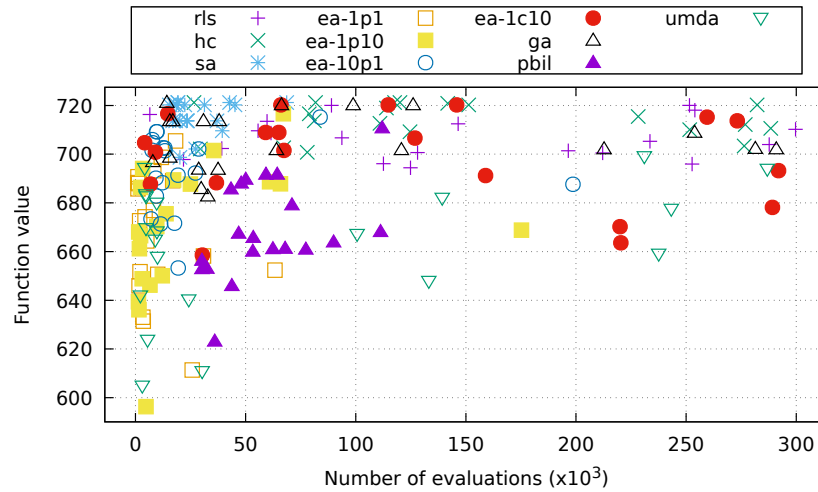


Figure 38: walsh2

A Plan

```
{
  "exec": "hnco",
  "opt": "--print-performance --map 1 --map-random -s 100 -i 0",
}
```

```

"budget": 300000,
"num_runs": 20,
"parallel": true,
"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",
    "col": ">{\{\nprounddigits{0}\}\}N{3}{0}"
  }
]

```

```

},
{
  "id": "labs",
  "opt": "-F 81",
  "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 --fn-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",
  "col": ">{\{\nprounddigits{2}\}\}N{3}{2}"
}
],
"algorithms": [
  {
    "id": "rls",
    "opt": "-A 100 --restart"
  },
  {
    "id": "hc",
    "opt": "-A 150 --restart"
  },
  {
    "id": "sa",
    "opt": "-A 200 --sa-beta-ratio 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 --allow-stay"
    },
    {
        "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
# cache_budget = 0
# ea_lambda = 100
# ea_mu = 10
# fn_name = noname
# fn_num_traps = 10
# fn_prefix_length = 2
# fn_threshold = 10
# function = 0
# ga_crossover_bias = 0.5
# 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
# mutation_probability = 1
# neighborhood = 0
# neighborhood_iterator = 0
# noise_stddev = 1
# num_iterations = 0
# num_threads = 1
# path = nopath
# pn_mutation_probability = 1

```



```
# pn_neighborhood = 0
# pn_radius = 2
# population_size = 10
# pv_log_num_components = 5
# radius = 2
# rls_patience = 50
# sa_beta_ratio = 1.2
# sa_initial_acceptance_probability = 0.6
# sa_num_transitions = 50
# sa_num_trials = 100
# seed = 0
# selection_size = 1
# target = 100
# print_defaults
# last_parameter
# exec_name = hnco
# version = 0.10
# Generated from hnco.json
```