Comparison tables: BBOB 2012 noisy testbed in 40-D

The BBOBies

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Abstract

This document provides tabular results of the workshop for Black-Box Optimization Benchmarking at GECCO 2012, see `http://coco.gforge.inria.fr/doku.php?id=bbob-2012`. 4 algorithms have been tested on 24 benchmark functions in dimensions between 2 and 40. A description of the used objective functions can be found in [4, 2]. The experimental set-up is described in [3].

The performance measure provided in the following tables is the expected number of objective function evaluations to reach a given target function value (ERT, expected running time), divided by the respective value for the best algorithm in BBOB-2009 (see [1]) if an algorithm from BBOB-2009 reached the given target function value. The ERT value is given otherwise ($\mathrm{ERT}_{\mathrm{best}}$ is noted as infinite). See [3] for details on how ERT is obtained. Bold entries in the table correspond to values below 3 or the top-three best values. Table 1 gives an overview on all algorithms submitted to the noise-free testbed in 2012.

Table 1: Names and references of all algorithms submitted for the noise-free testbed

algorithm short name	paper	reference
IPOPsaACM	Black-box Optimization Benchmarking of IPOP-saACM-ES on the BBOB-2012 Noisy Testbed (Page 261)	[8]
SNES	Benchmarking Separable Natural Evolution Strategies on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 205)	[7]
xNES	Benchmarking Exponential Natural Evolution Strategies on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 213)	[5]
xNESas	Benchmarking Natural Evolution Strategies with Adaptation Sampling on the Noiseless and Noisy Black-Box Optimization Testbeds (Page 229)	[6]
SNES, xNES, xNESas	Comparing Natural Evolution Strategies to BIPOP-CMA-ES on Noiseless and Noisy Black-Box Optimization Testbeds (Page 237)	[9]

Table 2: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{101}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f101	584	905	1255	1913	2556	3237	15/15
SNES	**1.2**$_{(0.2)^{\star 5}}$	**1.9**$_{(0.1)^{\star 5}}$	**2.1**$_{(0.1)^{\star 5}}$	**2.4**$_{(0.1)^{\star 5}}$	**2.5**$_{(0.1)^{\star 5}}$	**2.6**$_{(0.0)^{\star 5}}$	15/15
xNESas	9.3$_{(1)}$	16$_{(3)}$	16$_{(6)}$	14$_{(9)}$	12$_{(8)}$	10$_{(6)}$	30/30

Table 3: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{102}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f102	821	1286	1742	2629	3557	4504	15/15
SNES	**0.94**$_{(0.2)}{}^{\star 4}$	**1.3**$_{(0.1)}{}^{\star 4}$	**1.5**$_{(0.1)}{}^{\star 4}$	**1.8**$_{(0.0)}{}^{\star 4}$	**1.8**$_{(0.0)}{}^{\star 4}$	**1.9**$_{(0.0)}{}^{\star 4}$	15/15
xNES	6.8$_{(1)}$	14$_{(0.6)}$	18$_{(0.6)}$	22$_{(0.2)}$	23$_{(0.3)}$	24$_{(0.2)}$	15/15
xNESas	6.9$_{(1)}$	12$_{(2)}$	12$_{(4)}$	11$_{(6)}$	10$_{(7)}$	9.3$_{(8)}$	30/30

Table 4: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{103}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f103	529	1223	1693	2720	3818	4963	15/15
SNES	**1.4**$_{(0.1)}{}^{\star 4}$	**1.4**$_{(0.1)}{}^{\star 4}$	**1.6**$_{(0.1)}{}^{\star 4}$	**1.8**$_{(0.1)}{}^{\star 4}$	**2.0**$_{(0.0)}{}^{\star 4}$	**4.3**$_{(2)}{}^{\star 4}$	15/15
xNES	11$_{(1)}$	15$_{(0.7)}$	18$_{(0.4)}$	22$_{(0.3)}$	24$_{(0.4)}$	25$_{(0.3)}$	15/15
xNESas	10$_{(2)}$	12$_{(3)}$	12$_{(5)}$	13$_{(8)}$	19$_{(13)}$	24$_{(13)}$	30/30

Table 5: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{104}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f104	3.1e6	3.6e6	3.7e6	3.7e6	3.7e6	3.8e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *1e7*	0/1
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/30

Table 6: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{105}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f105	5.6e6	5.9e6	6.0e6	6.1e6	6.2e6	6.3e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/19

Table 7: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{106}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f106	69253	90821	95524	99526	1.0e5	1.0e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**1.4**$_{(0.1)^{\star 4}}$	**1.6**$_{(0.1)^{\star 4}}$	**1.6**$_{(0.1)^{\star 4}}$	**1.7**$_{(0.1)^{\star 4}}$	**2.0**$_{(0.8)^{\star 4}}$	**3.0**$_{(1)^{\star 4}}$	15/15

Table 8: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{107}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f107	38382	57745	74911	97700	1.2e5	1.4e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *9e6*	0/2
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/27

Table 9: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{108}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f108	2.1e5	5.6e5	9.4e5	1.8e6	2.8e6	4.3e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 10: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{109}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f109	841	1456	2504	4958	7525	10054	15/15
SNES	**0.92**$_{(0.1)^{\star 4}}$	**1.4**$_{(0.1)^{\star 4}}$	**1.6**$_{(0.1)^{\star 4}}$	**3.4**$_{(2)^{\star 4}}$	**18**$_{(24)}$	129$_{(139)}$	1/15
xNESas	6.6$_{(1)}$	15$_{(2)}$	19$_{(1)}$	23$_{(0.7)}$	30$_{(11)}$	**32**$_{(10)}$	15/15

Table 11: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{110}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f110	∞	∞	∞	∞	∞	∞	0
SNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/15

Table 12: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{111}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f111	∞	∞	∞	∞	∞	∞	0
SNES	.	.	.	.	.	.	0/15
xNESas	.	.	.	.	.	.	0/3

Table 13: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{112}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f112	1.8e5	2.5e5	2.7e5	2.8e5	2.8e5	2.9e5	14/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 14: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{113}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f113	4.4e5	2.5e6	2.7e6	3.0e6	3.0e6	3.0e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	∞	∞	∞	∞	∞	∞ *2e7*	0/1
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/15

Table 15: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{114}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f114	1.7e6	6.5e6	1.0e7	1.2e7	1.2e7	1.2e7	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 16: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{115}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f115	20541	1.9e5	3.7e5	4.2e5	4.2e5	4.2e5	15/15
SNES	0.93(1)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**0.92**(0.1)	**0.21**(9e-3)$^{\star 4}$	**0.24**(0.0)$^{\star 4}$	**0.96**(0.7)$^{\star 4}$	**0.96**(0.7)$^{\star 4}$	**0.96**(0.7)	15/15

Table 17: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{116}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f116	4.2e6	4.3e6	4.5e6	4.8e6	5.1e6	5.4e6	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *3e7*	0/15

Table 18: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{117}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f117	8.4e6	1.2e7	1.4e7	1.7e7	1.9e7	2.1e7	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/7

Table 19: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{118}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f118	39183	47888	81836	1.1e5	1.2e5	1.3e5	15/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 20: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{119}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f119	42381	1.2e5	1.6e5	2.1e6	1.0e7	1.3e7	15/15
SNES	31(34)	∞	∞	∞	∞	∞ *4e5*	0/15
xNES	7.4(1e-3)	∞	∞	∞	∞	∞ *1e7*	0/2
xNESas	**3.6**(3)	∞	∞	∞	∞	∞ *3e7*	0/15

Table 21: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{120}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f120	1.6e5	7.1e5	1.7e6	1.1e7	4.3e7	2.4e8	3/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	∞	∞	∞	∞	∞	∞ *2e7*	0/15

Table 22: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{121}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f121	728	1739	3362	27554	97381	2.0e5	14/15
SNES	**0.77**(0.2)	**1.1**(0.1)$^{\star 4}$	**1.8**(0.9)$^{\star 4}$	∞	∞	∞ *4e5*	0/15
xNESas	1.0(0.3)	11(0.7)	16(0.6)	**5.6**(2)$^{\star 4}$	**2.9**(1)$^{\star 4}$	**1.8**(0.5)$^{\star 4}$	15/15

Table 23: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{122}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f122	4936	2.7e5	6.4e5	2.8e6	1.2e7	3.3e7	11/15
SNES	2.1(3)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**1.2**(0.8)	∞	∞	∞	∞	∞ *2e7*	0/15

Table 24: 40-D, running time excess $\mathrm{ERT}/\mathrm{ERT}_{\text{best 2009}}$ on f_{123}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f123	13229	2.4e6	9.4e6	2.4e7	2.3e8	7.3e8	0
SNES	77(83)	∞	∞	∞	∞	∞ *4e5*	0/15
xNESas	**25**(28)	∞	∞	∞	∞	∞ *2e7*	0/4

Table 25: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{124}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f124	570	30165	2.1e5	3.7e5	1.1e6	2.2e6	15/15
SNES	**0.64**$_{(0.1)_{\downarrow 2}}$	**0.15**$_{(0.0)}$	**0.69**$_{(0.5)}$	∞	∞	∞ *4e5*	0/15

Table 26: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{125}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f125	1	4611	1.1e8	5.4e8	∞	∞	0
SNES	2.3(2)	44(49)	∞	∞	.	.	0/15
xNES	**1.4**(0.5)	3.2(5)	∞	∞	.	.	0/15
xNESas	1.7(2)	**2.3**(2)	∞	∞	.	.	0/15

Table 27: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{126}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f126	1	8740	∞	∞	∞	∞	0
SNES	**1.4**(0.5)	∞	.	.	.	.	0/15
xNES	2.1(2)	**1088**(835)	.	.	.	.	0/12
xNESas	1.8(2)	1183(1011)	.	.	.	.	0/15

Table 28: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{127}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f127	1	702	1.8e6	1.5e7	2.6e7	2.7e7	15/15
SNES	**1.5**(1)	**0.58**$_{(0.3)\downarrow 2}$	∞	∞	∞	∞ *4e5*	0/15
xNESas	1.7(0.5)	0.68(0.3)	∞	∞	∞	∞ *2e7*	0/10

Table 29: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{128}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f128	4.1e6	3.8e7	1.1e8	1.1e8	1.1e8	1.1e8	4/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 30: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{129}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f129	3.5e7	3.8e7	1.0e8	1.0e8	1.0e8	1.0e8	2/15
SNES	∞	∞	∞	∞	∞	∞ *4e5*	0/15

Table 31: 40-D, running time excess ERT/$\mathrm{ERT}_{\text{best 2009}}$ on f_{130}, in italics is given the median final function value and the median number of function evaluations to reach this value divided by dimension

Δf_{opt}	1e1	1e0	1e-1	1e-3	1e-5	1e-7	#succ
f130	12699	2.8e5	1.7e6	1.7e6	1.7e6	1.7e6	3/15
SNES	**0.64**(1)	**0.27**(0.3)	**0.07**$(0.1)_{\downarrow 2}$	**0.07**$(0.1)_{\downarrow 2}$	**0.13**$(0.1)_{\downarrow}$	**0.23**(0.3)	4/15

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