HNCO
Comparison of various black box optimization algorithms

October 26, 2018

Contents

1 Ranking

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

one-max: (sa, ga, umda, ea-1p1, ea-1p10, pbil, ea-1c10, rls, ea-10p1, hc)
lin: (rls, ea-1c10, pbil, hc, ea-10p1, ga, umda, ea-1p1, sa, ea-1p10)
leading-ones: (hc, ea-10p1, pbil, rls, ea-1c10, ea-1p10, sa, umda, ea-1p1), ga
ridge: (ea-1p1, umda, sa, ea-1p10, hc, ea-10p1), pbil, ea-1c10, rls, ga
jmp-5: (umda, ga, pbil), (ea-1p10, ea-1p1, sa, hc, ea-10p1, ea-1c10, rls)
jmp-10: pbil, (ga, umda, ea-1p1, sa, ea-1p10, ea-1c10, rls, ea-10p1, hc)
djmp-5: (umda, ga, pbil), (ea-1p1, sa, ea-1p10, rls, ea-1c10, ea-10p1, hc)
djmp-10: pbil, (ea-1p10, umda, ga, ea-1p1, sa, ea-10p1, hc, ea-1c10, rls)
fp-5: (ea-1p1, umda, pbil, ea-1c10, rls, ea-10p1), ea-1p10, sa, ga, hc
fp-10: pbil, rls, (ea-1c10, ea-10p1), umda, ga, ea-1p1, sa, ea-1p10, hc
nk: sa, ga, ea-1c10, ea-10p1, hc, pbil, rls, ea-1p1, ea-1p10, umda
max-sat: sa, rls, ea-1c10, ga, ea-10p1, ea-1p10, umda, ea-1p1, pbil, hc
labs: ga, ea-1c10, sa, hc, ea-10p1, rls, ea-1p10, ea-1p1, pbil, umda
ep: rls, ga, hc, pbil, sa, ea-10p1, ea-1c10, ea-1p1, umda, ea-1p10
cancel: pbil, ea-10p1, ea-1p10, ea-1c10, ga, ea-1p1, umda, rls, hc, sa
trap: hc, rls, (ga, sa, ea-1p10, ea-10p1), (umda, ea-1p1, ea-1c10, pbil)
hiff: ga, sa, ea-10p1, ea-1c10, pbil, ea-1p10, umda, hc, ea-1p1, rls
plateau: (ea-1p10, sa), ea-1p1, (hc, ea-10p1, pbil, ea-1c10, rls, ga, umda)
walsh2: sa, hc, rls, ea-1c10, ga, ea-10p1, ea-1p1, ea-1p10, umda, pbil

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	0.00	0.00
hc	100	100	100	100	100	1	0.00	0.00
sa	100	100	100	100	100	1	0.00	0.00
ea-1p1	100	100	100	100	100	1	0.00	0.00
ea-1p10	100	100	100	100	100	1	0.00	0.00
ea-10p1	100	100	100	100	100	1	0.01	0.01
ea-1c10	100	100	100	100	100	1	0.00	0.00
ga	100	100	100	100	100	1	0.01	0.00
pbil	100	100	100	100	100	1	0.06	0.01
umda	100	100	100	100	100	1	0.00	0.00
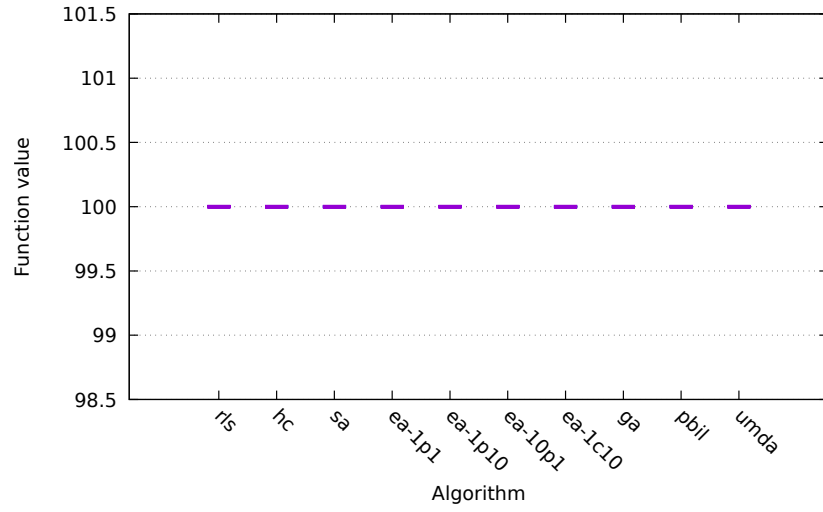
Figure 1: one-max
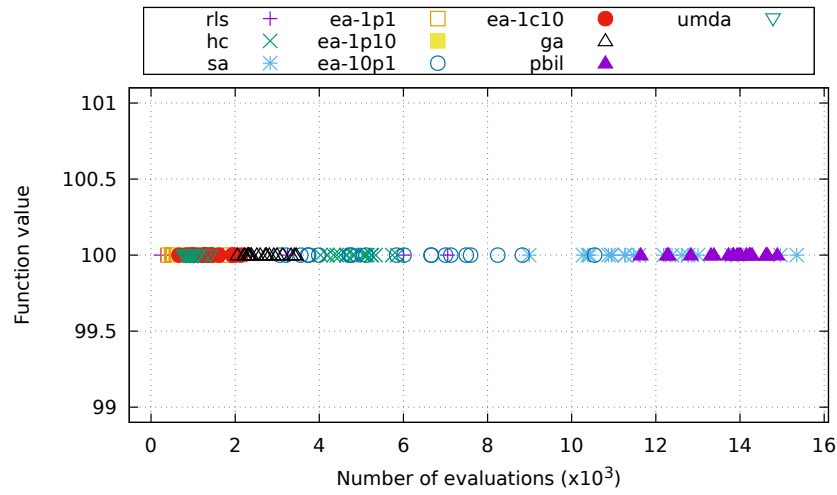
Figure 2: one-max

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	0.19	0.01
hc	45.03	45.03	45.03	45.03	45.03	1	0.16	0.01
sa	45.03	45.03	45.03	45.03	45.03	1	0.18	0.01
ea-1p1	45.03	45.03	45.03	45.03	45.03	1	0.29	0.01
ea-1p10	45.03	45.03	45.03	45.03	45.03	1	0.31	0.01
ea-10p1	45.03	45.03	45.03	45.03	45.03	1	0.39	0.03
ea-1c10	45.03	45.03	45.03	45.03	45.03	1	0.26	0.00
ga	45.03	45.03	45.03	45.03	45.03	1	1.23	0.02
pbil	45.03	45.03	45.03	45.03	45.03	1	1.25	0.02
umda	45.03	45.03	45.03	45.03	45.03	1	1.24	0.04
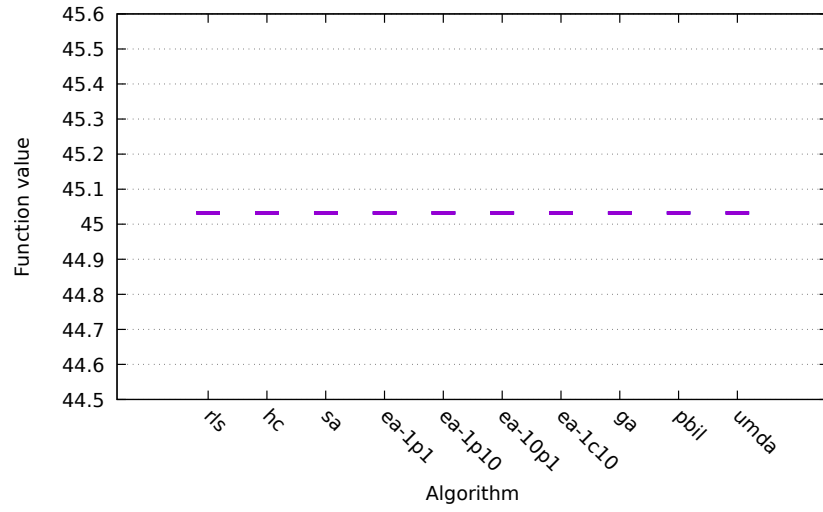
Figure 3: lin
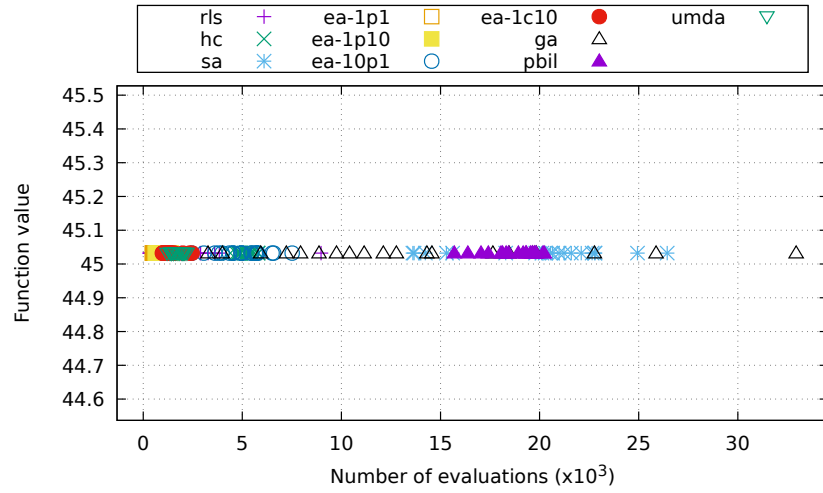
Figure 4: lin

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	0.01	0.01
hc	100	100	100	100	100	1	0.00	0.00
sa	100	100	100	100	100	1	0.00	0.00
ea-1p1	100	100	100	100	100	1	0.01	0.01
ea-1p10	100	100	100	100	100	1	0.00	0.00
ea-10p1	100	100	100	100	100	1	0.05	0.01
ea-1c10	100	100	100	100	100	1	0.01	0.01
ga	94	95	98	99	100	10	1.29	0.25
pbil	100	100	100	100	100	1	0.39	0.05
umda	100	100	100	100	100	1	0.05	0.01
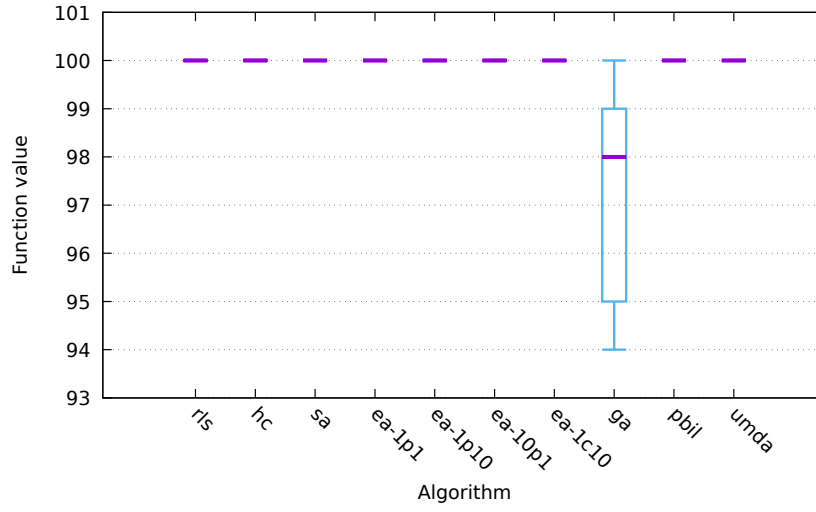
Figure 5: leading-ones
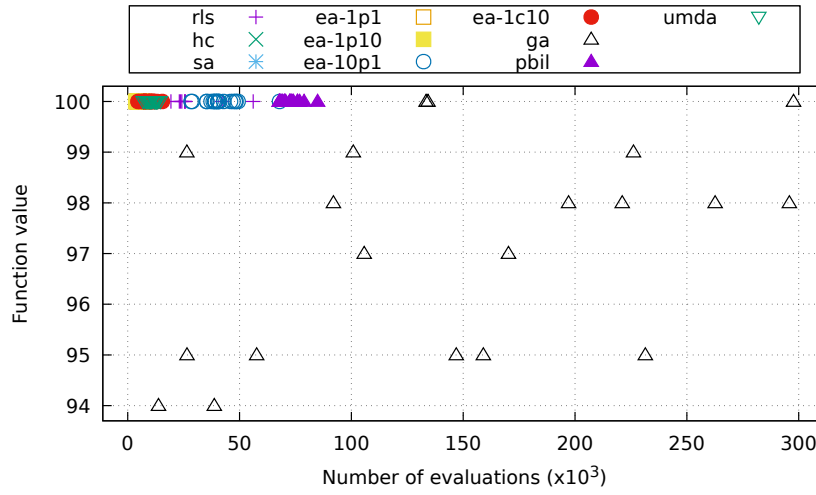
Figure 6: leading-ones

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	0.16	0.02
hc	200	200	200	200	200	1	0.00	0.01
sa	200	200	200	200	200	1	0.01	0.00
ea-1p1	200	200	200	200	200	1	0.01	0.00
ea-1p10	200	200	200	200	200	1	0.02	0.00
ea-10p1	200	200	200	200	200	1	0.20	0.03
ea-1c10	118	120	125	130	144	8	0.24	0.01
ga	102	102	103	103	104	10	1.22	0.07
pbil	152	153	154	155	156	7	1.24	0.04
umda	200	200	200	200	200	1	0.20	0.02
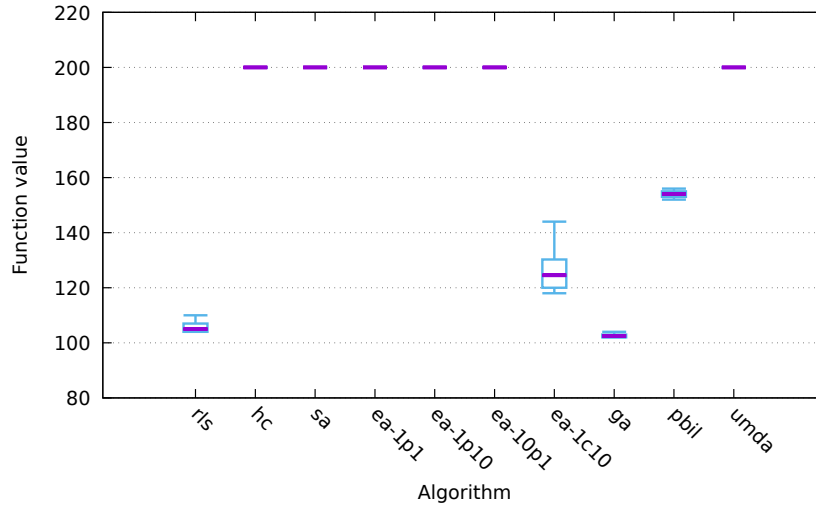
Figure 7: ridge
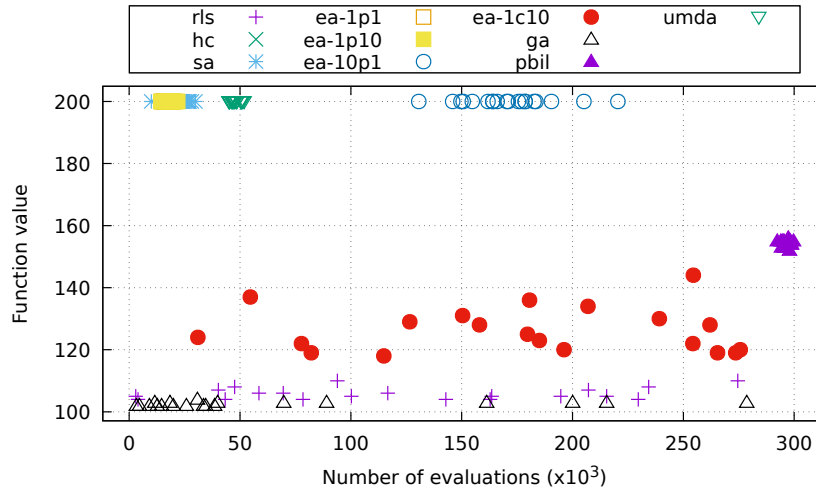
Figure 8: ridge

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	0.15	0.01
hc	95	95	95	95	95	4	0.13	0.01
sa	95	95	95	95	95	4	0.16	0.01
ea-1p1	95	95	95	95	95	4	0.26	0.02
ea-1p10	95	95	95	95	95	4	0.29	0.04
ea-10p1	95	95	95	95	95	4	0.38	0.09
ea-1c10	95	95	95	95	95	4	0.30	0.06
ga	100	100	100	100	100	1	0.39	0.33
pbil	100	100	100	100	100	1	0.08	0.01
umda	100	100	100	100	100	1	0.20	0.22
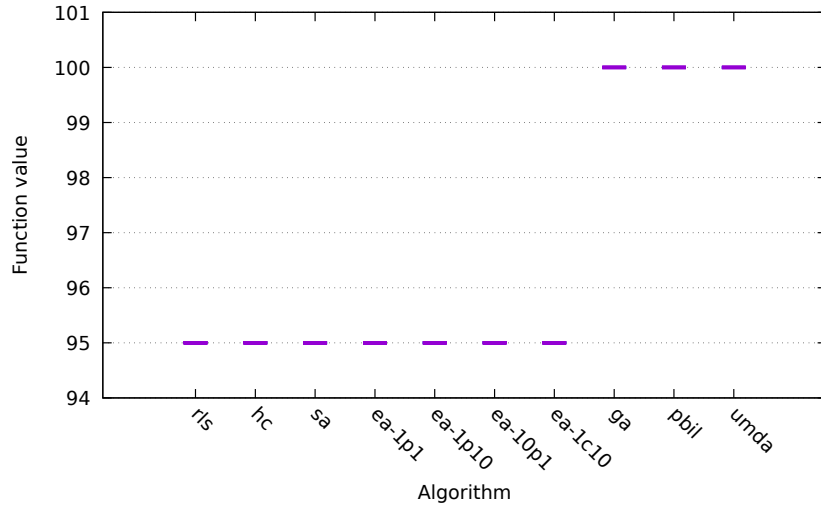
Figure 9: jmp-5
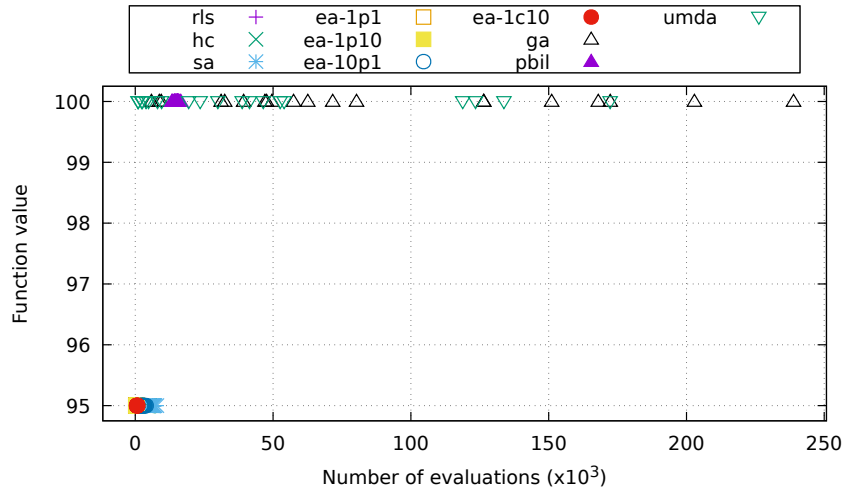
Figure 10: jmp-5

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	0.16	0.01
hc	90	90	90	90	90	2	0.12	0.00
sa	90	90	90	90	90	2	0.17	0.03
ea-1p1	90	90	90	90	90	2	0.28	0.06
ea-1p10	90	90	90	90	90	2	0.28	0.01
ea-10p1	90	90	90	90	90	2	0.35	0.04
ea-1c10	90	90	90	90	90	2	0.24	0.04
ga	90	90	90	90	90	2	1.19	0.05
pbil	90	90	90	100	100	1	0.94	0.50
umda	90	90	90	90	90	2	1.27	0.07
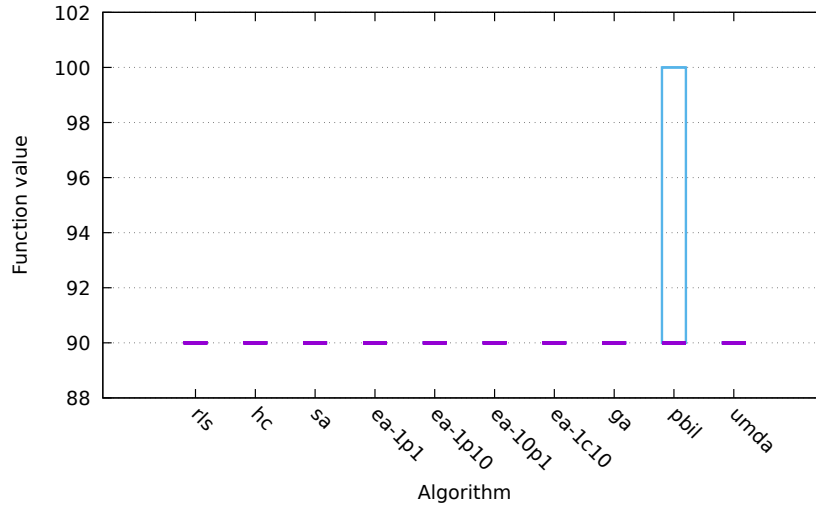
Figure 11: jmp-10
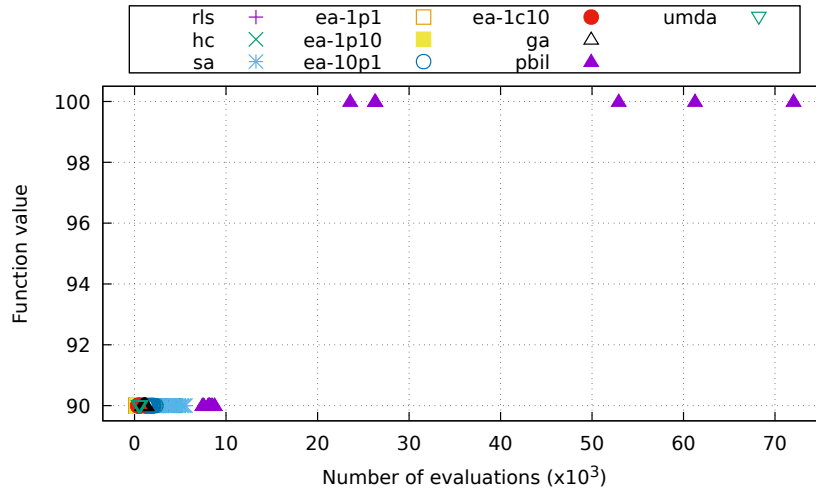
Figure 12: jmp-10

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	0.17	0.02
hc	100	100	100	100	100	4	0.16	0.04
sa	100	100	100	100	100	4	0.19	0.03
ea-1p1	100	100	100	100	100	4	0.35	0.08
ea-1p10	100	100	100	100	100	4	0.28	0.01
ea-10p1	100	100	100	100	100	4	0.34	0.01
ea-1c10	100	100	100	100	100	4	0.26	0.06
ga	105	105	105	105	105	1	0.54	0.40
pbil	105	105	105	105	105	1	0.08	0.02
umda	105	105	105	105	105	1	0.19	0.16
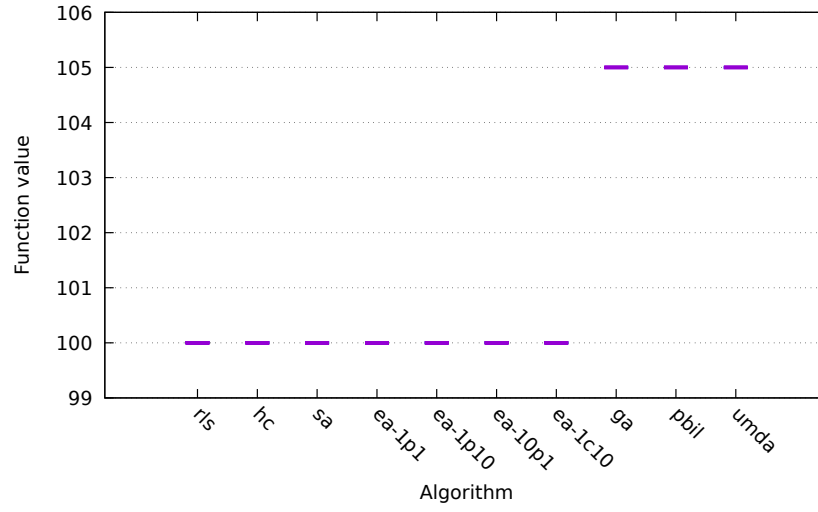
Figure 13: djmp-5
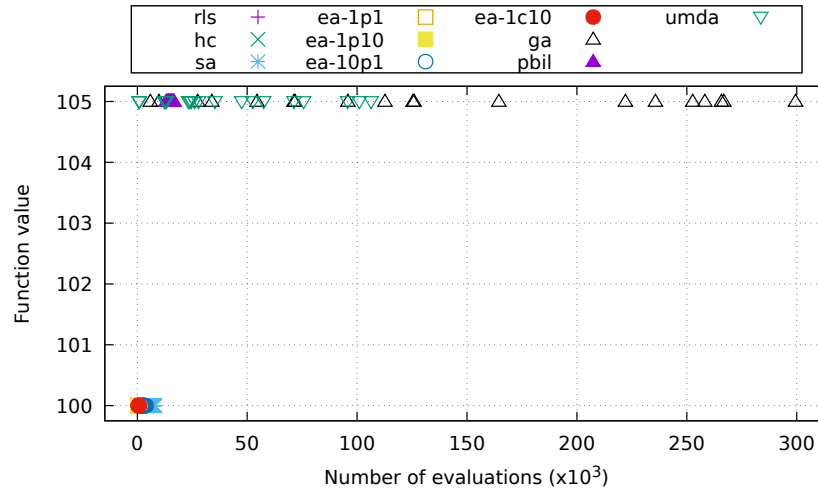
Figure 14: djmp-5

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	0.16	0.02
hc	100	100	100	100	100	2	0.12	0.01
sa	100	100	100	100	100	2	0.15	0.00
ea-1p1	100	100	100	100	100	2	0.25	0.01
ea-1p10	100	100	100	100	100	2	0.28	0.00
ea-10p1	100	100	100	100	100	2	0.34	0.01
ea-1c10	100	100	100	100	100	2	0.28	0.03
ga	100	100	100	100	100	2	1.40	0.09
pbil	100	100	110	110	110	1	0.60	0.59
umda	100	100	100	100	100	2	1.23	0.02
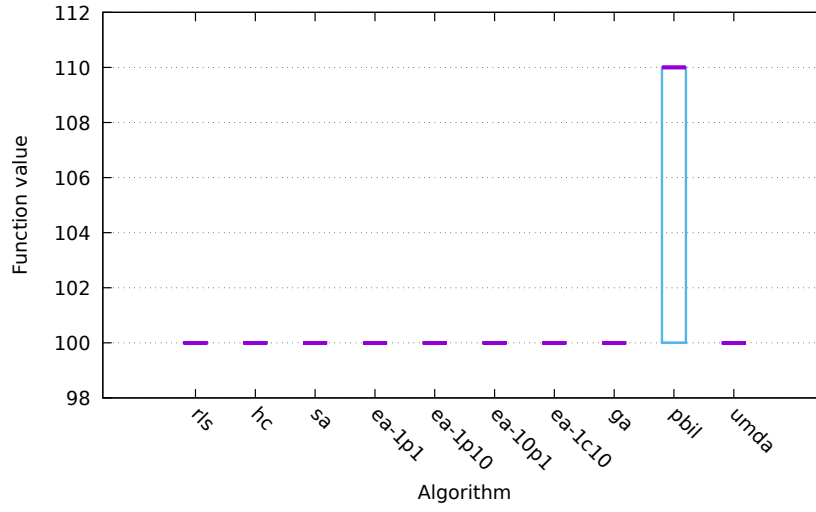
Figure 15: djmp-10
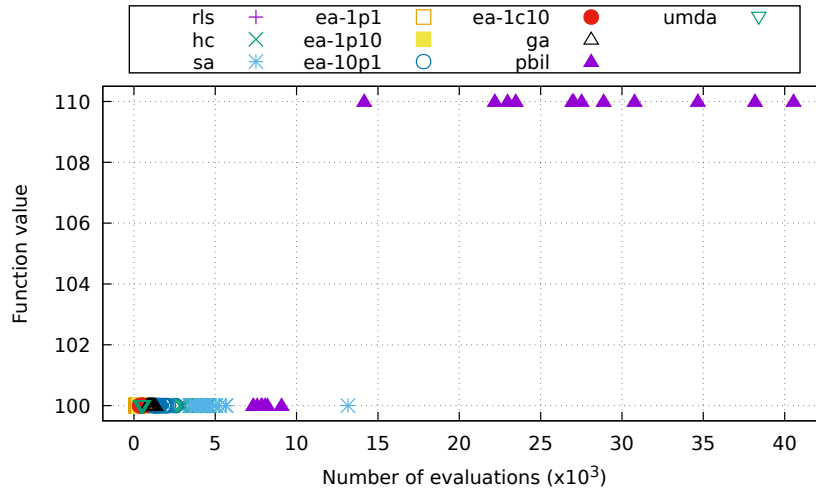
Figure 16: djmp-10

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	0.00	0.01
hc	100	100	100	194	194	10	0.09	0.04
sa	4	100	194	194	194	8	0.06	0.07
ea-1p1	194	194	194	194	194	1	0.00	0.00
ea-1p10	100	194	194	194	194	7	0.02	0.07
ea-10p1	194	194	194	194	194	1	0.04	0.01
ea-1c10	194	194	194	194	194	1	0.00	0.01
ga	187	189	190	191	194	9	1.08	0.27
pbil	194	194	194	194	194	1	0.37	0.04
umda	194	194	194	194	194	1	0.04	0.01
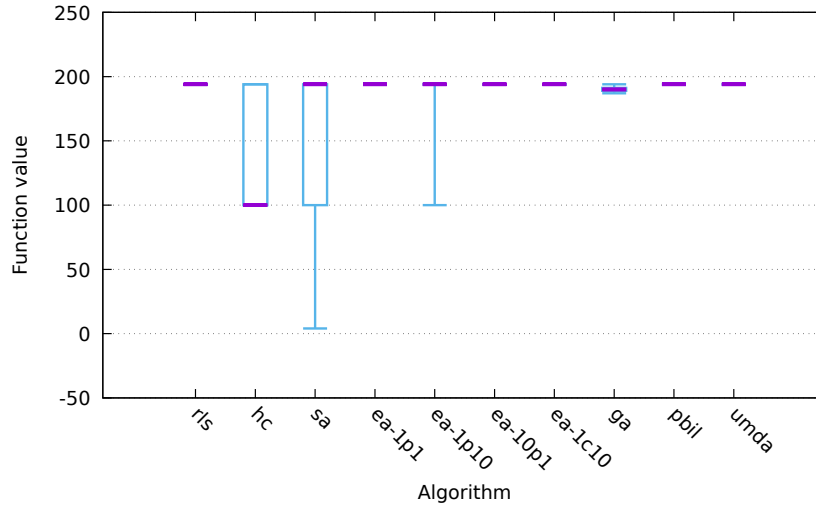
Figure 17: fp-5

Figure 18: fp-5

11
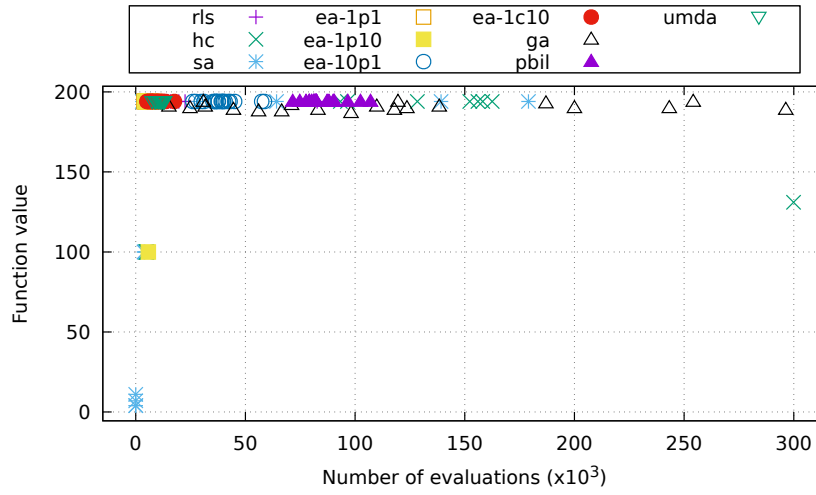
11 Function fp-10

algorithm	function value						time (s)	
	min	Q_1	med.	Q_3	max	rk	mean	dev.
rls	187	189	189	189	189	2	0.05	0.05
hc	100	100	100	100	100	10	0.12	0.00
sa	3	100	100	189	189	8	0.11	0.07
ea-1p1	100	100	100	189	189	7	0.17	0.13
ea-1p10	100	100	100	100	189	9	0.23	0.12
ea-10p1	100	189	189	189	189	3	0.08	0.09
ea-1c10	100	189	189	189	189	3	0.12	0.09
ga	182	184	186	186	189	6	1.15	0.22
pbil	189	189	189	189	189	1	0.33	0.03
umda	100	167	189	189	189	5	0.34	0.52
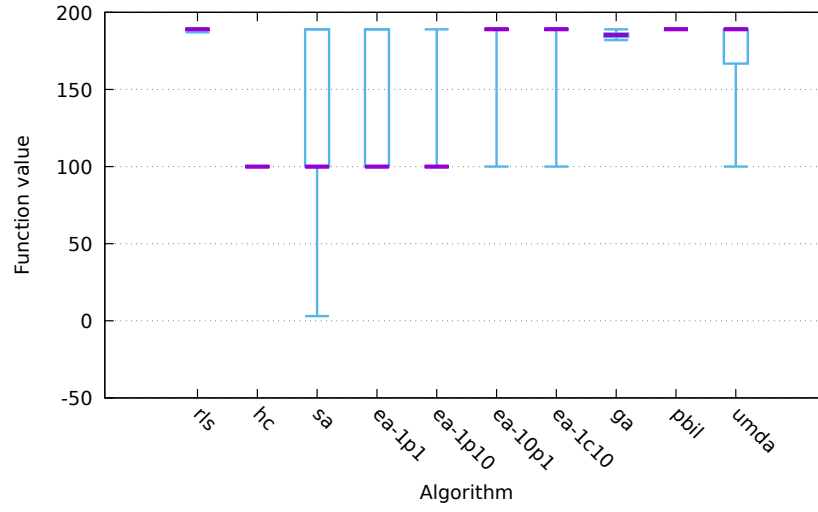
Figure 19: fp-10
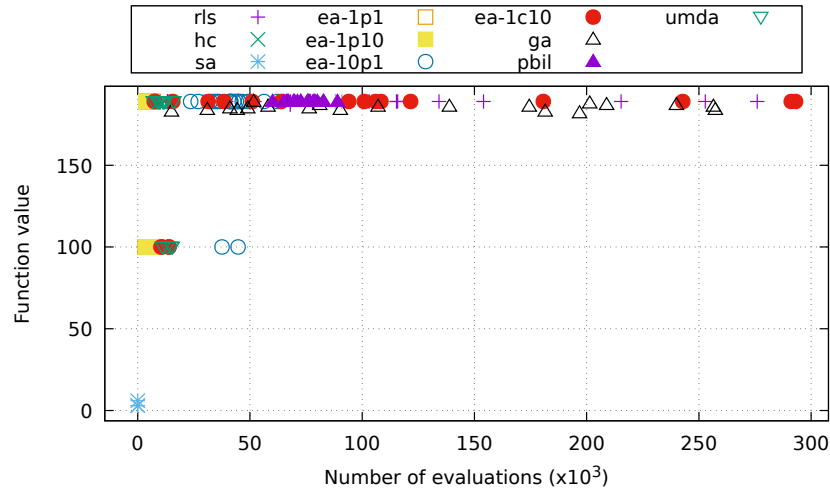
Figure 20: fp-10

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	0.63	0.01
hc	0.96	0.97	1.00	1.02	1.05	5	0.58	0.01
sa	1.01	1.03	1.04	1.06	1.10	1	0.71	0.08
ea-1p1	0.87	0.92	0.95	0.98	1.04	8	0.89	0.05
ea-1p10	0.82	0.90	0.94	0.98	1.10	9	0.78	0.03
ea-10p1	0.95	0.98	1.00	1.01	1.06	4	0.86	0.03
ea-1c10	0.96	0.98	1.02	1.04	1.08	3	0.67	0.01
ga	0.96	1.01	1.02	1.05	1.09	2	2.09	0.15
pbil	0.92	0.98	1.00	1.01	1.05	6	1.70	0.03
umda	0.84	0.91	0.94	0.96	1.01	10	1.64	0.03
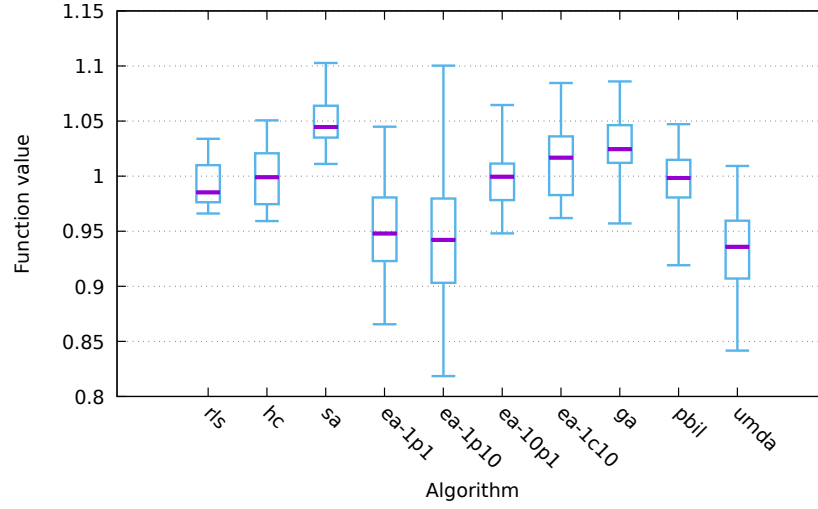
Figure 21: nk
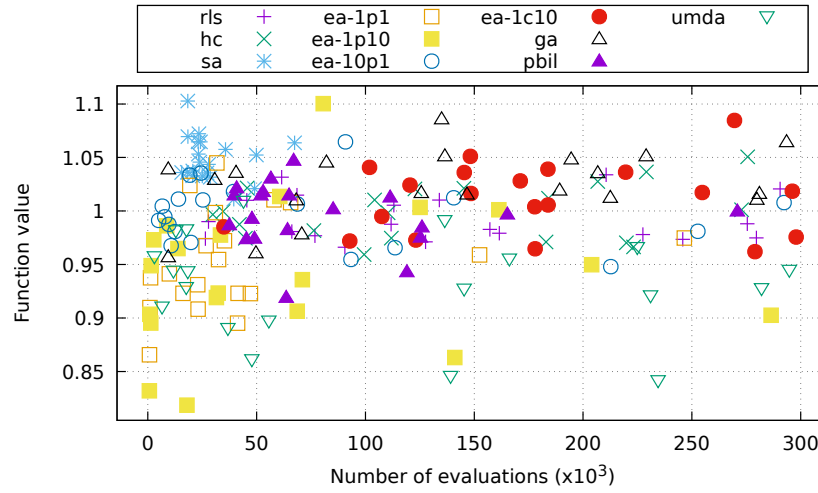
Figure 22: nk

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	3.51	0.05
hc	964	966	967	968	971	10	3.41	0.27
sa	969	972	972	972	972	1	2.99	0.08
ea-1p1	963	965	968	970	972	8	3.50	0.35
ea-1p10	961	967	968	969	972	6	3.51	0.32
ea-10p1	960	968	969	971	972	5	4.37	0.37
ea-1c10	964	969	970	972	972	3	2.96	0.14
ga	964	968	969	972	972	4	5.35	0.13
pbil	965	967	967	967	969	9	4.62	0.35
umda	953	965	968	970	972	7	4.46	0.36
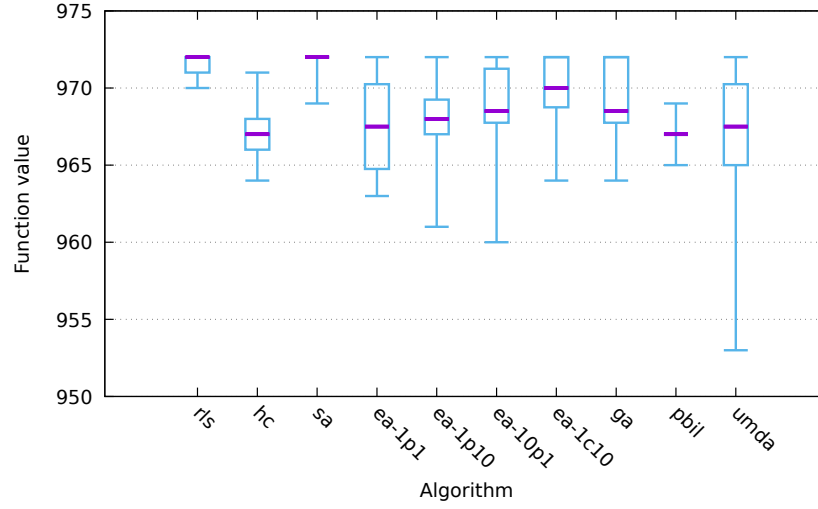
Figure 23: max-sat
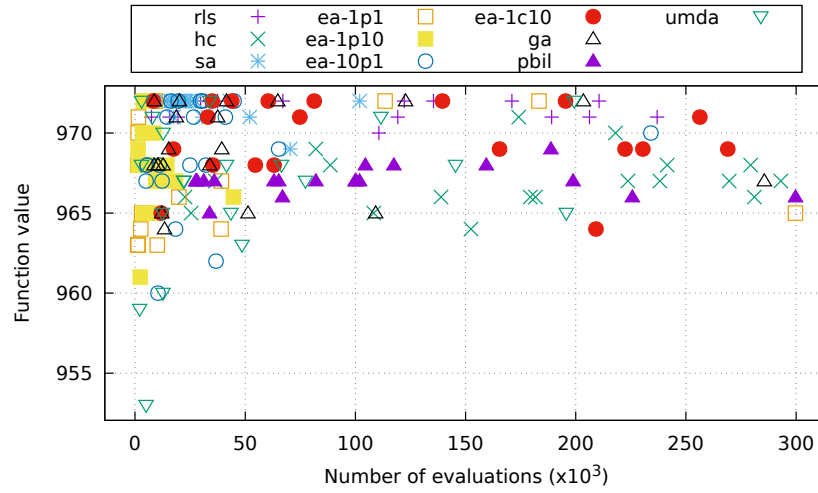
Figure 24: max-sat

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	3.54	0.15
hc	4.50	4.60	4.69	5.00	5.45	4	3.51	0.21
sa	4.35	4.63	4.78	4.92	5.29	3	3.62	0.27
ea-1p1	3.84	4.03	4.15	4.34	4.97	8	3.55	0.31
ea-1p10	3.61	4.00	4.19	4.32	4.52	7	3.62	0.24
ea-10p1	4.33	4.55	4.65	4.75	5.26	5	3.70	0.31
ea-1c10	4.55	4.71	4.87	5.14	5.67	2	3.63	0.35
ga	4.62	4.85	4.93	5.09	5.59	1	4.51	0.41
pbil	3.14	3.85	4.04	4.19	4.35	9	4.76	0.33
umda	3.36	3.73	3.98	4.28	4.82	10	4.61	0.33
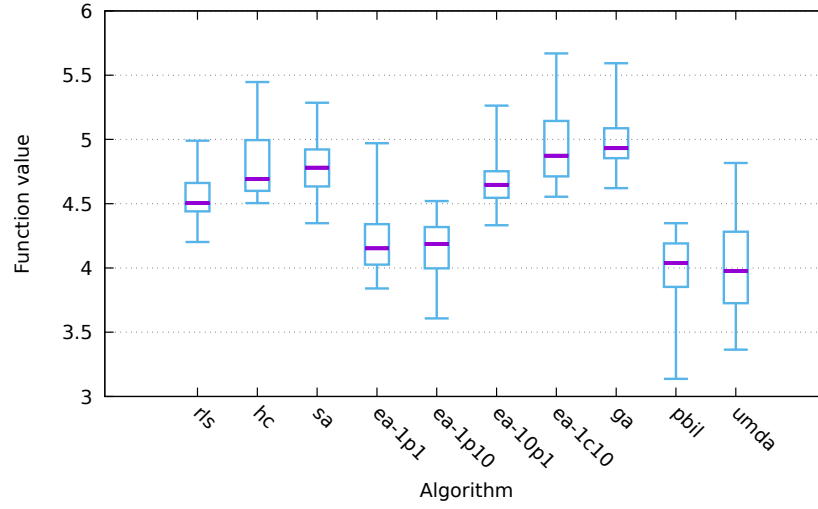
Figure 25: labs
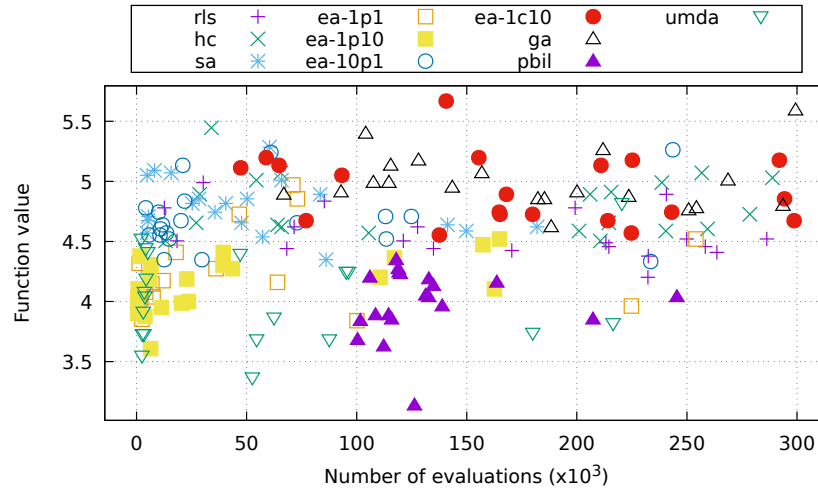
Figure 26: labs

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	0.21	0.01
hc	1.3×10^{-31}	2.1×10^{-30}	3.7×10^{-30}	8.4×10^{-30}	1.2×10^{-29}	3	0.16	0.00
sa	4.2×10^{-31}	3.6×10^{-30}	4.5×10^{-30}	9.3×10^{-30}	2.9×10^{-25}	5	0.18	0.01
ea-1p1	2.1×10^{-31}	6.9×10^{-30}	1.4×10^{-29}	1.7×10^{-29}	5.0×10^{-29}	8	0.29	0.01
ea-1p10	2.6×10^{-31}	7.3×10^{-30}	3.0×10^{-29}	4.2×10^{-29}	6.8×10^{-29}	10	0.32	0.00
ea-10p1	8.0×10^{-31}	4.0×10^{-30}	7.3×10^{-30}	1.1×10^{-29}	2.1×10^{-29}	6	0.40	0.01
ea-1c10	4.0×10^{-31}	2.1×10^{-30}	7.3×10^{-30}	1.2×10^{-29}	2.2×10^{-29}	7	0.35	0.01
ga	2.7×10^{-31}	1.5×10^{-30}	2.4×10^{-30}	3.4×10^{-30}	1.4×10^{-29}	2	1.49	0.12
pbil	4.6×10^{-31}	2.0×10^{-30}	4.4×10^{-30}	8.6×10^{-30}	2.1×10^{-29}	4	1.46	0.04
umda	1.4×10^{-30}	1.3×10^{-29}	2.6×10^{-29}	5.5×10^{-29}	1.4×10^{-28}	9	1.25	0.02
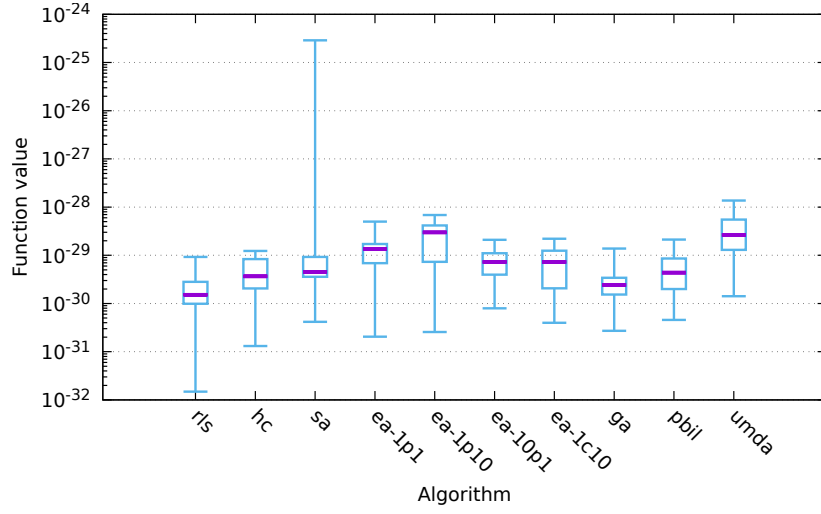
Figure 27: ep
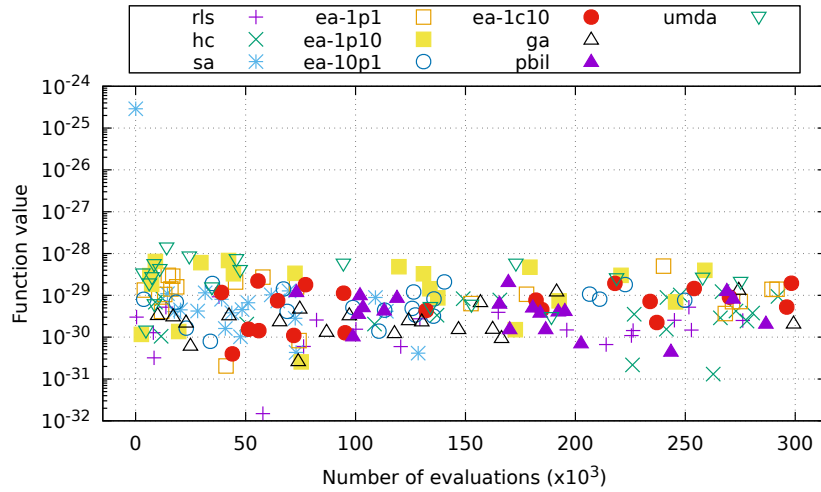
Figure 28: ep

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	0.19	0.00
hc	1.29	1.52	2.03	2.21	2.68	9	0.20	0.01
sa	0.11	1.61	2.29	2.60	2.95	10	0.24	0.00
ea-1p1	0.05	0.25	0.74	1.04	1.65	6	0.38	0.01
ea-1p10	0.05	0.33	0.50	0.88	2.05	3	0.36	0.01
ea-10p1	0.05	0.20	0.37	0.73	1.67	2	0.43	0.02
ea-1c10	0.07	0.34	0.69	0.96	2.61	4	0.27	0.00
ga	0.06	0.39	0.69	1.33	2.64	5	1.22	0.02
pbil	0.05	0.06	0.07	0.11	1.31	1	1.30	0.02
umda	0.16	1.01	1.44	1.73	2.93	7	1.28	0.09
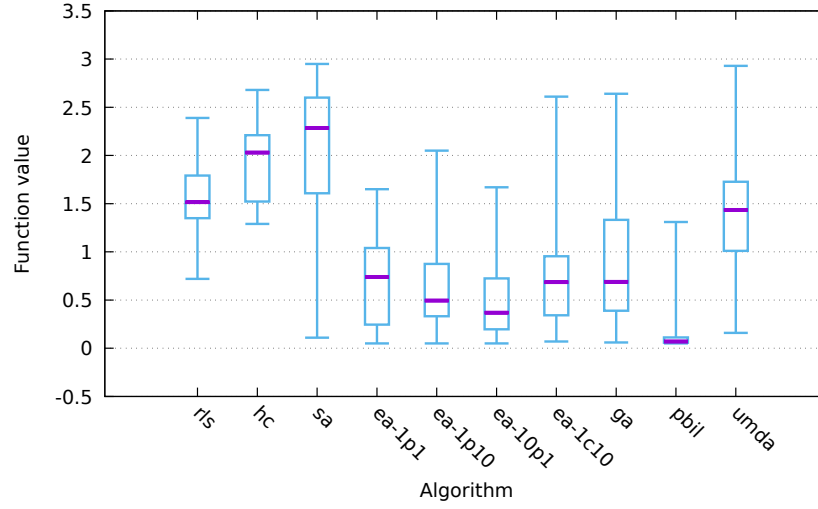
Figure 29: cancel
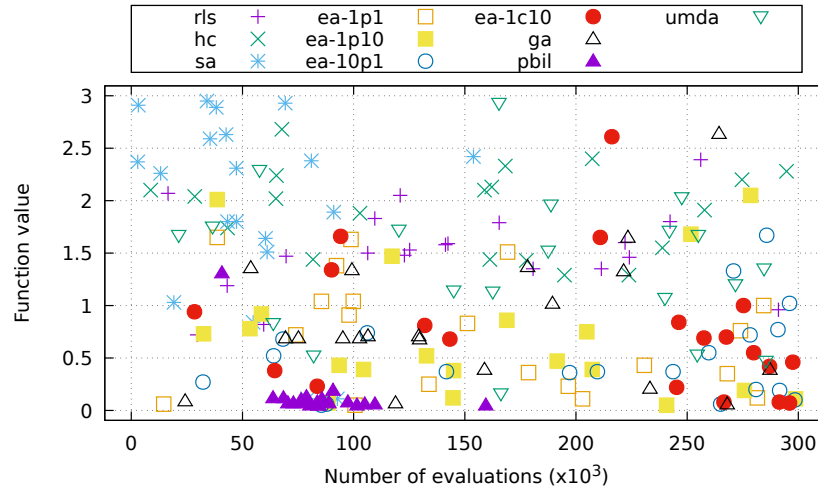
Figure 30: cancel

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	0.23	0.01
hc	91	91	91	92	92	1	0.20	0.00
sa	90	90	90	90	91	3	0.23	0.01
ea-1p1	90	90	90	90	90	7	0.33	0.00
ea-1p10	90	90	90	90	91	3	0.35	0.00
ea-10p1	90	90	90	90	91	3	0.39	0.01
ea-1c10	90	90	90	90	90	7	0.27	0.00
ga	90	90	90	90	91	3	1.21	0.02
pbil	90	90	90	90	90	7	1.46	0.14
umda	90	90	90	90	90	7	1.32	0.07
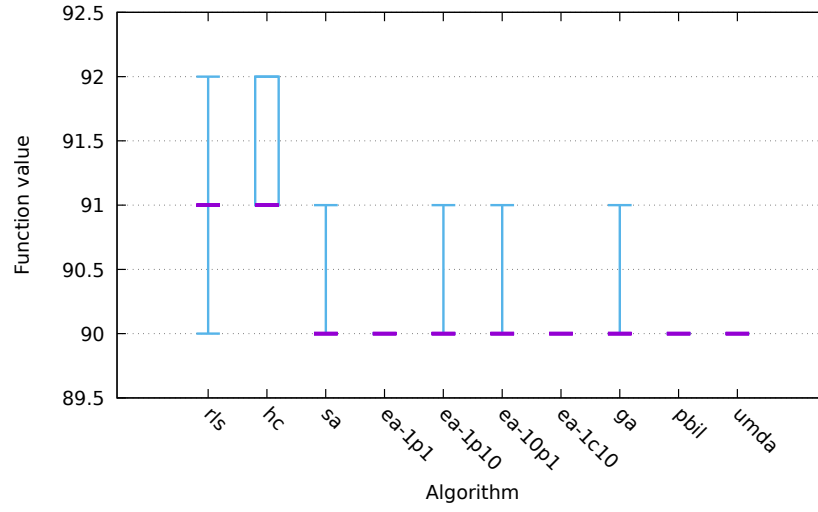
Figure 31: trap
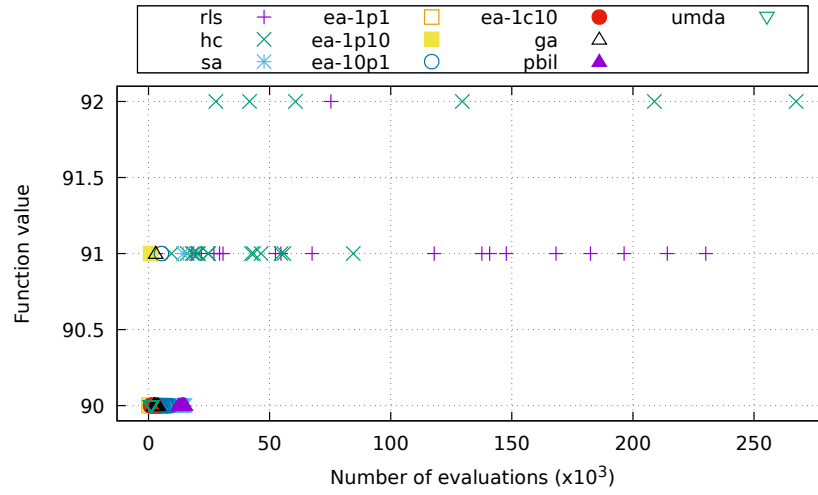
Figure 32: trap

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	0.51	0.01
hc	472	487	498	510	540	8	0.49	0.01
sa	640	672	704	752	832	2	0.64	0.02
ea-1p1	448	470	492	520	568	9	0.67	0.01
ea-1p10	432	478	504	530	576	6	0.71	0.02
ea-10p1	544	640	704	736	832	3	0.99	0.10
ea-1c10	600	632	656	682	776	4	0.77	0.02
ga	708	720	770	776	832	1	1.87	0.03
pbil	476	520	544	578	648	5	2.24	0.17
umda	440	484	502	524	560	7	1.90	0.03
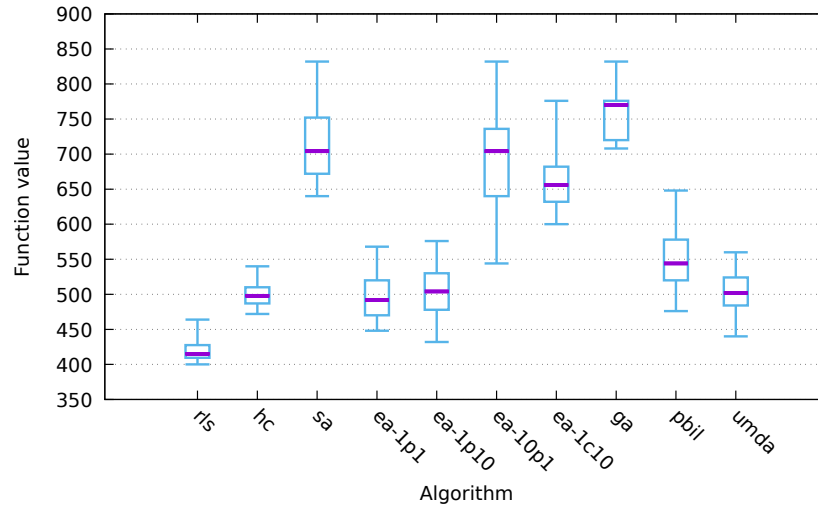
Figure 33: hiff
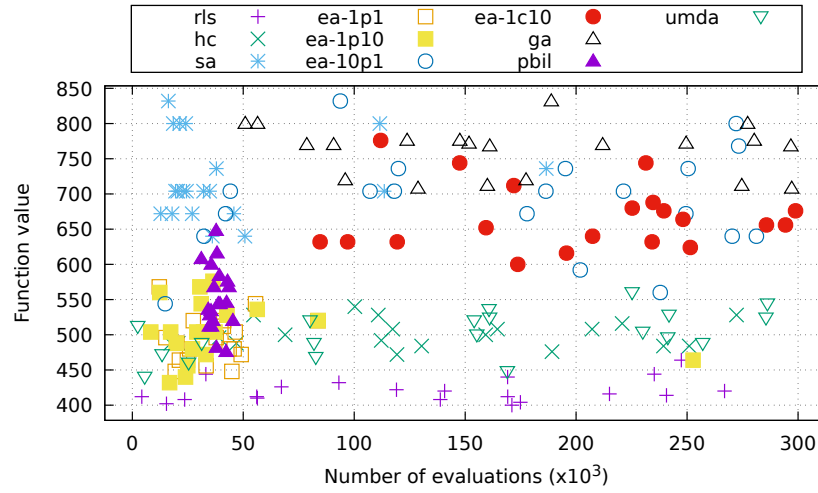
Figure 34: hiff

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	0.15	0.00
hc	101	101	101	101	101	4	0.13	0.00
sa	101	101	101	101	102	1	0.17	0.04
ea-1p1	101	101	101	101	102	3	0.33	0.05
ea-1p10	101	101	101	101	102	1	0.34	0.07
ea-10p1	101	101	101	101	101	4	0.40	0.01
ea-1c10	101	101	101	101	101	4	0.28	0.00
ga	101	101	101	101	101	4	1.21	0.03
pbil	101	101	101	101	101	4	1.24	0.02
umda	101	101	101	101	101	4	1.21	0.02
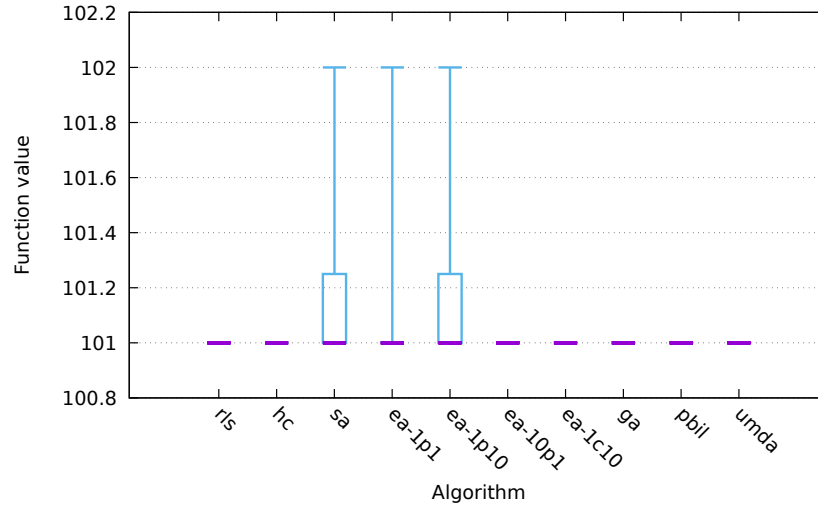
Figure 35: plateau
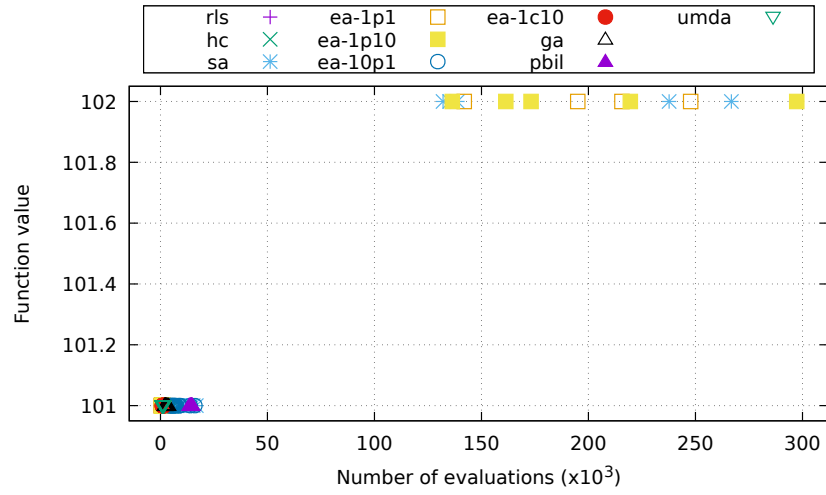
Figure 36: plateau

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	3.35	0.21
hc	700.78	709.84	714.58	720.39	721.22	2	3.03	0.12
sa	698.68	713.69	716.97	720.24	721.22	1	3.53	0.22
ea-1p1	611.34	651.46	673.43	688.51	705.43	7	3.62	0.20
ea-1p10	596.31	649.75	669.56	688.04	716.57	8	3.59	0.17
ea-10p1	653.24	686.42	696.83	703.15	715.23	6	4.13	0.30
ea-1c10	658.55	688.13	703.12	714.08	720.24	4	3.35	0.12
ga	682.78	698.23	702.22	713.69	721.22	5	5.15	0.15
pbil	623.15	659.15	664.80	686.26	710.76	10	4.59	0.18
umda	604.84	646.33	667.65	682.12	699.03	9	4.27	0.16
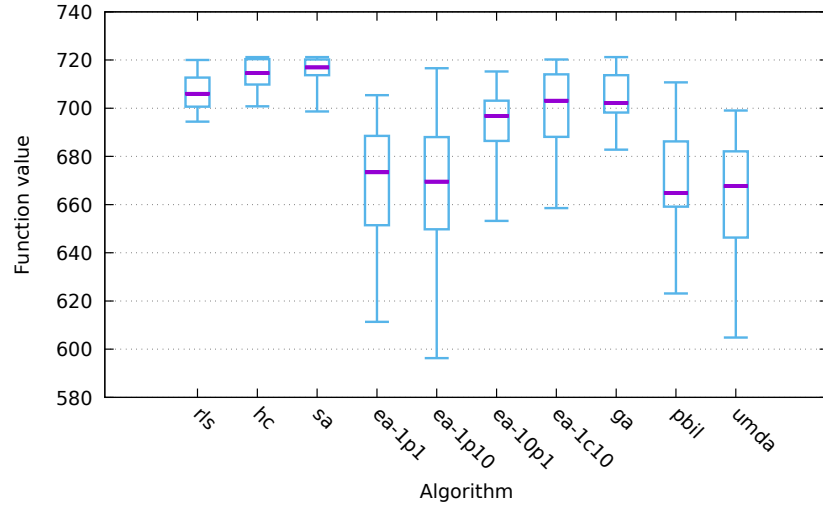
Figure 37: walsh2
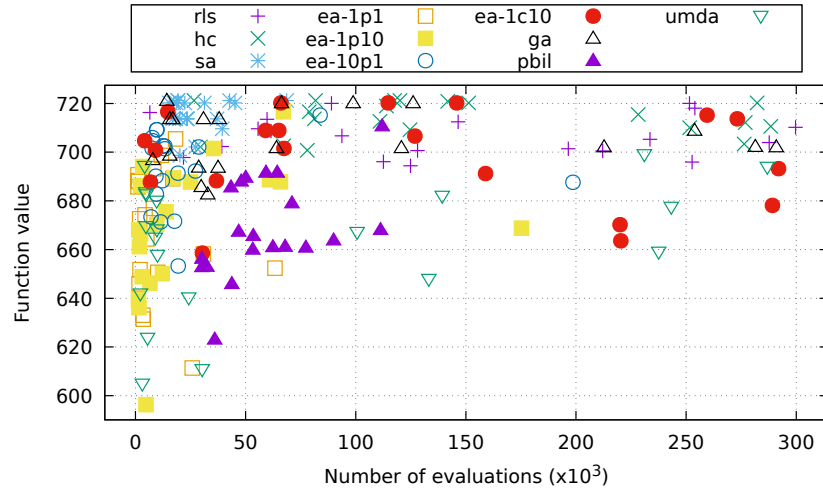
Figure 38: walsh2

A Plan

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

```json
    "budget": 300000,
    "num_runs": 20,
    "parallel": true,
    "functions": [
        {
            "id": "one-max",
            "opt": "-F 0 --stop-on-maximum",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "lin",
            "opt": "-F 1 -p instances/lin.100",
            "rounding": {
                "value": { "before": 2, "after": 2 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "leading-ones",
            "opt": "-F 10 --stop-on-maximum",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "ridge",
            "opt": "-F 11 --stop-on-maximum",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "jmp-5",
            "opt": "-F 30 --stop-on-maximum -t 5",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "jmp-10",
            "opt": "-F 30 --stop-on-maximum -t 10",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "djmp-5",
            "opt": "-F 31 --stop-on-maximum -t 5",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "djmp-10",
            "opt": "-F 31 --stop-on-maximum -t 10",
            "rounding": {
                "value": { "before": 3, "after": 0 },
                "time": { "before": 1, "after": 2 } }
        },
        {
            "id": "fp-5",
            "opt": "-F 40 --stop-on-maximum -t 5",
```

```json
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "fp-10",
        "opt": "-F 40 --stop-on-maximum -t 10",
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "nk",
        "opt": "-F 60 -p instances/nk.100.4",
        "rounding": {
            "value": { "before": 1, "after": 2 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "max-sat",
        "opt": "-F 70 -p instances/ms.100.3.1000",
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "labs",
        "opt": "-F 81",
        "rounding": {
            "value": { "before": 1, "after": 2 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "ep",
        "opt": "-F 90 -p instances/ep.100",
        "reverse": true,
        "logscale": true,
        "rounding": {
            "value": { "before": 1, "after": 1 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "cancel",
        "opt": "-F 100 -s 99",
        "reverse": true,
        "rounding": {
            "value": { "before": 1, "after": 2 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "trap",
        "opt": "-F 110 --stop-on-maximum --fn-num-traps 10",
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
    {

        "id": "hiff",
        "opt": "-F 120 --stop-on-maximum -s 128",
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
```

```json
    {
        "id": "plateau",
        "opt": "-F 130 --stop-on-maximum",
        "rounding": {
            "value": { "before": 3, "after": 0 },
            "time": { "before": 1, "after": 2 } }
    },
    {
        "id": "walsh2",
        "opt": "-F 162 -p instances/walsh2.100",
        "rounding": {
            "value": { "before": 3, "after": 2 },
            "time": { "before": 1, "after": 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
```