Supplemental file of "Adaptive strategy in differential evolution via explicit exploitation and exploration controls"

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TABLE CAPTIONS

Table S1 Performance comparisons of EaDE with the variants on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		10-D				30-D			
		Variant-oppo	Variant-random	Variant-TAE	EaDE	Variant-oppo	Variant-random	Variant-TAE	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	1.93E-04 - (1.38E-03)	0.00E+00 (0.00E+00)
	F3	9.79E-03 = (2.48E-02)	4.20E-03 = (1.70E-02)	4.20E-03 = (1.70E-02)	8.39E-03 (2.32E-02)	1.91E-04 = (1.11E-03)	1.53E-03 = (1.02E-02)	3.92E+01 - (2.50E+02)	8.13E-04 (4.85E-03)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	1.35E+00 = (3.41E+00)	2.12E+00 = (4.08E+00)	3.66E+00 - (4.79E+00)	1.73E+00 (3.78E+00)	0.00E+00 = (0.00E+00)	5.18E-01 = (3.70E+00)	1.56E-09 = (8.49E-09)	0.00E+00 (0.00E+00)
	F7	8.94E-06 = (2.96E-05)	7.89E-06 = (1.49E-05)	7.31E-06 = (2.63E-05)	8.59E-06 (2.59E-05)	2.09E-01 = (1.98E-01)	2.91E-01 = (2.73E-01)	8.26E-01 - (1.15E+00)	3.38E-01 (3.67E-01)
	F8	2.02E+01 - (1.24E-01)	2.02E+01 - (1.28E-01)	2.02E+01 = (1.50E-01)	2.01E+01 (1.51E-01)	2.09E+01 - (1.16E-01)	2.08E+01 - (1.20E-01)	2.08E+01 = (1.29E-01)	2.07E+01 (1.83E-01)
	F9	1.37E+00 = (1.54E+00)	1.28E+00 = (1.17E+00)	1.37E+00 = (1.23E+00)	1.34E+00 (1.18E+00)	2.55E+01 - (1.35E+00)	2.21E+01 = (2.23E+00)	2.21E+01 = (3.23E+00)	2.24E+01 (2.86E+00)
	F10	4.39E-03 = (8.55E-03)	3.96E-03 = (7.94E-03)	4.10E-03 = (7.68E-03)	5.17E-03 (1.29E-02)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	1.84E-03 - (4.12E-03)	0.00E+00 (0.00E+00)
	F11	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F12	2.59E+00 - (1.43E+00)	2.11E+00 = (1.14E+00)	1.62E+00 = (1.09E+00)	1.89E+00 (1.31E+00)	6.73E+00 - (1.80E+00)	2.72E+00 = (2.28E+00)	3.05E+00 = (2.17E+00)	2.73E+00 (2.45E+00)
	F13	1.99E+00 - (1.37E+00)	1.24E+00 = (1.04E+00)	1.35E+00 = (1.15E+00)	1.21E+00 (1.12E+00)	6.70E+00 - (3.75E+00)	1.96E+00 = (2.57E+00)	2.31E+00 - (2.67E+00)	1.63E+00 (2.40E+00)
	F14	6.12E-03 + (1.88E-02)	2.08E-02 = (3.88E-02)	2.45E-03 + (1.22E-02)	2.33E-02 (3.74E-02)	1.67E-01 - (8.59E-02)	3.23E-02 - (2.33E-02)	2.69E-02 - (2.64E-02)	1.10E-02 (1.34E-02)
	F15	3.05E+02 = (1.35E+02)	2.91E+02 = (1.14E+02)	2.89E+02 = (1.09E+02)	3.00E+02 (1.06E+02)	2.60E+03 = (3.15E+02)	2.58E+03 = (3.34E+02)	2.41E+03 + (4.51E+02)	2.59E+03 (3.05E+02)
	F16	2.14E-01 - (1.41E-01)	1.56E-01 - (1.21E-01)	1.71E-01 - (1.12E-01)	1.38E-01 (1.74E-01)	6.34E-01 - (3.07E-01)	4.78E-01 - (3.94E-01)	4.52E-01 - (2.98E-01)	2.18E-01 (1.86E-01)
	F17	1.01E+01 = (1.12E-14)	1.01E+01 = (1.35E-14)	1.01E+01 + (2.62E-14)	1.01E+01 (1.35E-14)	3.04E+01 - (3.25E-03)	3.04E+01 - (1.32E-06)	3.04E+01 - (7.83E-14)	3.04E+01 (9.43E-07)
	F18	1.40E+01 - (1.48E+00)	1.22E+01 = (1.54E+00)	1.24E+01 = (2.06E+00)	1.23E+01 (1.84E+00)	5.20E+01 - (4.86E+00)	4.27E+01 - (5.27E+00)	3.99E+01 = (4.12E+00)	4.05E+01 (4.59E+00)
	F19	2.23E-01 = (3.95E-02)	2.18E-01 = (3.51E-02)	2.30E-01 = (3.88E-02)	2.32E-01 (5.60E-02)	1.13E+00 = (1.20E-01)	1.10E+00 = (1.12E-01)	1.08E+00 + (1.49E-01)	1.15E+00 (1.27E-01)
	F20	1.84E+00 = (3.00E-01)	1.81E+00 = (3.65E-01)	1.78E+00 = (3.78E-01)	1.89E+00 (3.04E-01)	1.12E+01 - (1.67E+00)	1.01E+01 = (1.29E+00)	1.01E+01 = (1.07E+00)	1.05E+01 (1.41E+00)
Composition Functions	F21	4.00E+02 = (0.00E+00)	4.00E+02 = (0.00E+00)	3.92E+02 = (3.92E+01)	4.00E+02 (0.00E+00)	2.97E+02 = (4.92E+01)	2.93E+02 = (3.69E+01)	2.97E+02 = (3.17E+01)	2.92E+02 (2.72E+01)
	F22	1.72E+01 = (3.12E+01)	6.41E+00 = (3.54E+00)	5.48E+00 = (3.91E+00)	1.03E+01 (2.34E+01)	1.11E+02 - (2.38E+00)	1.08E+02 - (2.13E+00)	1.07E+02 - (1.35E+00)	1.07E+02 (1.73E+00)
	F23	2.56E+02 - (1.39E+02)	2.19E+02 = (1.39E+02)	2.22E+02 = (1.27E+02)	2.04E+02 (1.15E+02)	2.44E+03 - (3.29E+02)	2.25E+03 = (3.63E+02)	2.20E+03 = (3.83E+02)	2.24E+03 (3.87E+02)
	F24	2.05E+02 = (3.24E+00)	2.03E+02 = (1.28E+01)	2.03E+02 = (3.41E+00)	2.04E+02 (3.59E+00)	2.00E+02 = (2.83E-01)	2.00E+02 = (8.34E-01)	2.02E+02 - (2.45E+00)	2.00E+02 (5.33E-01)
	F25	2.01E+02 = (2.05E+00)	2.01E+02 = (2.05E+00)	2.01E+02 = (1.67E+00)	1.99E+02 (1.42E+01)	2.40E+02 = (4.46E+00)	2.40E+02 = (4.69E+00)	2.41E+02 - (4.26E+00)	2.39E+02 (3.91E+00)
	F26	1.22E+02 = (3.88E+01)	1.40E+02 = (4.71E+01)	1.34E+02 = (4.69E+01)	1.40E+02 (4.84E+01)	2.00E+02 = (1.20E-13)	2.00E+02 = (8.51E-14)	2.00E+02 - (1.70E-13)	2.00E+02 (1.11E-13)
	F27	3.03E+02 = (2.45E+01)	3.02E+02 = (1.40E+01)	3.00E+02 = (0.00E+00)	3.04E+02 (2.54E+01)	3.01E+02 = (1.34E+00)	3.00E+02 = (5.44E-01)	3.09E+02 - (1.28E+01)	3.00E+02 (2.78E-01)
	F28	3.00E+02 = (0.00E+00)	3.00E+02 = (0.00E+00)	2.92E+02 = (3.92E+01)	3.00E+02 (0.00E+00)	3.00E+02 = (3.22E-14)	3.00E+02 = (0.00E+00)	3.00E+02 = (3.22E-14)	3.00E+02 (0.00E+00)
win tie lose		**6** **21** **1**	**2** **26** **0**	**2** **24** **2**		**11** **17** **0**	**6** **22** **0**	**13** **13** **2**	
		Variant-oppo	Variant-random	Variant-TAE	EaDE	Variant-oppo	Variant-random	Variant-TAE	EaDE

Table S1(Continued) Performance comparisons of EaDE with the variants on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		50-D				100-D			
		Variant-oppo	Variant-random	Variant-TAE	EaDE	Variant-oppo	Variant-random	Variant-TAE	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	4.28E+01 = (9.23E+01)	1.95E+01 = (5.83E+01)	1.42E+03 - (1.80E+03)	1.99E+01 (5.33E+01)	1.04E+05 = (3.86E+04)	1.11E+05 = (4.11E+04)	1.41E+05 - (2.85E+04)	1.03E+05 (2.54E+04)
	F3	3.42E+03 = (1.58E+04)	6.30E+03 = (1.49E+04)	7.10E+04 - (2.11E+05)	2.31E+03 (5.30E+03)	5.95E+06 = (8.79E+06)	2.62E+06 = (2.09E+06)	9.70E+06 - (1.19E+07)	2.81E+06 (2.51E+06)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	5.02E-04 = (4.88E-04)	4.13E-04 = (2.40E-04)	1.09E-04 + (1.88E-04)	4.81E-04 (3.61E-04)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.34E+01 = (0.00E+00)	4.34E+01 = (0.00E+00)	4.34E+01 = (2.27E-14)	4.34E+01 (0.00E+00)	2.16E+02 = (2.18E+01)	2.29E+02 = (2.25E+01)	2.23E+02 = (1.81E+01)	2.16E+02 (2.88E+01)
	F7	7.61E-01 = (7.80E-01)	8.25E-01 = (8.81E-01)	3.10E+00 - (2.43E+00)	7.01E-01 (7.35E-01)	5.61E+00 = (1.93E+00)	5.82E+00 = (1.87E+00)	1.00E+01 - (5.37E+00)	6.29E+00 (2.26E+00)
	F8	2.10E+01 - (9.87E-02)	2.10E+01 = (1.03E-01)	2.10E+01 - (1.15E-01)	2.10E+01 (1.24E-01)	2.13E+01 = (4.11E-02)	2.13E+01 - (5.81E-02)	2.13E+01 - (4.03E-02)	2.12E+01 (8.77E-02)
	F9	5.19E+01 - (2.35E+00)	4.60E+01 = (4.71E+00)	3.88E+01 + (1.20E+01)	4.53E+01 (8.18E+00)	1.31E+02 - (3.28E+00)	1.26E+02 = (4.36E+00)	1.25E+02 = (6.81E+00)	1.23E+02 (1.09E+01)
	F10	3.82E-03 = (4.63E-03)	3.82E-03 = (5.06E-03)	9.56E-03 - (9.67E-03)	3.58E-03 (4.25E-03)	1.51E-02 = (1.12E-02)	1.64E-02 = (1.42E-02)	1.27E-02 = (9.98E-03)	1.40E-02 (1.04E-02)
	F11	2.14E-09 - (8.13E-09)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	9.35E-01 - (9.59E-01)	6.07E-04 - (4.41E-04)	2.03E-04 - (1.81E-04)	6.73E-05 (2.56E-05)
	F12	1.34E+01 - (2.58E+00)	1.03E+01 = (3.40E+00)	9.34E+00 = (4.32E+00)	9.63E+00 (3.26E+00)	4.82E+01 - (4.66E+00)	4.39E+01 = (8.57E+00)	3.65E+01 + (9.11E+00)	4.24E+01 (9.24E+00)
	F13	1.85E+01 - (8.64E+00)	9.87E+00 = (6.13E+00)	1.35E+01 = (1.20E+01)	1.03E+01 (7.26E+00)	1.14E+02 = (2.25E+01)	9.04E+01 = (2.03E+01)	1.01E+02 = (5.10E+01)	1.10E+02 (3.19E+01)
	F14	1.17E+01 - (5.42E+00)	1.07E+00 - (6.46E-01)	8.68E-01 - (7.79E-01)	1.53E-01 (5.05E-02)	2.99E+02 - (9.29E+01)	1.48E+02 - (4.18E+01)	1.38E+02 - (3.47E+01)	8.68E+01 (1.88E+01)
	F15	6.25E+03 = (5.27E+02)	5.93E+03 = (7.08E+02)	6.07E+03 = (6.64E+02)	6.06E+03 (5.96E+02)	1.52E+04 - (6.23E+02)	1.30E+04 = (1.24E+03)	1.29E+04 = (1.09E+03)	1.30E+04 (1.16E+03)
	F16	1.13E+00 - (4.41E-01)	8.24E-01 - (3.59E-01)	7.35E-01 - (3.43E-01)	5.85E-01 (4.49E-01)	1.60E+00 - (4.83E-01)	1.43E+00 - (4.32E-01)	1.47E+00 - (4.47E-01)	8.20E-01 (3.98E-01)
	F17	5.10E+01 - (6.90E-02)	5.08E+01 - (6.46E-03)	5.08E+01 - (6.61E-03)	5.08E+01 (2.81E-04)	1.09E+02 - (1.11E+00)	1.04E+02 - (5.11E-01)	1.03E+02 - (6.00E-01)	1.02E+02 (1.77E-01)
	F18	1.02E+02 - (8.38E+00)	8.25E+01 - (1.16E+01)	7.65E+01 = (8.12E+00)	7.51E+01 (8.04E+00)	2.75E+02 - (1.57E+01)	2.24E+02 = (3.12E+01)	1.92E+02 = (2.57E+01)	2.10E+02 (2.81E+01)
	F19	2.45E+00 = (2.21E-01)	2.36E+00 = (2.09E-01)	2.26E+00 = (2.68E-01)	2.34E+00 (2.92E-01)	7.67E+00 - (4.39E-01)	7.16E+00 = (4.89E-01)	7.05E+00 = (5.73E-01)	6.90E+00 (5.35E-01)
	F20	1.83E+01 - (4.73E-01)	1.76E+01 - (6.47E-01)	1.75E+01 = (7.53E-01)	1.73E+01 (8.16E-01)	4.97E+01 = (1.31E+00)	5.00E+01 = (2.53E-01)	4.99E+01 + (2.24E-01)	4.99E+01 (2.44E-01)
Composition Functions	F21	6.16E+02 = (4.63E+02)	5.74E+02 = (4.53E+02)	7.31E+02 = (4.52E+02)	5.62E+02 (4.55E+02)	3.30E+02 = (4.66E+01)	3.47E+02 = (5.07E+01)	3.47E+02 - (5.07E+01)	3.33E+02 (4.79E+01)
	F22	3.17E+01 - (5.66E+00)	1.59E+01 - (2.13E+00)	1.36E+01 - (1.42E+00)	1.24E+01 (1.01E+00)	3.40E+02 - (9.68E+01)	1.54E+02 - (2.29E+01)	1.49E+02 - (4.86E+01)	8.32E+01 (1.43E+01)
	F23	5.54E+03 - (6.21E+02)	4.97E+03 = (6.34E+02)	4.57E+03 + (8.28E+02)	5.10E+03 (6.94E+02)	1.46E+04 - (9.21E+02)	1.24E+04 = (1.20E+03)	1.13E+04 + (1.10E+03)	1.21E+04 (1.17E+03)
	F24	2.03E+02 = (3.74E+00)	2.04E+02 = (4.84E+00)	2.15E+02 - (9.21E+00)	2.04E+02 (3.52E+00)	2.25E+02 = (5.38E+00)	2.25E+02 = (5.53E+00)	2.44E+02 - (1.49E+01)	2.25E+02 (6.70E+00)
	F25	2.73E+02 = (5.97E+00)	2.76E+02 = (6.30E+00)	2.81E+02 - (7.08E+00)	2.75E+02 (6.02E+00)	3.81E+02 = (9.62E+00)	3.86E+02 - (1.16E+01)	3.97E+02 - (1.54E+01)	3.79E+02 (1.06E+01)
	F26	2.37E+02 - (5.12E+01)	2.51E+02 - (5.28E+01)	2.30E+02 - (4.90E+01)	2.20E+02 (4.32E+01)	3.48E+02 = (9.96E+00)	3.40E+02 = (6.37E+00)	3.48E+02 - (1.02E+01)	3.45E+02 (7.56E+00)
	F27	3.61E+02 = (6.37E+01)	3.64E+02 = (6.15E+01)	4.44E+02 - (1.05E+02)	3.61E+02 (5.76E+01)	5.78E+02 = (8.68E+01)	5.61E+02 = (6.02E+01)	7.91E+02 - (1.60E+02)	5.52E+02 (6.21E+01)
	F28	4.00E+02 = (3.85E-13)	4.00E+02 = (2.82E-13)	4.00E+02 = (2.82E-13)	4.00E+02 (3.92E-13)	3.74E+03 = (1.04E+03)	3.66E+03 = (1.04E+03)	3.29E+03 = (1.02E+03)	3.32E+03 (1.04E+03)
win tie lose		**13** **15** **0**	**7** **21** **0**	**13** **13** **2**		**11** **17** **0**	**7** **21** **0**	**14** **10** **4**	
		Variant-oppo	Variant-random	Variant-TAE	EaDE	Variant-oppo	Variant-random	Variant-TAE	EaDE

Table S2 Performance comparisons of EaDE with the components on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		10-D				30-D			
		SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE	SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	1.15E+02 - (2.41E+02)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F3	5.60E-03 = (1.94E-02)	1.31E-01 = (8.84E-01)	7.00E-03 = (2.14E-02)	8.39E-03 (2.32E-02)	5.34E+02 - (2.11E+03)	1.34E-04 = (9.29E-04)	1.94E-06 = (8.14E-06)	8.13E-04 (4.85E-03)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	8.08E+00 - (3.78E+00)	1.35E+00 = (3.41E+00)	1.35E+00 = (3.41E+00)	1.73E+00 (3.78E+00)	5.18E-01 - (3.70E+00)	5.18E-01 = (3.70E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F7	7.33E-06 = (1.90E-05)	1.01E-05 = (2.47E-05)	8.67E-06 = (2.36E-05)	8.59E-06 (2.59E-05)	1.84E+00 - (1.06E+00)	2.03E-01 = (2.08E-01)	3.14E-01 = (3.90E-01)	3.38E-01 (3.67E-01)
	F8	2.03E+01 - (7.07E-02)	2.01E+01 = (1.48E-01)	2.02E+01 = (1.64E-01)	2.01E+01 (1.51E-01)	2.09E+01 - (5.85E-02)	2.07E+01 = (1.40E-01)	2.08E+01 - (1.24E-01)	2.07E+01 (1.83E-01)
	F9	1.91E+00 - (1.23E+00)	1.14E+00 = (1.43E+00)	1.99E+00 = (1.62E+00)	1.34E+00 (1.18E+00)	1.97E+01 = (5.96E+00)	2.51E+01 - (2.96E+00)	2.67E+01 - (1.72E+00)	2.24E+01 (2.86E+00)
	F10	6.28E-04 + (2.65E-03)	3.79E-02 - (4.20E-02)	8.74E-03 - (1.19E-02)	5.17E-03 (1.29E-02)	8.89E-03 - (6.29E-03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F11	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F12	1.40E+00 = (1.07E+00)	4.37E+00 - (2.05E+00)	2.68E+00 - (1.28E+00)	1.89E+00 (1.31E+00)	3.60E+00 - (2.64E+00)	6.97E+00 - (1.79E+00)	5.95E+00 - (1.47E+00)	2.73E+00 (2.45E+00)
	F13	1.08E+00 = (1.20E+00)	2.49E+00 - (2.00E+00)	1.95E+00 - (7.83E-01)	1.21E+00 (1.12E+00)	6.04E+00 - (6.30E+00)	8.53E+00 - (3.64E+00)	6.89E+00 - (3.71E+00)	1.63E+00 (2.40E+00)
	F14	1.96E-02 = (3.42E-02)	3.43E-02 = (4.73E-02)	4.78E-02 - (6.19E-02)	2.33E-02 (3.74E-02)	3.96E+00 - (2.35E+00)	1.51E-02 = (1.77E-02)	3.06E-02 = (2.65E-02)	1.10E-02 (1.34E-02)
	F15	3.08E+02 = (1.07E+02)	4.47E+02 - (2.28E+02)	2.87E+02 = (1.27E+02)	3.00E+02 (1.06E+02)	2.57E+03 = (5.01E+02)	2.71E+03 = (4.50E+02)	2.51E+03 = (3.15E+02)	2.59E+03 (3.05E+02)
	F16	3.39E-01 - (1.81E-01)	9.88E-02 = (1.29E-01)	1.73E-01 - (1.43E-01)	1.38E-01 (1.74E-01)	8.00E-01 - (4.21E-01)	1.55E-01 = (1.17E-01)	5.29E-01 - (3.10E-01)	2.18E-01 (1.86E-01)
	F17	1.01E+01 = (1.85E-14)	1.01E+01 = (1.12E-14)	1.01E+01 = (7.99E-15)	1.01E+01 (1.35E-14)	3.05E+01 - (3.96E-02)	3.04E+01 - (6.79E-14)	3.04E+01 - (1.32E-06)	3.04E+01 (9.43E-07)
	F18	1.16E+01 + (1.12E+00)	1.71E+01 - (2.88E+00)	1.40E+01 - (1.41E+00)	1.23E+01 (1.84E+00)	3.86E+01 + (4.07E+00)	5.53E+01 - (7.75E+00)	5.00E+01 - (3.46E+00)	4.05E+01 (4.59E+00)
	F19	2.25E-01 = (4.14E-02)	2.31E-01 = (4.76E-02)	2.38E-01 = (3.75E-02)	2.32E-01 (5.60E-02)	1.13E+00 = (1.26E-01)	1.30E+00 - (1.20E-01)	1.22E+00 - (1.09E-01)	1.15E+00 (1.27E-01)
	F20	1.90E+00 = (4.16E-01)	1.98E+00 = (3.15E-01)	1.85E+00 = (3.15E-01)	1.89E+00 (3.04E-01)	1.02E+01 = (1.51E+00)	1.19E+01 - (2.04E+00)	1.31E+01 - (1.85E+00)	1.05E+01 (1.41E+00)
Composition Functions	F21	3.96E+02 = (2.80E+01)	3.96E+02 = (2.80E+01)	3.96E+02 = (2.80E+01)	4.00E+02 (0.00E+00)	3.04E+02 - (3.18E+01)	2.89E+02 = (4.11E+01)	2.94E+02 = (2.38E+01)	2.92E+02 (2.72E+01)
	F22	7.16E+00 - (3.39E+00)	5.98E+00 = (1.42E+01)	1.20E+01 = (2.27E+01)	1.03E+01 (2.34E+01)	1.16E+02 - (2.97E+00)	1.07E+02 = (1.84E+00)	1.08E+02 - (1.50E+00)	1.07E+02 (1.73E+00)
	F23	2.11E+02 = (1.44E+02)	3.85E+02 - (2.30E+02)	2.55E+02 - (1.43E+02)	2.04E+02 (1.15E+02)	2.08E+03 = (5.36E+02)	2.83E+03 - (4.52E+02)	2.52E+03 - (2.68E+02)	2.24E+03 (3.87E+02)
	F24	2.03E+02 + (3.25E+00)	2.02E+02 = (1.44E+01)	2.04E+02 = (3.19E+00)	2.04E+02 (3.59E+00)	2.04E+02 - (3.68E+00)	2.00E+02 - (2.06E-02)	2.00E+02 = (2.21E-01)	2.00E+02 (5.33E-01)
	F25	2.00E+02 + (1.08E+00)	2.01E+02 = (2.00E+00)	2.01E+02 = (2.09E+00)	1.99E+02 (1.42E+01)	2.44E+02 - (4.63E+00)	2.38E+02 = (4.04E+00)	2.39E+02 = (4.81E+00)	2.39E+02 (3.91E+00)
	F26	1.38E+02 = (4.67E+01)	1.48E+02 - (4.77E+01)	1.48E+02 - (4.85E+01)	1.40E+02 (4.84E+01)	2.00E+02 - (6.88E-06)	2.00E+02 - (1.44E-13)	2.00E+02 - (1.97E-13)	2.00E+02 (1.11E-13)
	F27	3.00E+02 = (0.00E+00)	3.07E+02 = (3.49E+01)	3.04E+02 = (2.55E+01)	3.04E+02 (2.54E+01)	3.19E+02 - (1.44E+01)	3.00E+02 = (8.51E-01)	3.00E+02 = (4.85E-01)	3.00E+02 (2.78E-01)
	F28	3.00E+02 = (0.00E+00)	2.96E+02 = (2.80E+01)	2.92E+02 = (3.92E+01)	3.00E+02 (0.00E+00)	3.00E+02 - (1.20E-13)	3.00E+02 = (0.00E+00)	3.00E+02 = (0.00E+00)	3.00E+02 (0.00E+00)
win tie lose		**5** **19** **4**	**7** **21** **0**	**8** **20** **0**		**18** **9** **1**	**10** **18** **0**	**12** **16** **0**	
		SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE	SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE

Table S2 (Continued) Performance comparisons of EaDE with the components on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		50-D				100-D			
		SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE	SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	1.94E+04 - (1.08E+04)	3.47E+01 = (6.22E+01)	3.83E+01 = (9.38E+01)	1.99E+01 (5.33E+01)	1.41E+05 - (3.24E+04)	1.09E+05 = (4.48E+04)	9.74E+04 = (3.10E+04)	1.03E+05 (2.54E+04)
	F3	2.85E+05 - (6.77E+05)	9.43E+02 = (2.52E+03)	6.20E+02 = (2.15E+03)	2.31E+03 (5.30E+03)	1.05E+07 - (1.03E+07)	3.83E+06 = (3.38E+06)	3.04E+06 = (3.59E+06)	2.81E+06 (2.51E+06)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	1.55E-04 + (1.18E-04)	4.72E-04 = (3.45E-04)	4.93E-04 = (4.13E-04)	4.81E-04 (3.61E-04)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.34E+01 + (5.28E-14)	4.34E+01 = (0.00E+00)	4.34E+01 = (0.00E+00)	4.34E+01 (0.00E+00)	1.62E+02 + (4.39E+01)	2.15E+02 = (2.73E+01)	2.18E+02 = (2.96E+01)	2.16E+02 (2.88E+01)
	F7	5.05E+00 - (1.75E+00)	7.62E-01 = (7.12E-01)	7.64E-01 = (8.52E-01)	7.01E-01 (7.35E-01)	1.16E+01 - (3.19E+00)	5.56E+00 = (1.50E+00)	5.85E+00 = (2.11E+00)	6.29E+00 (2.26E+00)
	F8	2.11E+01 - (2.72E-02)	2.09E+01 = (1.60E-01)	2.10E+01 = (1.21E-01)	2.10E+01 (1.24E-01)	2.13E+01 - (2.76E-02)	2.12E+01 = (9.32E-02)	2.12E+01 = (4.82E-02)	2.12E+01 (8.77E-02)
	F9	2.34E+01 + (5.06E+00)	5.28E+01 - (1.59E+00)	5.37E+01 - (1.74E+00)	4.53E+01 (8.18E+00)	1.27E+02 - (1.31E+01)	1.29E+02 - (7.34E+00)	1.34E+02 - (2.14E+00)	1.23E+02 (1.09E+01)
	F10	2.99E-02 - (2.56E-02)	3.91E-03 = (4.65E-03)	3.62E-03 = (4.76E-03)	3.58E-03 (4.25E-03)	1.81E-02 = (1.41E-02)	2.00E-02 = (1.65E-02)	1.08E-02 + (9.45E-03)	1.40E-02 (1.04E-02)
	F11	2.94E-04 - (6.52E-04)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	1.10E+01 - (1.71E+00)	2.23E-04 - (1.26E-04)	7.38E-04 - (7.24E-04)	6.73E-05 (2.56E-05)
	F12	1.79E+01 - (5.20E+00)	1.45E+01 - (3.29E+00)	1.20E+01 - (2.38E+00)	9.63E+00 (3.26E+00)	7.14E+01 - (1.25E+01)	5.61E+01 - (7.86E+00)	4.72E+01 = (4.92E+00)	4.24E+01 (9.24E+00)
	F13	6.26E+01 - (2.87E+01)	1.97E+01 - (7.84E+00)	1.70E+01 - (7.21E+00)	1.03E+01 (7.26E+00)	1.97E+02 - (2.98E+01)	1.24E+02 - (2.11E+01)	1.07E+02 = (2.66E+01)	1.10E+02 (3.19E+01)
	F14	3.53E+01 - (9.36E+00)	1.60E-01 = (3.87E-02)	1.93E-01 - (4.81E-02)	1.53E-01 (5.05E-02)	8.46E+02 - (1.30E+02)	1.47E+02 = (3.75E+02)	6.69E+01 + (1.38E+01)	8.68E+01 (1.88E+01)
	F15	6.05E+03 = (7.58E+02)	6.47E+03 - (4.96E+02)	6.01E+03 = (4.67E+02)	6.06E+03 (5.96E+02)	1.37E+04 = (1.19E+03)	1.59E+04 - (1.13E+03)	1.51E+04 - (8.09E+02)	1.30E+04 (1.16E+03)
	F16	1.33E+00 - (5.23E-01)	2.18E-01 + (1.47E-01)	8.75E-01 - (4.54E-01)	5.85E-01 (4.49E-01)	1.98E+00 - (7.40E-01)	4.53E-01 + (2.94E-01)	1.63E+00 - (5.66E-01)	8.20E-01 (3.98E-01)
	F17	5.18E+01 - (2.44E-01)	5.08E+01 - (3.44E-04)	5.08E+01 - (2.18E-03)	5.08E+01 (2.81E-04)	1.15E+02 - (1.51E+00)	1.03E+02 - (2.72E-01)	1.03E+02 - (2.76E-01)	1.02E+02 (1.77E-01)
	F18	7.10E+01 + (5.46E+00)	1.13E+02 - (1.14E+01)	9.76E+01 - (5.81E+00)	7.51E+01 (8.04E+00)	1.94E+02 + (2.29E+01)	2.85E+02 - (3.47E+01)	2.62E+02 - (1.29E+01)	2.10E+02 (2.81E+01)
	F19	2.52E+00 - (2.27E-01)	2.94E+00 - (2.39E-01)	2.57E+00 - (1.47E-01)	2.34E+00 (2.92E-01)	7.47E+00 - (4.05E-01)	8.66E+00 - (4.44E-01)	7.44E+00 - (3.60E-01)	6.90E+00 (5.35E-01)
	F20	1.72E+01 = (9.62E-01)	1.98E+01 - (7.09E-01)	1.87E+01 - (2.05E+00)	1.73E+01 (8.16E-01)	5.00E+01 = (1.24E-01)	5.00E+01 = (5.83E-06)	5.00E+01 = (8.45E-08)	4.99E+01 (2.44E-01)
Composition Functions	F21	1.09E+03 - (1.44E+02)	5.44E+02 = (4.50E+02)	6.70E+02 - (4.66E+02)	5.62E+02 (4.55E+02)	3.87E+02 - (3.46E+01)	3.33E+02 = (4.79E+01)	3.30E+02 = (4.66E+01)	3.33E+02 (4.79E+01)
	F22	5.86E+01 - (9.67E+00)	1.27E+01 = (1.53E+00)	1.43E+01 - (1.57E+00)	1.24E+01 (1.01E+00)	7.16E+02 - (1.10E+02)	8.70E+01 = (1.17E+01)	9.89E+01 - (2.23E+01)	8.32E+01 (1.43E+01)
	F23	4.39E+03 + (7.70E+02)	6.14E+03 - (6.62E+02)	5.38E+03 - (4.48E+02)	5.10E+03 (6.94E+02)	1.24E+04 = (1.42E+03)	1.51E+04 - (1.56E+03)	1.43E+04 - (7.05E+02)	1.21E+04 (1.17E+03)
	F24	2.21E+02 - (5.34E+00)	2.05E+02 = (5.52E+00)	2.03E+02 + (3.24E+00)	2.04E+02 (3.52E+00)	2.51E+02 - (8.52E+00)	2.24E+02 = (6.14E+00)	2.25E+02 = (5.76E+00)	2.25E+02 (6.70E+00)
	F25	2.86E+02 - (7.29E+00)	2.75E+02 = (6.43E+00)	2.75E+02 = (5.92E+00)	2.75E+02 (6.02E+00)	4.03E+02 - (9.35E+00)	3.77E+02 = (1.15E+01)	3.84E+02 - (9.71E+00)	3.79E+02 (1.06E+01)
	F26	2.29E+02 - (5.01E+01)	2.28E+02 = (4.59E+01)	2.33E+02 = (4.90E+01)	2.20E+02 (4.32E+01)	3.59E+02 - (6.23E+00)	3.15E+02 + (8.72E+00)	3.35E+02 + (5.79E+00)	3.45E+02 (7.56E+00)
	F27	5.02E+02 - (9.58E+01)	3.60E+02 = (5.80E+01)	3.55E+02 = (4.84E+01)	3.61E+02 (5.76E+01)	8.30E+02 - (9.47E+01)	5.70E+02 = (8.66E+01)	5.82E+02 = (8.99E+01)	5.52E+02 (6.21E+01)
	F28	4.00E+02 + (3.31E-13)	4.00E+02 = (2.82E-13)	4.00E+02 = (2.84E-13)	4.00E+02 (3.92E-13)	2.77E+03 = (6.61E+02)	4.02E+03 - (9.31E+02)	3.46E+03 = (1.05E+03)	3.32E+03 (1.04E+03)
win tie lose		**18** **5** **5**	**9** **18** **1**	**12** **15** **1**		**18** **7** **3**	**10** **16** **2**	**10** **15** **3**	
		SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE	SCSS-L-CIPDE_GD0.9	SCSS-L-SHADE_GD0.1	SCSS-L-SHADE_GD0.5	EaDE

Table S3 Performance comparisons of different adaptation methods on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		10-D			30-D		
		Variant-Sa	Variant-SaM	EaDE	Variant-Sa	Variant-SaM	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	3.41E-01 - (1.35E+00)	0.00E+00 (0.00E+00)
	F3	7.00E-03 = (2.14E-02)	2.80E-03 = (1.40E-02)	8.39E-03 (2.32E-02)	5.23E-02 - (3.07E-01)	1.15E+02 - (3.29E+02)	8.13E-04 (4.85E-03)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	9.62E-01 = (2.95E+00)	8.66E+00 - (3.19E+00)	1.73E+00 (3.78E+00)	7.56E-10 = (5.40E-09)	1.72E-07 - (7.47E-07)	0.00E+00 (0.00E+00)
	F7	1.29E-05 - (3.59E-05)	3.78E-06 = (8.71E-06)	8.59E-06 (2.59E-05)	3.15E-01 = (3.60E-01)	1.65E+00 - (1.08E+00)	3.38E-01 (3.67E-01)
	F8	2.02E+01 - (1.26E-01)	2.03E+01 - (1.39E-01)	2.01E+01 (1.51E-01)	2.08E+01 - (1.06E-01)	2.08E+01 = (1.38E-01)	2.07E+01 (1.83E-01)
	F9	8.37E-01 + (1.08E+00)	1.02E+00 = (1.13E+00)	1.34E+00 (1.18E+00)	2.11E+01 = (3.96E+00)	1.85E+01 + (5.91E+00)	2.24E+01 (2.86E+00)
	F10	6.47E-03 - (8.13E-03)	2.27E-03 = (4.54E-03)	5.17E-03 (1.29E-02)	0.00E+00 = (0.00E+00)	5.95E-03 - (4.66E-03)	0.00E+00 (0.00E+00)
	F11	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	2.01E+00 - (3.22E+00)	0.00E+00 (0.00E+00)
	F12	2.22E+00 = (1.66E+00)	1.56E+00 = (1.21E+00)	1.89E+00 (1.31E+00)	3.37E+00 = (2.74E+00)	3.25E+00 = (2.91E+00)	2.73E+00 (2.45E+00)
	F13	1.32E+00 = (1.40E+00)	1.00E+00 = (1.16E+00)	1.21E+00 (1.12E+00)	2.32E+00 = (2.33E+00)	5.01E+00 - (5.98E+00)	1.63E+00 (2.40E+00)
	F14	7.92E-02 + (5.30E-01)	1.97E+00 - (4.37E+00)	2.33E-02 (3.74E-02)	3.85E+00 - (2.71E+01)	5.10E+01 - (1.49E+02)	1.10E-02 (1.34E-02)
	F15	2.91E+02 = (1.48E+02)	3.18E+02 = (1.62E+02)	3.00E+02 (1.06E+02)	2.51E+03 = (5.49E+02)	2.51E+03 = (5.62E+02)	2.59E+03 (3.05E+02)
	F16	3.03E-01 - (2.91E-01)	4.18E-01 - (3.72E-01)	1.38E-01 (1.74E-01)	5.93E-01 - (5.27E-01)	8.84E-01 - (6.61E-01)	2.18E-01 (1.86E-01)
	F17	1.01E+01 = (3.61E-02)	1.02E+01 - (2.65E-01)	1.01E+01 (1.35E-14)	3.04E+01 - (2.59E-06)	3.35E+01 - (5.23E+00)	3.04E+01 (9.43E-07)
	F18	1.30E+01 - (2.18E+00)	1.24E+01 = (1.85E+00)	1.23E+01 (1.84E+00)	4.15E+01 = (5.79E+00)	4.62E+01 = (1.93E+01)	4.05E+01 (4.59E+00)
	F19	2.19E-01 = (4.86E-02)	2.43E-01 = (7.07E-02)	2.32E-01 (5.60E-02)	1.07E+00 = (1.29E-01)	1.07E+00 = (1.48E-01)	1.15E+00 (1.27E-01)
	F20	1.81E+00 = (2.98E-01)	1.85E+00 = (3.81E-01)	1.89E+00 (3.04E-01)	9.91E+00 + (1.24E+00)	1.04E+01 = (1.59E+00)	1.05E+01 (1.41E+00)
Composition Functions	F21	4.00E+02 = (0.00E+00)	4.00E+02 = (0.00E+00)	4.00E+02 (0.00E+00)	2.99E+02 = (2.85E+01)	2.92E+02 = (2.72E+01)	2.92E+02 (2.72E+01)
	F22	1.02E+01 = (1.93E+01)	1.37E+01 - (2.11E+01)	1.03E+01 (2.34E+01)	1.08E+02 - (2.16E+00)	1.32E+02 - (7.07E+01)	1.07E+02 (1.73E+00)
	F23	2.12E+02 = (1.56E+02)	1.99E+02 = (1.48E+02)	2.04E+02 (1.15E+02)	2.28E+03 = (4.78E+02)	2.26E+03 = (7.06E+02)	2.24E+03 (3.87E+02)
	F24	1.98E+02 + (1.96E+01)	1.98E+02 + (1.76E+01)	2.04E+02 (3.59E+00)	2.00E+02 = (5.66E-02)	2.02E+02 - (2.31E+00)	2.00E+02 (5.33E-01)
	F25	1.99E+02 = (1.34E+01)	2.00E+02 + (5.42E-05)	1.99E+02 (1.42E+01)	2.39E+02 = (3.48E+00)	2.44E+02 - (5.13E+00)	2.39E+02 (3.91E+00)
	F26	1.35E+02 = (4.63E+01)	1.33E+02 = (4.58E+01)	1.40E+02 (4.84E+01)	2.00E+02 = (1.01E-13)	2.00E+02 - (4.27E-08)	2.00E+02 (1.11E-13)
	F27	3.00E+02 = (0.00E+00)	3.00E+02 = (0.00E+00)	3.04E+02 (2.54E+01)	3.00E+02 = (1.97E-01)	3.10E+02 - (9.92E+00)	3.00E+02 (2.78E-01)
	F28	3.00E+02 = (0.00E+00)	3.00E+02 = (0.00E+00)	3.00E+02 (0.00E+00)	3.00E+02 = (3.22E-14)	3.00E+02 - (1.61E-13)	3.00E+02 (0.00E+00)
win tie lose		**5** **20** **3**	**6** **20** **2**		**6** **21** **1**	**16** **11** **1**	
		Variant-Sa	Variant-SaM	EaDE	Variant-Sa	Variant-SaM	EaDE

Table S3 (Continued) Performance comparisons of different adaptation methods on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		50-D			100-D		
		Variant-Sa	Variant-SaM	EaDE	Variant-Sa	Variant-SaM	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	5.00E+02 - (6.77E+02)	1.39E+04 - (8.44E+03)	1.99E+01 (5.33E+01)	1.45E+05 - (3.72E+04)	1.35E+05 - (3.44E+04)	1.03E+05 (2.54E+04)
	F3	1.63E+04 = (6.19E+04)	2.90E+05 - (5.83E+05)	2.31E+03 (5.30E+03)	3.29E+06 = (3.76E+06)	1.92E+07 - (2.48E+07)	2.81E+06 (2.51E+06)
	F4	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	1.27E-04 + (1.03E-04)	8.24E-07 + (6.66E-07)	4.81E-04 (3.61E-04)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.34E+01 = (0.00E+00)	4.34E+01 + (4.42E-14)	4.34E+01 (0.00E+00)	2.24E+02 = (2.24E+01)	1.92E+02 + (2.67E+01)	2.16E+02 (2.88E+01)
	F7	1.36E+00 - (1.24E+00)	4.34E+00 - (1.98E+00)	7.01E-01 (7.35E-01)	5.37E+00 + (1.95E+00)	1.32E+01 - (3.10E+00)	6.29E+00 (2.26E+00)
	F8	2.11E+01 - (1.00E-01)	2.11E+01 - (1.05E-01)	2.10E+01 (1.24E-01)	2.13E+01 - (4.96E-02)	2.13E+01 - (7.09E-02)	2.12E+01 (8.77E-02)
	F9	3.22E+01 + (1.30E+01)	2.24E+01 + (4.46E+00)	4.53E+01 (8.18E+00)	1.16E+02 + (1.73E+01)	1.23E+02 = (1.69E+01)	1.23E+02 (1.09E+01)
	F10	4.35E-03 = (5.56E-03)	1.87E-02 - (1.16E-02)	3.58E-03 (4.25E-03)	1.32E-02 = (1.21E-02)	1.43E-02 = (1.15E-02)	1.40E-02 (1.04E-02)
	F11	9.04E-08 = (6.46E-07)	5.44E+00 - (8.81E+00)	0.00E+00 (0.00E+00)	1.60E-01 - (7.75E-01)	7.93E+00 - (1.66E+01)	6.73E-05 (2.56E-05)
	F12	9.85E+00 = (3.39E+00)	1.81E+01 - (5.45E+00)	9.63E+00 (3.26E+00)	4.10E+01 = (1.38E+01)	5.46E+01 - (7.58E+00)	4.24E+01 (9.24E+00)
	F13	1.35E+01 = (1.08E+01)	4.41E+01 - (2.24E+01)	1.03E+01 (7.26E+00)	8.30E+01+ (3.15E+01)	1.75E+02 - (4.32E+01)	1.10E+02 (3.19E+01)
	F14	2.22E+01 - (9.31E+01)	7.16E+01 - (2.73E+02)	1.53E-01 (5.05E-02)	3.84E+02 - (2.06E+02)	4.10E+02 - (1.25E+03)	8.68E+01 (1.88E+01)
	F15	6.11E+03 = (8.44E+02)	6.69E+03 - (1.53E+03)	6.06E+03 (5.96E+02)	1.35E+04 = (1.81E+03)	1.45E+04 = (4.05E+03)	1.30E+04 (1.16E+03)
	F16	9.56E-01 - (8.10E-01)	1.40E+00 - (8.65E-01)	5.85E-01 (4.49E-01)	1.25E+00 - (4.82E-01)	2.24E+00 - (1.01E+00)	8.20E-01 (3.98E-01)
	F17	5.08E+01 - (2.44E-02)	6.54E+01 - (1.63E+01)	5.08E+01 (2.81E-04)	1.07E+02 - (7.86E-01)	1.20E+02 - (3.62E+01)	1.02E+02 (1.77E-01)
	F18	7.46E+01 = (1.07E+01)	8.75E+01 = (5.07E+01)	7.51E+01 (8.04E+00)	2.31E+02 - (4.27E+01)	2.42E+02 = (7.26E+01)	2.10E+02 (2.81E+01)
	F19	2.52E+00 - (2.00E-01)	2.31E+00 + (2.41E-01)	2.34E+00 (2.92E-01)	8.25E+00 - (3.53E-01)	7.59E+00 - (5.51E-01)	6.90E+00 (5.35E-01)
	F20	1.77E+01 - (6.56E-01)	1.73E+01 = (1.13E+00)	1.73E+01 (8.16E-01)	4.99E+01 = (2.36E-01)	4.97E+01 + (2.58E-01)	4.99E+01 (2.44E-01)
Composition Functions	F21	8.45E+02 - (4.23E+02)	9.80E+02 - (3.02E+02)	5.62E+02 (4.55E+02)	3.63E+02 - (4.90E+01)	3.90E+02 - (3.05E+01)	3.33E+02 (4.79E+01)
	F22	2.01E+01 - (5.33E+00)	3.47E+01 - (8.74E+01)	1.24E+01 (1.01E+00)	3.04E+02 - (6.99E+01)	3.98E+02 - (9.71E+02)	8.32E+01 (1.43E+01)
	F23	4.47E+03 + (8.06E+02)	4.50E+03 + (8.83E+02)	5.10E+03 (6.94E+02)	1.15E+04 = (1.44E+03)	1.22E+04 = (3.06E+03)	1.21E+04 (1.17E+03)
	F24	2.03E+02 = (2.93E+00)	2.18E+02 - (6.92E+00)	2.04E+02 (3.52E+00)	2.23E+02 = (6.69E+00)	2.54E+02 - (8.82E+00)	2.25E+02 (6.70E+00)
	F25	2.76E+02 = (6.59E+00)	2.83E+02 - (7.01E+00)	2.75E+02 (6.02E+00)	3.78E+02 = (7.99E+00)	4.02E+02 - (1.12E+01)	3.79E+02 (1.06E+01)
	F26	2.30E+02 = (4.76E+01)	2.30E+02 - (4.93E+01)	2.20E+02 (4.32E+01)	3.29E+02 + (6.93E+00)	3.44E+02 = (6.15E+00)	3.45E+02 (7.56E+00)
	F27	3.49E+02 = (4.23E+01)	4.89E+02 - (8.34E+01)	3.61E+02 (5.76E+01)	5.33E+02 = (1.03E+02)	8.45E+02 - (1.10E+02)	5.52E+02 (6.21E+01)
	F28	4.00E+02 + (3.43E-13)	4.00E+02 + (3.31E-13)	4.00E+02 (3.92E-13)	2.89E+03 + (8.47E+02)	2.60E+03 = (3.96E+02)	3.32E+03 (1.04E+03)
win tie lose		**10** **15** **3**	**18** **5** **5**		**10** **12** **6**	**16** **9** **3**	
		Variant-Sa	Variant-SaM	EaDE	Variant-Sa	Variant-SaM	EaDE

Table S4 Performance comparisons of EaDE with state-of-the art DEs on 10-D CEC2013 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	9.75E+02- (1.18E+03)	0.00E+00= (0.00E+00)	4.93E-10= (2.70E-09)	0.00E+00= (0.00E+00)	5.40E-06- (2.52E-05)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F3	2.75E+00- (3.21E+00)	9.46E-01- (2.16E+00)	2.50E+00- (8.10E+00)	2.85E+00= (1.43E+01)	1.70E+00- (2.67E+00)	3.18E+01- (5.81E+01)	2.38E-03= (1.30E-02)	2.38E-03+ (1.30E-02)	8.39E-03 (2.32E-02)
	F4	3.17E-02- (1.16E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	1.36E-09= (4.22E-09)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F5	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.58E+00- (4.98E+00)	6.54E-01= (2.49E+00)	2.62E+00- (4.41E+00)	8.50E+00- (3.39E+00)	5.89E+00- (4.89E+00)	6.21E+00- (4.81E+00)	4.91E+00- (4.99E+00)	6.54E-01= (2.49E+00)	1.73E+00 (3.78E+00)
	F7	1.11E-02- (1.85E-02)	1.97E-02- (4.61E-02)	5.39E-02- (3.14E-02)	2.05E-03- (2.62E-03)	2.06E-03- (2.71E-03)	9.61E-02- (2.55E-01)	1.50E-05= (3.41E-05)	4.31E-06= (9.66E-06)	8.59E-06 (2.59E-05)
	F8	2.03E+01- (7.41E-02)	2.01E+01= (1.11E-01)	2.03E+01- (7.39E-02)	2.04E+01- (7.22E-02)	2.04E+01- (8.59E-02)	2.03E+01- (7.97E-02)	2.02E+01- (1.57E-01)	2.04E+01- (8.28E-02)	2.01E+01 (1.51E-01)
	F9	5.69E-01= (7.18E-01)	1.04E+00+ (8.97E-01)	2.55E+00- (1.37E+00)	1.98E+00- (9.73E-01)	1.55E+00= (1.71E+00)	3.76E+00- (8.00E-01)	2.47E+00- (1.36E+00)	8.50E-01= (9.57E-01)	1.34E+00 (1.18E+00)
	F10	3.29E-02- (3.03E-02)	5.16E-02- (3.78E-02)	6.66E-03= (1.12E-02)	4.88E-03= (6.83E-03)	5.18E-02- (3.06E-02)	1.66E-02- (1.04E-02)	2.30E-03+ (5.71E-03)	0.00E+00+ (0.00E+00)	5.17E-03 (1.29E-02)
	F11	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	1.17E-07- (1.31E-07)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F12	4.65E+00- (2.15E+00)	7.79E+00- (3.08E+00)	7.99E+00- (2.18E+00)	1.69E+00= (1.05E+00)	1.05E+01- (2.96E+00)	4.54E+00- (1.39E+00)	1.90E+00- (7.94E-01)	2.39E+00- (6.71E-01)	1.89E+00 (1.31E+00)
	F13	5.59E+00- (3.32E+00)	1.57E+01- (6.84E+00)	6.73E+00- (2.82E+00)	1.60E+00= (1.17E+00)	1.26E+01- (4.21E+00)	4.89E+00- (1.84E+00)	1.81E+00- (8.87E-01)	2.07E+00- (8.28E-01)	1.21E+00 (1.12E+00)
	F14	1.52E+01- (1.20E+01)	5.83E-02- (5.17E-02)	3.85E+00- (1.88E+00)	1.29E-01- (8.15E-02)	2.08E-03+ (1.14E-02)	1.46E-02= (2.69E-02)	2.08E-02= (3.41E-02)	3.66E-02= (5.26E-02)	2.33E-02 (3.74E-02)
	F15	1.08E+03- (1.57E+02)	4.87E+02- (1.62E+02)	1.01E+03- (1.84E+02)	3.26E+02= (1.54E+02)	1.02E+03- (1.82E+02)	4.74E+02- (1.40E+02)	2.68E+02= (1.06E+02)	2.95E+02= (1.09E+02)	3.00E+02 (1.06E+02)
	F16	1.08E+00- (2.42E-01)	5.89E-02= (4.87E-02)	1.15E+00- (1.68E-01)	1.06E+00- (2.66E-01)	1.07E+00- (1.58E-01)	9.46E-01- (3.86E-01)	2.52E-01- (1.58E-01)	1.09E+00- (2.49E-01)	1.38E-01 (1.74E-01)
	F17	1.23E+01- (5.52E-01)	9.11E+00+ (3.09E+00)	1.03E+01- (4.91E-02)	1.01E+01- (1.71E-02)	1.01E+01- (2.04E-12)	1.01E+01= (1.04E-14)	1.01E+01= (1.44E-14)	1.01E+01- (8.86E-04)	1.01E+01 (1.35E-14)
	F18	2.91E+01- (2.82E+00)	1.74E+01- (3.11E+00)	3.02E+01- (4.04E+00)	1.26E+01= (1.89E+00)	3.35E+01- (3.93E+00)	1.82E+01- (2.12E+00)	1.36E+01- (8.22E-01)	1.35E+01- (1.39E+00)	1.23E+01 (1.84E+00)
	F19	9.15E-01- (1.01E-01)	3.17E-01- (7.89E-02)	5.67E-01- (9.39E-02)	2.66E-01- (5.88E-02)	4.43E-01- (4.96E-02)	3.47E-01- (4.97E-02)	2.38E-01= (3.51E-02)	2.73E-01- (4.38E-02)	2.32E-01 (5.60E-02)
	F20	2.39E+00- (3.35E-01)	2.22E+00- (4.11E-01)	2.68E+00- (2.51E-01)	1.91E+00= (4.17E-01)	2.55E+00- (2.74E-01)	2.20E+00- (3.80E-01)	2.06E+00- (4.11E-01)	1.52E+00+ (2.55E-01)	1.89E+00 (3.04E-01)
Composition Functions	F21	3.94E+02= (3.66E+01)	3.47E+02+ (9.00E+01)	3.63E+02= (8.51E+01)	4.00E+02= (2.89E-13)	3.80E+02= (6.11E+01)	4.00E+02= (2.89E-13)	4.00E+02= (2.89E-13)	3.94E+02= (3.66E+01)	4.00E+02 (0.00E+00)
	F22	8.35E+01- (6.98E+01)	1.85E+01- (2.38E+01)	7.40E+01- (3.62E+01)	3.10E+00= (3.47E+00)	2.28E+01- (1.60E+01)	4.98E+00= (4.09E+00)	1.63E+01- (2.87E+01)	9.04E+00- (1.82E+01)	1.03E+01 (2.34E+01)
	F23	8.65E+02- (1.90E+02)	5.61E+02- (3.10E+02)	1.07E+03- (2.06E+02)	1.76E+02= (1.31E+02)	1.04E+03- (1.86E+02)	5.92E+02- (1.23E+02)	3.07E+02- (1.16E+02)	1.84E+02= (1.29E+02)	2.04E+02 (1.15E+02)
	F24	1.88E+02+ (2.92E+01)	2.03E+02= (3.73E+00)	1.91E+02+ (2.65E+01)	1.98E+02+ (1.23E+01)	1.95E+02+ (2.12E+01)	1.96E+02+ (1.78E+01)	2.00E+02= (1.82E+01)	2.02E+02+ (3.04E+00)	2.04E+02 (3.59E+00)
	F25	2.00E+02= (7.88E-02)	2.01E+02- (2.35E+00)	2.00E+02= (5.13E-02)	1.97E+02= (1.52E+01)	1.98E+02= (1.36E+01)	2.02E+02- (2.65E+00)	2.00E+02+ (8.29E-01)	2.00E+02+ (1.15E+00)	1.99E+02 (1.42E+01)
	F26	1.21E+02- (3.22E+01)	1.42E+02- (4.52E+01)	1.54E+02- (4.39E+01)	1.29E+02= (4.34E+01)	1.21E+02- (2.72E+01)	1.37E+02- (4.21E+01)	1.38E+02= (4.79E+01)	1.06E+02= (1.79E+01)	1.40E+02 (4.84E+01)
	F27	3.00E+02- (6.58E-03)	3.03E+02- (1.83E+01)	3.04E+02- (1.82E+01)	3.00E+02- (6.45E-03)	3.03E+02- (1.83E+01)	3.00E+02- (1.21E-01)	3.06E+02= (3.18E+01)	3.00E+02= (0.00E+00)	3.04E+02 (2.54E+01)
	F28	2.67E+02= (7.58E+01)	2.87E+02= (5.07E+01)	2.87E+02- (5.07E+01)	3.00E+02= (0.00E+00)	2.67E+02= (7.58E+01)	2.93E+02= (3.65E+01)	3.00E+02= (0.00E+00)	3.00E+02= (0.00E+00)	3.00E+02 (0.00E+00)
win tie lose		**20** **7** **1**	**15** **10** **3**	**20** **7** **1**	**9** **18** **1**	**18** **8** **2**	**17** **10** **1**	**10** **16** **2**	**8** **15** **5**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S5 Performance comparisons of EaDE with state-of-the art DEs on 30-D CEC2013 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	1.59E+05 - (7.44E+04)	8.39E+04 - (3.77E+04)	1.30E+01 - (6.06E+01)	1.06E+04 - (6.88E+03)	1.33E+05 - (7.06E+04)	9.98E+03 - (5.33E+03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F3	4.55E+06 - (7.17E+06)	6.37E+05 - (1.41E+06)	2.20E+01 - (1.01E+02)	1.20E+06 - (2.84E+06)	1.52E+06 - (2.67E+06)	1.35E+06 - (5.63E+06)	5.28E-02 = (3.76E-01)	9.06E-08 + (5.30E-07)	8.13E-04 (4.85E-03)
	F4	4.12E+01 - (1.16E+02)	7.27E-02 - (7.77E-02)	7.88E-05 - (2.57E-04)	8.25E+03 - (1.13E+04)	1.72E+01 - (1.52E+01)	1.03E+04 - (1.67E+04)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F5	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	2.20E+01 - (2.43E+01)	1.59E+00 - (5.08E+00)	5.35E-03 - (2.59E-02)	5.18E-01 = (3.70E+00)	1.35E+01 - (9.29E+00)	1.04E+00 = (5.18E+00)	2.16E-09 = (1.54E-08)	2.54E-09 = (1.81E-08)	0.00E+00 (0.00E+00)
	F7	8.71E+00 - (6.98E+00)	9.97E+00 - (7.37E+00)	1.74E+00 - (1.51E+00)	4.54E+00 - (4.05E+00)	1.62E+00 - (1.05E+00)	6.54E+00 - (7.03E+00)	5.44E-01 - (3.78E-01)	1.24E-02 + (2.05E-02)	3.38E-01 (3.67E-01)
	F8	2.09E+01 - (5.66E-02)	2.08E+01 = (1.27E-01)	2.10E+01 - (4.25E-02)	2.09E+01 - (4.68E-02)	2.09E+01 - (5.83E-02)	2.09E+01 - (1.04E-01)	2.09E+01 - (1.00E-01)	2.10E+01 - (4.28E-02)	2.07E+01 (1.83E-01)
	F9	1.44E+01 + (2.44E+00)	1.45E+01 + (2.75E+00)	1.50E+01 + (4.85E+00)	1.86E+01 + (3.47E+00)	2.57E+01 - (3.52E+00)	2.67E+01 - (1.54E+00)	2.63E+01 - (1.73E+00)	2.38E+01 - (3.57E+00)	2.24E+01 (2.86E+00)
	F10	1.86E-01 - (8.53E-02)	3.19E-02 - (2.44E-02)	2.95E-02 - (1.97E-02)	6.18E-02 - (2.79E-02)	3.47E-02 - (2.10E-02)	4.87E-02 - (2.56E-02)	1.11E-03 - (3.17E-03)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F11	2.98E+00 - (1.49E+00)	1.95E-02 = (1.39E-01)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F12	3.12E+01 - (8.99E+00)	4.02E+01 - (1.08E+01)	2.18E+01 - (7.39E+00)	1.55E+01 - (4.05E+00)	5.91E+01 - (1.04E+01)	2.17E+01 - (3.75E+00)	5.54E+00 - (1.70E+00)	9.01E+00 - (2.58E+00)	2.73E+00 (2.45E+00)
	F13	7.76E+01 - (2.24E+01)	7.97E+01 - (2.27E+01)	4.06E+01 - (1.75E+01)	2.22E+01 - (1.06E+01)	9.35E+01 - (1.46E+01)	3.90E+01 - (1.18E+01)	6.02E+00 - (2.39E+00)	1.02E+01 - (4.97E+00)	1.63E+00 (2.40E+00)
	F14	3.37E+02 - (1.06E+02)	2.61E+00 - (2.30E+00)	8.88E+00 - (3.91E+00)	6.05E-01 - (5.61E-01)	1.63E-03 + (5.65E-03)	2.65E-02 - (2.36E-02)	2.29E-02 - (2.21E-02)	1.11E+01 - (5.89E+00)	1.10E-02 (1.34E-02)
	F15	6.08E+03 - (3.74E+02)	3.43E+03 - (5.23E+02)	4.50E+03 - (5.08E+02)	2.68E+03 = (5.72E+02)	5.27E+03 - (3.90E+02)	3.31E+03 - (3.73E+02)	2.72E+03 - (2.45E+02)	2.69E+03 = (3.64E+02)	2.59E+03 (3.05E+02)
	F16	2.33E+00 - (3.25E-01)	3.71E-01 - (2.06E-01)	2.43E+00 - (3.37E-01)	2.08E+00 - (7.61E-01)	2.41E+00 - (3.43E-01)	1.85E+00 - (6.42E-01)	7.66E-01 - (2.17E-01)	2.32E+00 - (3.78E-01)	2.18E-01 (1.86E-01)
	F17	5.00E+01 - (3.49E+00)	3.04E+01 - (5.17E-02)	3.06E+01 - (5.55E-02)	3.05E+01 - (3.74E-02)	3.04E+01 + (9.43E-07)	3.04E+01 + (8.04E-15)	3.04E+01 - (1.32E-06)	3.07E+01 - (1.12E-01)	3.04E+01 (9.43E-07)
	F18	1.65E+02 - (1.20E+01)	6.41E+01 - (1.07E+01)	9.86E+01 - (1.01E+01)	4.02E+01 = (3.76E+00)	1.58E+02 - (1.42E+01)	7.55E+01 - (6.28E+00)	5.20E+01 - (3.55E+00)	5.66E+01 - (6.08E+00)	4.05E+01 (4.59E+00)
	F19	6.90E+00 - (1.25E+00)	1.61E+00 - (3.92E-01)	1.99E+00 - (2.17E-01)	1.04E+00 + (1.78E-01)	1.65E+00 - (1.24E-01)	1.46E+00 - (1.13E-01)	1.17E+00 = (1.17E-01)	1.26E+00 - (1.14E-01)	1.15E+00 (1.27E-01)
	F20	1.13E+01 - (4.68E-01)	1.07E+01 = (6.12E-01)	1.05E+01 = (5.47E-01)	9.99E+00 = (6.83E-01)	1.17E+01 - (3.23E-01)	1.06E+01 = (6.17E-01)	1.13E+01 - (2.04E+00)	9.48E+00 + (3.84E-01)	1.05E+01 (1.41E+00)
Composition Functions	F21	2.96E+02 - (7.53E+01)	3.12E+02 = (7.46E+01)	3.26E+02 - (7.11E+01)	2.91E+02 = (3.91E+01)	3.04E+02 = (6.68E+01)	2.80E+02 = (4.01E+01)	2.98E+02 = (4.02E+01)	2.83E+02 = (4.61E+01)	2.92E+02 (2.72E+01)
	F22	3.69E+02 - (2.33E+02)	1.18E+02 - (1.10E+01)	1.23E+02 - (6.91E+00)	1.15E+02 - (2.59E+01)	1.13E+02 - (1.12E+01)	9.37E+01 = (3.43E+01)	1.08E+02 - (2.21E+00)	1.19E+02 - (4.97E+00)	1.07E+02 (1.73E+00)
	F23	6.15E+03 - (5.65E+02)	3.62E+03 - (5.17E+02)	4.34E+03 - (5.75E+02)	2.63E+03 - (6.32E+02)	5.26E+03 - (5.46E+02)	3.48E+03 - (3.86E+02)	2.56E+03 - (2.79E+02)	2.41E+03 - (3.23E+02)	2.24E+03 (3.87E+02)
	F24	2.20E+02 - (6.29E+00)	2.21E+02 - (9.05E+00)	2.07E+02 - (4.06E+00)	2.08E+02 - (4.42E+00)	2.07E+02 - (6.26E+00)	2.19E+02 - (1.62E+01)	2.00E+02 - (1.11E+00)	2.00E+02 - (4.91E-02)	2.00E+02 (5.33E-01)
	F25	2.56E+02 - (6.48E+00)	2.56E+02 - (8.26E+00)	2.48E+02 - (5.71E+00)	2.63E+02 - (9.73E+00)	2.55E+02 - (1.25E+01)	2.79E+02 - (9.20E+00)	2.40E+02 = (6.47E+00)	2.42E+02 - (6.98E+00)	2.39E+02 (3.91E+00)
	F26	2.11E+02 - (3.49E+01)	2.10E+02 - (3.39E+01)	2.00E+02 - (4.92E-06)	2.00E+02 - (3.96E-04)	2.00E+02 - (5.39E-03)	2.09E+02 - (3.81E+01)	2.00E+02 - (1.44E-13)	2.00E+02 - (1.43E-13)	2.00E+02 (1.11E-13)
	F27	5.07E+02 - (9.55E+01)	5.88E+02 - (1.23E+02)	3.67E+02 - (3.98E+01)	4.55E+02 - (1.15E+02)	4.31E+02 - (1.67E+02)	8.80E+02 - (1.52E+02)	3.01E+02 - (1.96E+00)	3.01E+02 - (1.80E+00)	3.00E+02 (2.78E-01)
	F28	3.00E+02 - (2.11E-13)	3.00E+02 = (0.00E+00)	3.00E+02 = (0.00E+00)	3.00E+02 = (3.22E-14)	3.00E+02 = (6.43E-14)	3.00E+02 - (1.96E-13)	3.00E+02 = (0.00E+00)	3.00E+02 = (9.09E-14)	3.00E+02 (0.00E+00)
win		**25**	**20**	**22**	**17**	**21**	**20**	**17**	**15**	
tie		**2**	**7**	**5**	**9**	**5**	**7**	**11**	**10**	
lose		**1**	**1**	**1**	**2**	**2**	**1**	**0**	**3**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S6 Performance comparisons of EaDE with state-of-the art DEs on 50-D CEC2013 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	4.98E+05 - (1.85E+05)	2.54E+05 - (8.23E+04)	9.37E+04 - (5.68E+04)	2.71E+04 - (1.70E+04)	4.71E+05 - (1.99E+05)	2.60E+04 - (1.33E+04)	6.51E+02 - (8.90E+02)	1.73E+02 - (4.06E+02)	1.99E+01 (5.33E+01)
	F3	2.93E+07 - (3.07E+07)	1.47E+07 - (2.33E+07)	6.38E+05 - (1.50E+06)	2.65E+06 - (3.77E+06)	3.56E+06 - (7.33E+06)	2.03E+06 - (3.68E+06)	1.27E+04 - (4.36E+04)	3.87E+01+ (2.66E+02)	2.31E+03 (5.30E+03)
	F4	1.79E+02 - (4.20E+02)	1.38E-01 - (1.77E-01)	7.55E-01 - (3.35E+00)	4.63E+03 - (1.10E+04)	1.04E+02 - (9.27E+01)	8.37E+03 - (1.86E+04)	1.98E-10 = (1.41E-09)	1.20E-08 - (1.52E-08)	0.00E+00 (0.00E+00)
	F5	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.43E+01 - (7.63E+00)	4.37E+01 - (1.11E+00)	4.34E+01 - (7.95E-14)	4.34E+01 - (1.72E-13)	4.36E+01 - (3.47E-01)	4.34E+01 - (1.64E-13)	4.34E+01= (0.00E+00)	4.34E+01= (0.00E+00)	4.34E+01 (0.00E+00)
	F7	3.44E+01 - (8.54E+00)	3.91E+01 - (1.19E+01)	1.51E+01 - (6.88E+00)	2.11E+01 - (6.50E+00)	1.47E+01 - (5.94E+00)	2.58E+01 - (1.16E+01)	2.07E+00 - (1.30E+00)	1.59E-01 + (1.68E-01)	7.01E-01 (7.35E-01)
	F8	2.11E+01 - (3.54E-02)	2.10E+01= (8.48E-02)	2.11E+01 - (3.72E-02)	2.11E+01 - (4.11E-02)	2.11E+01 - (3.70E-02)	2.11E+01 - (7.96E-02)	2.10E+01 - (9.98E-02)	2.11E+01 - (4.62E-02)	2.10E+01 (1.24E-01)
	F9	3.22E+01+ (4.21E+00)	3.25E+01+ (5.86E+00)	3.14E+01+ (4.81E+00)	4.02E+01+ (5.29E+00)	4.94E+01 - (8.99E+00)	5.42E+01 - (2.74E+00)	5.33E+01 - (1.94E+00)	4.78E+01= (5.11E+00)	4.53E+01 (8.18E+00)
	F10	2.44E-01 - (1.55E-01)	5.05E-02 - (2.98E-02)	2.68E-02 - (2.16E-02)	9.72E-02 - (4.77E-02)	5.56E-02 - (3.53E-02)	5.62E-02 - (4.60E-02)	1.06E-02 - (7.75E-03)	2.27E-03 = (4.35E-03)	3.58E-03 (4.25E-03)
	F11	1.61E+01 - (5.97E+00)	8.97E-01 - (1.02E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F12	8.99E+01 - (2.00E+01)	9.30E+01 - (1.88E+01)	5.49E+01 - (1.61E+01)	4.41E+01 - (1.19E+01)	1.09E+02 - (1.69E+01)	5.28E+01 - (9.08E+00)	1.41E+01 - (2.33E+00)	1.69E+01 - (2.71E+00)	9.63E+00 (3.26E+00)
	F13	2.03E+02 - (4.03E+01)	1.92E+02 - (3.11E+01)	1.32E+02 - (2.80E+01)	8.72E+01 - (2.17E+01)	1.87E+02 - (2.99E+01)	1.12E+02 - (2.23E+01)	2.23E+01 - (8.33E+00)	2.26E+01 - (1.29E+01)	1.03E+01 (7.26E+00)
	F14	6.26E+02 - (1.72E+02)	2.87E+01 - (1.35E+01)	6.26E+00 - (3.01E+00)	2.39E+00 - (1.20E+00)	5.15E-03 + (1.50E-02)	4.24E-02 + (2.44E-02)	2.06E-01 - (4.67E-02)	6.46E+01 - (1.58E+01)	1.53E-01 (5.05E-02)
	F15	1.21E+04 - (5.64E+02)	7.04E+03 - (6.97E+02)	8.76E+03 - (8.13E+02)	6.34E+03 - (8.18E+02)	9.72E+03 - (7.01E+02)	6.98E+03 - (4.26E+02)	6.39E+03 - (4.04E+02)	6.40E+03 - (4.91E+02)	6.06E+03 (5.96E+02)
	F16	3.14E+00 - (2.97E-01)	7.62E-01 - (3.48E-01)	3.32E+00 - (3.16E-01)	2.77E+00 - (9.91E-01)	3.22E+00 - (3.63E-01)	1.92E+00 - (9.25E-01)	1.21E+00 - (1.97E-01)	3.07E+00 - (4.75E-01)	5.85E-01 (4.49E-01)
	F17	8.82E+01 - (6.21E+00)	5.22E+01 - (6.00E-01)	5.09E+01 - (3.75E-02)	5.10E+01 - (7.15E-02)	5.08E+01+ (7.84E-14)	5.08E+01+ (5.58E-14)	5.08E+01 - (3.43E-03)	5.26E+01 - (4.24E-01)	5.08E+01 (2.81E-04)
	F18	3.29E+02 - (2.86E+01)	1.23E+02 - (1.55E+01)	1.63E+02 - (3.27E+01)	7.12E+01+ (5.62E+00)	2.85E+02 - (2.14E+01)	1.42E+02 - (9.94E+00)	1.03E+02 - (5.60E+00)	1.09E+02 - (1.10E+01)	7.51E+01 (8.04E+00)
	F19	1.29E+01 - (5.62E+00)	3.34E+00 - (6.06E-01)	3.41E+00 - (4.54E-01)	2.06E+00+ (2.73E-01)	2.80E+00 - (2.21E-01)	2.76E+00 - (2.03E-01)	2.54E+00 - (1.49E-01)	2.70E+00 - (1.68E-01)	2.34E+00 (2.92E-01)
	F20	2.08E+01 - (4.60E-01)	1.98E+01 - (8.66E-01)	1.93E+01 - (7.81E-01)	1.88E+01 - (8.16E-01)	2.13E+01 - (3.81E-01)	1.97E+01 - (5.26E-01)	1.81E+01 - (5.76E-01)	1.83E+01 - (5.59E-01)	1.73E+01 (8.16E-01)
Composition Functions	F21	7.81E+02 - (3.65E+02)	6.98E+02= (4.32E+02)	8.34E+02 - (4.19E+02)	8.21E+02 - (3.69E+02)	5.87E+02= (4.52E+02)	8.19E+02 - (3.99E+02)	7.19E+02 - (4.58E+02)	5.57E+02= (4.37E+02)	5.62E+02 (4.55E+02)
	F22	5.70E+02 - (5.88E+02)	3.95E+01 - (1.24E+01)	1.97E+01 - (3.10E+00)	2.48E+01 - (2.97E+01)	2.46E+01 - (2.71E+01)	1.32E+01+ (5.73E+00)	1.41E+01 - (1.60E+00)	6.46E+01 - (1.53E+01)	1.24E+01 (1.01E+00)
	F23	1.17E+04 - (1.34E+03)	7.31E+03 - (1.09E+03)	8.53E+03 - (8.61E+02)	5.79E+03 - (9.19E+02)	9.88E+03 - (6.06E+02)	7.18E+03 - (5.72E+02)	5.64E+03 - (4.04E+02)	5.52E+03 - (5.25E+02)	5.10E+03 (6.94E+02)
	F24	2.65E+02 - (1.03E+01)	2.61E+02 - (1.26E+01)	2.40E+02 - (1.09E+01)	2.38E+02 - (7.72E+00)	2.34E+02 - (1.25E+01)	2.57E+02 - (2.46E+01)	2.09E+02 - (5.34E+00)	2.00E+02+ (3.98E-01)	2.04E+02 (3.52E+00)
	F25	3.19E+02 - (9.60E+00)	3.17E+02 - (1.31E+01)	3.02E+02 - (1.07E+01)	3.32E+02 - (1.33E+01)	3.15E+02 - (2.78E+01)	3.65E+02 - (8.55E+00)	2.77E+02= (6.28E+00)	2.77E+02= (7.49E+00)	2.75E+02 (6.02E+00)
	F26	2.45E+02 - (7.37E+01)	2.96E+02 - (8.84E+01)	2.66E+02 - (6.82E+01)	3.24E+02 - (6.10E+01)	2.40E+02 - (6.78E+01)	3.98E+02 - (7.44E+01)	2.40E+02 - (5.20E+01)	2.27E+02 - (4.63E+01)	2.20E+02 (4.32E+01)
	F27	1.04E+03 - (1.05E+02)	1.06E+03 - (1.26E+02)	8.00E+02 - (1.14E+02)	9.05E+02 - (2.04E+02)	9.90E+02 - (2.59E+02)	1.52E+03 - (2.44E+02)	3.94E+02 - (4.87E+01)	3.34E+02+ (2.83E+01)	3.61E+02 (5.76E+01)
	F28	4.59E+02 - (4.24E+02)	5.17E+02+ (5.85E+02)	4.00E+02= (2.87E-13)	4.58E+02 - (4.14E+02)	4.00E+02= (2.87E-13)	4.58E+02 - (4.17E+02)	4.00E+02= (2.84E-13)	4.00E+02= (2.84E-13)	4.00E+02 (3.92E-13)
win tie lose		**25** **2** **1**	**22** **4** **2**	**23** **4** **1**	**22** **3** **3**	**21** **5** **2**	**22** **3** **3**	**21** **7** **0**	**15** **9** **4**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S7 Performance comparisons of EaDE with state-of-the art DEs on 100-D CEC2013 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	0.00E+00= (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= 0.00E+00	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	1.70E+06- (3.67E+05)	8.41E+05 - (1.93E+05)	1.90E+05- (5.12E+04)	2.82E+05- 9.13E+04	1.64E+06 - (5.39E+05)	2.18E+05 - (7.90E+04)	1.38E+05- (3.43E+04)	1.39E+05- (4.90E+04)	1.03E+05 (2.54E+04)
	F3	5.97E+08- (3.04E+08)	1.77E+08 - (1.45E+08)	8.33E+07- (8.97E+07)	3.84E+08- 3.09E+08	1.25E+08 - (1.26E+08)	2.13E+08 - (1.46E+08)	3.80E+06= (3.24E+06)	2.86E+05+ (2.86E+05)	2.81E+06 (2.51E+06)
	F4	1.19E+03- (1.44E+03)	2.49E+00 - (3.07E+00)	8.38E-01- (3.39E+00)	1.34E+04- 2.55E+04	4.65E+02 - (2.69E+02)	8.36E+03 - (2.56E+04)	1.77E-04+ (1.56E-04)	9.91E-04- (7.52E-04)	4.81E-04 (3.61E-04)
	F5	0.00E+00= (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= 0.00E+00	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	1.14E+02+ (4.89E+01)	1.40E+02+ (5.92E+01)	9.31E+01+ (5.33E+01)	6.15E+01+ 5.36E+01	2.05E+02 = (2.92E+01)	7.87E+01 + (6.01E+01)	2.11E+02= (3.10E+01)	2.09E+02= (3.95E+01)	2.16E+02 (2.88E+01)
	F7	8.37E+01- (1.26E+01)	7.37E+01 - (1.30E+01)	4.66E+01- (1.12E+01)	7.29E+01- 1.07E+01	4.29E+01 - (1.22E+01)	7.85E+01 - (1.69E+01)	6.77E+00= (2.07E+00)	2.96E+00+ (1.16E+00)	6.29E+00 (2.26E+00)
	F8	2.13E+01- (2.50E-02)	2.12E+01 = (5.36E-02)	2.13E+01- (2.77E-02)	2.13E+01- 3.27E-02	2.13E+01 - (2.62E-02)	2.13E+01 - (2.79E-02)	2.13E+01= (4.97E-02)	2.13E+01- (3.58E-02)	2.12E+01 (8.77E-02)
	F9	9.59E+01+ (9.40E+00)	9.08E+01 + (8.87E+00)	9.31E+01+ (7.85E+00)	1.11E+02+ 8.64E+00	1.28E+02 - (4.26E+00)	1.33E+02 - (3.13E+00)	1.33E+02- (2.60E+00)	1.30E+02- (4.17E+00)	1.23E+02 (1.09E+01)
	F10	1.35E-01- (8.06E-02)	8.57E-02 - (4.36E-02)	2.25E-02= (2.18E-02)	7.94E-02- 5.13E-02	1.53E-01 - (9.43E-02)	4.90E-02 - (3.05E-02)	1.52E-02= (1.61E-02)	1.17E-02= (1.06E-02)	1.40E-02 (1.04E-02)
	F11	1.23E+02- (1.86E+01)	2.60E+01 - (8.67E+00)	6.30E-01= (1.09E+00)	3.32E-02+ 1.82E-01	0.00E+00 + (0.00E+00)	1.33E-01 + (7.27E-01)	1.43E-03- (8.16E-04)	5.05E-03- (4.98E-03)	6.73E-05 (2.56E-05)
	F12	3.44E+02- (5.19E+01)	2.80E+02 - (4.17E+01)	2.02E+02- (3.35E+01)	2.36E+02- 2.99E+01	2.40E+02 - (3.40E+01)	2.16E+02 - (2.71E+01)	6.35E+01- (7.70E+00)	5.17E+01- (7.51E+00)	4.24E+01 (9.24E+00)
	F13	5.97E+02- (6.12E+01)	5.44E+02 - (9.07E+01)	4.12E+02- (5.10E+01)	4.61E+02- 5.53E+01	4.44E+02 - (5.31E+01)	4.81E+02 - (5.56E+01)	1.49E+02- (2.33E+01)	1.27E+02- (2.69E+01)	1.10E+02 (3.19E+01)
	F14	1.42E+03- (4.57E+02)	2.13E+02 - (1.29E+02)	1.00E+00+ (8.16E-01)	8.53E+00+ 2.11E+00	1.30E-02 + (3.56E-02)	8.64E-02 + (1.94E-02)	8.15E+01= (1.80E+01)	5.35E+02- (1.13E+02)	8.68E+01 (1.88E+01)
	F15	2.22E+04- (5.82E+03)	1.46E+04 - (1.34E+03)	1.38E+04= (1.22E+03)	1.32E+04= 2.15E+03	2.06E+04 - (1.15E+03)	1.49E+04 - (7.08E+02)	1.57E+04- (5.85E+02)	1.49E+04- (1.06E+03)	1.30E+04 (1.16E+03)
	F16	3.81E+00- (2.33E-01)	1.77E+00 - (4.90E-01)	3.24E+00- (7.38E-01)	3.07E+00- 1.23E+00	3.70E+00 - (3.56E-01)	1.87E+00 - (4.32E-01)	1.83E+00- (3.06E-01)	3.59E+00- (5.66E-01)	8.20E-01 (3.98E-01)
	F17	2.06E+02- (2.89E+01)	1.15E+02 - (2.84E+00)	1.02E+02+ (1.71E-02)	1.02E+02= 1.38E-01	1.02E+02 + (1.46E-13)	1.02E+02 + (9.08E-14)	1.03E+02- (3.51E-01)	1.14E+02- (1.65E+00)	1.02E+02 (1.77E-01)
	F18	4.57E+02- (1.78E+02)	3.63E+02 - (5.79E+01)	2.44E+02- (2.61E+01)	2.71E+02- 2.54E+01	5.55E+02 - (3.84E+01)	3.82E+02 - (2.73E+01)	2.86E+02- (1.04E+01)	2.76E+02- (2.10E+01)	2.10E+02 (2.81E+01)
	F19	3.87E+01- (7.44E+00)	9.28E+00 - (1.43E+00)	7.57E+00- (1.40E+00)	1.33E+01- 2.27E+00	5.68E+00 + (4.96E-01)	9.81E+00 - (1.22E+00)	7.35E+00- (3.91E-01)	7.19E+00= (3.75E-01)	6.90E+00 (5.35E-01)
	F20	5.00E+01- (1.48E-11)	4.99E+01 = (1.71E-01)	5.00E+01- (0.00E+00)	4.95E+01+ 4.31E-01	4.99E+01 = (4.93E-01)	5.00E+01 = (3.70E-05)	5.00E+01= (1.44E-09)	4.94E+01+ (1.44E+00)	4.99E+01 (2.44E-01)
Composition Functions	F21	4.00E+02- (3.80E-13)	3.60E+02 - (4.98E+01)	4.00E+02- (2.51E-13)	3.97E+02- 1.83E+01	3.83E+02 - (3.79E+01)	3.97E+02 - (1.83E+01)	3.60E+02= (4.98E+01)	3.70E+02- (4.66E+01)	3.33E+02 (4.79E+01)
	F22	1.64E+03- (1.16E+03)	2.24E+02 - (1.19E+02)	5.46E+01+ (4.68E+01)	5.32E+01+ 4.22E+01	1.71E+02 - (9.51E+01)	4.45E+01 + (4.38E+01)	1.12E+02- (3.47E+01)	3.76E+02- (6.69E+01)	8.32E+01 (1.43E+01)
	F23	1.70E+04- (4.30E+03)	1.68E+04 - (1.43E+03)	1.50E+04- (1.66E+03)	1.52E+04- 1.86E+03	2.12E+04 - (8.84E+02)	1.66E+04 - (1.41E+03)	1.50E+04- (6.75E+02)	1.41E+04- (9.38E+02)	1.21E+04 (1.17E+03)
	F24	3.90E+02- (1.64E+01)	3.68E+02 - (2.10E+01)	3.40E+02- (2.07E+01)	3.48E+02- 2.10E+01	2.99E+02 - (1.25E+01)	3.32E+02 - (1.65E+01)	2.36E+02- (6.55E+00)	2.14E+02+ (5.49E+00)	2.25E+02 (6.70E+00)
	F25	4.98E+02- (1.51E+01)	4.84E+02 - (2.37E+01)	4.81E+02- (2.31E+01)	4.72E+02- 2.90E+01	4.92E+02 - (5.79E+01)	5.97E+02 - (3.05E+01)	3.96E+02- (1.00E+01)	3.94E+02- (9.69E+00)	3.79E+02 (1.06E+01)
	F26	4.94E+02- (1.71E+01)	4.97E+02 - (2.11E+01)	4.53E+02- (1.19E+01)	4.49E+02- 1.59E+01	5.32E+02 - (7.18E+01)	5.58E+02 - (8.12E+01)	3.42E+02= (5.52E+00)	3.40E+02+ (5.63E+00)	3.45E+02 (7.56E+00)
	F27	2.31E+03- (1.78E+02)	2.28E+03 - (2.69E+02)	1.86E+03- (2.19E+02)	1.91E+03- 1.35E+02	2.26E+03 - (6.60E+02)	2.75E+03 - (7.28E+02)	6.70E+02- (8.42E+01)	5.06E+02+ (6.46E+01)	5.52E+02 (6.21E+01)
	F28	4.31E+03= (1.97E+03)	3.97E+03 - (1.44E+03)	2.96E+03= (7.55E+02)	4.10E+03= 2.00E+03	3.66E+03 - (1.11E+03)	3.52E+03 = (1.28E+03)	3.21E+03= (1.00E+03)	3.03E+03+ (9.26E+02)	3.32E+03 (1.04E+03)
win		**23**	**22**	**17**	**17**	**20**	**19**	**15**	**16**	
tie		**3**	**4**	**6**	**5**	**4**	**4**	**12**	**5**	
lose		**2**	**2**	**5**	**6**	**4**	**5**	**1**	**7**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S8 Performance comparisons of EaDE with state-of-the art DEs on 10-D CEC2014 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	9.60E-10= (3.71E-09)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F3	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	1.78E-03= (9.74E-03)	0.00E+00= (0.00E+00)	4.73E-05= (2.59E-04)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F4	1.54E+01+ (1.73E+01)	1.10E+01+ (1.59E+01)	1.99E+01= (1.74E+01)	2.35E+01= (1.63E+01)	8.55E+00+ (1.48E+01)	2.58E+01= (1.52E+01)	2.91E+01= (1.29E+01)	3.01E+01= (1.20E+01)	2.68E+01 (1.47E+01)
	F5	1.66E+01- (7.68E+00)	2.00E+01- (1.70E-02)	1.83E+01- (4.10E+00)	1.67E+01= (7.58E+00)	1.88E+01- (3.89E+00)	1.78E+01- (4.76E+00)	1.53E+01- (8.02E+00)	1.61E+01- (8.01E+00)	1.52E+01 (8.56E+00)
	F6	0.00E+00= (0.00E+00)	2.98E-02= (1.63E-01)	1.56E-02- (4.47E-02)	6.53E-02- (5.09E-02)	6.60E-05= (3.54E-04)	7.04E-02- (1.02E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F7	6.45E-03= (7.67E-03)	3.09E-02- (2.05E-02)	1.42E-02- (1.16E-02)	4.30E-04= (1.51E-03)	2.09E-02- (1.16E-02)	9.58E-03- (8.14E-03)	1.81E-03= (4.97E-03)	6.57E-04+ (2.50E-03)	4.27E-03 (7.42E-03)
	F8	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	4.65E-08- (7.62E-08)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F9	5.53E+00- (2.50E+00)	3.35E+00- (1.53E+00)	6.10E+00- (1.32E+00)	8.20E-01+ (1.18E+00)	5.65E+00- (1.43E+00)	3.27E+00- (9.49E-01)	2.36E+00- (7.14E-01)	1.59E+00= (7.20E-01)	1.89E+00 (1.24E+00)
	F10	9.29E-01- (1.16E+00)	2.71E-02- (4.55E-02)	6.81E-01- (2.32E-01)	6.72E-02- (6.84E-02)	0.00E+00= (0.00E+00)	4.16E-03= (1.58E-02)	0.00E+00= (0.00E+00)	3.12E-02- (4.26E-02)	4.16E-03 (1.58E-02)
	F11	4.11E+02- (1.23E+02)	7.74E+01- (7.89E+01)	2.96E+02- (1.32E+02)	4.96E+01- (5.89E+01)	2.54E+02- (9.51E+01)	8.74E+01- (5.07E+01)	2.96E+01= (3.07E+01)	2.31E+01= (2.50E+01)	1.73E+01 (1.34E+01)
	F12	6.26E-01- (1.16E-01)	5.21E-02= (6.61E-02)	4.06E-01- (7.70E-02)	4.85E-02= (3.72E-02)	4.01E-01- (7.41E-02)	2.56E-01- (5.69E-02)	7.31E-02- (1.57E-02)	2.67E-01- (2.80E-01)	4.05E-02 (3.82E-02)
	F13	1.25E-01- (2.65E-02)	7.96E-02- (3.78E-02)	1.24E-01- (2.36E-02)	3.69E-02- (1.06E-02)	1.42E-01- (2.76E-02)	8.74E-02- (1.63E-02)	5.03E-02- (1.14E-02)	7.01E-02- (1.53E-02)	2.29E-02 (1.60E-02)
	F14	1.61E-01- (4.09E-02)	1.09E-01- (3.71E-02)	1.29E-01- (2.68E-02)	9.09E-02- (4.29E-02)	1.61E-01- (3.78E-02)	1.18E-01- (3.27E-02)	7.66E-02- (2.44E-02)	5.56E-02- (2.13E-02)	4.27E-02 (1.98E-02)
	F15	1.16E+00- (2.51E-01)	6.25E-01- (1.70E-01)	8.78E-01- (1.44E-01)	4.83E-01- (1.40E-01)	1.00E+00- (1.83E-01)	5.28E-01- (1.12E-01)	3.73E-01= (7.07E-02)	4.09E-01= (8.52E-02)	3.70E-01 (8.96E-02)
	F16	2.07E+00- (2.43E-01)	1.11E+00- (5.74E-01)	2.06E+00- (2.87E-01)	5.51E-01= (4.44E-01)	1.98E+00- (2.66E-01)	1.66E+00- (2.83E-01)	1.29E+00- (2.86E-01)	8.23E-01- (2.91E-01)	5.23E-01 (3.40E-01)
Hybrid Functions	F17	2.78E+01- (3.96E+01)	1.94E+00= (3.88E+00)	2.38E+01- (1.45E+01)	1.10E+01- (2.34E+01)	8.61E+00- (8.48E+00)	1.68E+00= (3.43E+00)	9.68E-01= (8.11E-01)	1.55E+00= (2.24E+00)	9.91E-01 (8.72E-01)
	F18	5.65E-01= (6.09E-01)	3.38E-01= (4.85E-01)	1.69E+00- (7.21E-01)	1.02E-01+ (1.36E-01)	1.51E+00- (5.79E-01)	3.64E-01= (4.43E-01)	2.23E-01= (1.90E-01)	1.89E-01= (1.38E-01)	2.94E-01 (3.50E-01)
	F19	2.13E-01- (9.93E-02)	9.37E-02= (7.52E-02)	4.50E-01- (1.35E-01)	1.61E-01- (1.86E-01)	2.49E-01- (7.46E-02)	2.47E-01- (8.02E-02)	8.27E-02= (4.70E-02)	4.14E-02+ (2.51E-02)	8.54E-02 (1.38E-01)
	F20	1.67E-01= (2.24E-01)	2.52E-02+ (5.06E-02)	8.29E-01- (2.39E-01)	1.30E-01= (4.68E-02)	2.32E-01- (1.80E-01)	3.14E-01- (1.06E-01)	1.45E-01= (1.30E-01)	3.41E-01- (2.07E-01)	1.82E-01 (1.70E-01)
	F21	7.56E-01= (3.03E+00)	1.67E-01+ (2.19E-01)	4.04E+00- (2.63E+00)	4.75E-01= (2.47E-01)	3.21E-01= (2.88E-01)	7.29E-01- (6.37E-01)	3.12E-01= (2.33E-01)	5.59E-01= (2.71E-01)	3.94E-01 (3.19E-01)
	F22	1.53E-01= (1.79E-01)	6.04E-02+ (7.99E-02)	4.86E+00- (1.19E+00)	4.33E-01- (1.78E-01)	1.58E-01- (6.19E-02)	1.71E-01- (5.56E-02)	7.57E-02= (3.37E-02)	9.91E-01- (3.62E+00)	8.00E-02 (3.20E-02)
Composition Functions	F23	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02= (2.89E-13)	3.29E+02 (2.89E-13)
	F24	1.08E+02= (3.64E+00)	1.11E+02- (2.90E+00)	1.12E+02- (1.79E+00)	1.07E+02= (3.14E+00)	1.13E+02- (1.98E+00)	1.09E+02- (1.67E+00)	1.08E+02= (1.25E+00)	1.07E+02= (2.30E+00)	1.08E+02 (1.76E+00)
	F25	1.32E+02= (2.74E+01)	1.29E+02= (2.58E+01)	1.23E+02- (6.78E+00)	1.33E+02- (2.93E+01)	1.30E+02= (2.98E+01)	1.28E+02= (2.60E+01)	1.42E+02= (4.30E+01)	1.40E+02= (3.51E+01)	1.35E+02 (4.16E+01)
	F26	1.00E+02- (2.47E-02)	1.00E+02- (1.99E-02)	1.00E+02- (2.78E-02)	1.00E+02- (1.22E-02)	1.00E+02- (2.48E-02)	1.00E+02- (1.91E-02)	1.00E+02- (1.54E-02)	1.00E+02- (1.56E-02)	1.00E+02 (1.79E-02)
	F27	1.61E+02- (1.64E+02)	5.18E+01- (1.30E+02)	1.57E+01- (7.26E+01)	1.12E+02- (1.73E+02)	6.50E+01- (1.29E+02)	1.99E+02- (2.00E+02)	7.12E+01- (1.44E+02)	1.10E+01= (5.46E+01)	5.83E+01 (1.32E+02)
	F28	3.74E+02= (2.79E+01)	3.62E+02+ (1.82E+01)	3.63E+02= (6.41E+00)	4.58E+02- (1.82E+01)	4.11E+02- (5.02E+01)	4.62E+02- (7.23E+00)	3.76E+02= (2.39E+01)	3.74E+02- (1.98E+01)	3.81E+02 (3.68E+01)
	F29	2.23E+02- (5.32E+00)	2.18E+02= (2.23E+01)	2.22E+02- (5.67E-02)	2.23E+02- (5.32E+00)	2.22E+02- (8.61E-01)	2.32E+02= (4.18E+01)	2.22E+02= (5.48E-01)	2.22E+02= (4.08E-01)	2.22E+02 (5.61E-01)
	F30	4.82E+02- (2.37E+01)	4.68E+02- (1.35E+01)	4.77E+02- (1.44E+01)	4.76E+02- (2.08E+01)	4.72E+02- (2.38E+01)	4.91E+02- (3.86E+01)	4.66E+02= (1.22E+01)	4.63E+02- (2.19E-01)	4.67E+02 (1.72E+01)
win		**15**	**13**	**24**	**15**	**20**	**19**	**8**	**11**	
tie		**14**	**12**	**6**	**13**	**9**	**11**	**22**	**17**	
lose		**1**	**5**	**0**	**2**	**1**	**0**	**0**	**2**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S9 Performance comparisons of EaDE with state-of-the art DEs on 30-D CEC2014 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	8.86E+04 - (1.63E+05)	2.91E+04 - (2.53E+04)	0.00E+00 = (0.00E+00)	2.25E+03 - (2.47E+03)	7.02E+04 - (5.76E+04)	9.01E+02 - (1.16E+03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F2	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F3	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	8.32E-01 - (3.32E+00)	0.00E+00 = (0.00E+00)	9.09E-07 - (6.45E-06)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F4	8.62E+00 - (2.18E+01)	2.49E+00 - (1.24E+01)	1.24E+00 = (8.88E+00)	0.00E+00 = (0.00E+00)	2.26E+00 - (9.32E+00)	4.42E+00 = (2.42E+01)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F5	2.09E+01 - (5.59E-02)	2.00E+01 = (6.87E-02)	2.04E+01 - (5.01E-02)	2.00E+01 + (1.89E-02)	2.04E+01 - (3.45E-02)	2.03E+01 - (3.39E-02)	2.01E+01 - (3.04E-02)	2.09E+01 - (1.12E-01)	2.01E+01 (7.47E-02)
	F6	2.07E+00 - (1.06E+00)	2.33E+00 - (1.54E+00)	6.74E-01 - (8.57E-01)	2.90E+00 - (1.43E+00)	1.48E+00 - (3.30E+00)	8.98E+00 - (2.71E+00)	5.67E-04 = (4.05E-03)	1.87E-05 - (8.13E-05)	3.67E-02 (1.84E-01)
	F7	4.05E-03 - (9.46E-03)	3.38E-04 = (1.71E-03)	5.32E-04 = (2.17E-03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	1.45E-04 = (1.04E-03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F8	2.46E+00 - (1.47E+00)	1.95E-02 = (1.39E-01)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F9	2.98E+01 - (9.71E+00)	4.01E+01 - (9.76E+00)	2.83E+01 - (7.18E+00)	1.91E+01 - (6.60E+00)	4.35E+01 - (5.96E+00)	2.59E+01 - (4.08E+00)	6.93E+00 - (1.39E+00)	9.10E+00 - (1.97E+00)	4.15E+00 (2.15E+00)
	F10	3.92E+01 - (3.12E+01)	5.52E-01 - (5.12E-01)	1.03E+00 - (5.65E-01)	2.42E-01 - (6.90E-02)	8.16E-04 = (4.08E-03)	5.31E-03 - (1.09E-02)	5.31E-03 - (1.01E-02)	1.33E+00 - (1.07E+00)	8.16E-04 (4.08E-03)
	F11	5.10E+03 - (4.62E+02)	1.74E+03 - (5.66E+02)	2.38E+03 - (3.83E+02)	1.47E+03 - (3.16E+02)	2.40E+03 - (2.84E+02)	1.66E+03 - (2.38E+02)	1.23E+03 = (1.71E+02)	1.27E+03 = (2.06E+02)	1.18E+03 (2.06E+02)
	F12	1.68E+00 - (2.20E-01)	5.67E-02 + (2.90E-02)	4.93E-01 - (9.01E-02)	7.99E-02 + (2.99E-02)	4.69E-01 - (6.48E-02)	2.68E-01 - (3.90E-02)	1.57E-01 - (2.56E-02)	5.36E-01 - (4.42E-01)	1.04E-01 (3.83E-02)
	F13	2.64E-01 - (3.16E-02)	2.24E-01 - (4.87E-02)	2.19E-01 - (3.02E-02)	7.82E-02 = (2.46E-02)	2.95E-01 - (4.08E-02)	2.20E-01 - (3.11E-02)	1.15E-01 - (1.72E-02)	1.42E-01 - (2.62E-02)	7.84E-02 (2.56E-02)
	F14	2.48E-01 - (3.10E-02)	2.32E-01 - (3.76E-02)	2.34E-01 - (3.15E-02)	2.52E-01 - (4.40E-02)	2.65E-01 - (3.15E-02)	2.23E-01 - (3.94E-02)	2.39E-01 - (2.71E-02)	2.34E-01 - (3.57E-02)	2.05E-01 (2.83E-02)
	F15	5.04E+00 - (2.44E+00)	3.15E+00 - (7.61E-01)	4.15E+00 - (8.37E-01)	2.58E+00 - (5.74E-01)	5.74E+00 - (6.57E-01)	3.26E+00 - (3.72E-01)	2.20E+00 - (2.27E-01)	2.40E+00 - (3.62E-01)	2.04E+00 (2.54E-01)
	F16	1.17E+01 - (3.30E-01)	9.28E+00 - (8.27E-01)	1.01E+01 - (4.00E-01)	8.32E+00 - (7.11E-01)	9.88E+00 - (3.24E-01)	9.50E+00 - (3.24E-01)	8.55E+00 - (3.90E-01)	8.84E+00 - (7.45E-01)	7.40E+00 (8.52E-01)
Hybrid Functions	F17	4.71E+03 - (2.74E+03)	1.46E+03 - (1.26E+03)	2.29E+02 - (1.39E+02)	1.43E+03 - (3.92E+02)	1.06E+03 - (6.69E+02)	1.18E+03 - (3.42E+02)	1.53E+02 - (8.96E+01)	7.11E+01 = (2.34E+01)	8.06E+01 (4.95E+01)
	F18	2.96E+02 - (4.77E+02)	1.53E+01 - (6.38E+00)	1.41E+01 - (5.38E+00)	1.01E+02 - (3.59E+01)	1.97E+01 - (9.49E+00)	9.79E+01 - (1.07E+02)	6.05E+00 - (2.91E+00)	2.58E+00 + (1.21E+00)	3.52E+00 (1.34E+00)
	F19	4.88E+00 - (9.58E-01)	2.62E+00 = (5.64E-01)	3.90E+00 - (5.87E-01)	4.32E+00 - (5.82E-01)	4.45E+00 - (5.61E-01)	4.35E+00 - (6.28E-01)	3.74E+00 - (5.34E-01)	2.00E+00 + (6.87E-01)	2.77E+00 (7.05E-01)
	F20	7.90E+01 - (5.02E+01)	1.15E+01 - (5.61E+00)	9.07E+00 - (3.62E+00)	1.32E+03 - (2.07E+03)	1.15E+01 - (2.95E+00)	2.94E+03 - (2.75E+03)	2.47E+00 = (1.22E+00)	2.06E+00 + (8.33E-01)	2.51E+00 (9.75E-01)
	F21	9.05E+02 - (6.54E+02)	2.14E+02 - (1.17E+02)	1.14E+02 - (8.51E+01)	2.31E+03 - (1.09E+04)	2.87E+02 - (1.67E+02)	6.96E+03 - (4.32E+04)	1.02E+02 - (9.17E+01)	1.17E+01 = (1.94E+01)	1.95E+01 (3.62E+01)
	F22	1.04E+02 - (6.64E+01)	1.64E+02 - (1.04E+02)	8.44E+01 - (7.19E+01)	1.31E+02 - (7.99E+01)	1.14E+02 - (6.82E+01)	1.26E+02 - (6.46E+01)	2.44E+01 - (3.66E+00)	3.09E+01 - (2.38E+01)	2.12E+01 (4.18E+00)
Composition Functions	F23	3.15E+02 = (3.98E-13)	3.15E+02 + (4.00E-13)	3.15E+02 = (4.02E-13)	3.15E+02 = (4.02E-13)	3.15E+02 = (4.02E-13)	3.15E+02 = (4.02E-13)	3.15E+02 = (4.02E-13)	3.15E+02 = (4.02E-13)	3.15E+02 (4.02E-13)
	F24	2.26E+02 - (2.68E+00)	2.25E+02 - (1.56E+00)	2.26E+02 - (3.67E+00)	2.25E+02 - (2.14E+00)	2.24E+02 - (1.26E+00)	2.25E+02 - (2.01E+00)	2.24E+02 - (1.30E+00)	2.04E+02 + (8.28E+00)	2.23E+02 (1.04E+00)
	F25	2.08E+02 - (3.18E+00)	2.03E+02 - (1.06E+00)	2.03E+02 - (3.37E-01)	2.06E+02 - (2.72E+00)	2.03E+02 - (5.70E-01)	2.05E+02 - (1.78E+00)	2.03E+02 - (4.62E-02)	2.03E+02 = (2.49E-02)	2.03E+02 (4.27E-02)
	F26	1.00E+02 - (4.11E-02)	1.00E+02 - (4.28E-02)	1.00E+02 - (2.71E-02)	1.00E+02 - (2.88E-02)	1.00E+02 - (3.95E-02)	1.00E+02 - (3.24E-02)	1.00E+02 - (1.64E-02)	1.00E+02 - (2.60E-02)	1.00E+02 (2.55E-02)
	F27	3.69E+02 - (3.82E+01)	3.77E+02 - (4.05E+01)	3.75E+02 - (4.32E+01)	3.43E+02 - (4.94E+01)	3.52E+02 - (5.04E+01)	3.49E+02 - (5.18E+01)	3.00E+02 = (6.43E-14)	3.00E+02 - (2.57E-13)	3.00E+02 (1.29E-13)
	F28	8.75E+02 - (3.67E+01)	8.27E+02 = (2.98E+01)	8.32E+02 = (2.92E+01)	7.94E+02 + (2.36E+01)	7.94E+02 + (3.13E+01)	8.01E+02 + (2.09E+01)	8.29E+02 = (1.93E+01)	8.25E+02 = (1.90E+01)	8.31E+02 (2.03E+01)
	F29	9.17E+02 - (1.42E+02)	7.85E+02 - (1.22E+02)	6.41E+02 = (1.93E+02)	7.41E+02 - (1.93E+01)	7.89E+02 - (1.10E+02)	7.46E+02 - (8.97E+01)	7.17E+02 = (3.17E+00)	7.15E+02 = (1.46E+00)	7.16E+02 (2.65E+00)
	F30	1.82E+03 - (7.55E+02)	8.87E+02 = (3.11E+02)	6.70E+02 + (2.36E+02)	1.71E+03 - (5.77E+02)	1.18E+03 - (4.06E+02)	1.70E+03 - (5.93E+02)	1.25E+03 - (5.09E+02)	6.49E+02 + (2.16E+02)	1.07E+03 (5.08E+02)
win		**27**	**20**	**20**	**21**	**23**	**24**	**17**	**12**	
tie		**3**	**8**	**9**	**6**	**6**	**5**	**13**	**13**	
lose		**0**	**2**	**1**	**3**	**1**	**1**	**0**	**5**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S10 Performance comparisons of EaDE with state-of-the art DEs on 50-D CEC2014 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	3.39E+05 - (1.55E+05)	2.31E+05 - (9.00E+04)	6.28E+04 - (4.36E+04)	1.67E+04 - (1.18E+04)	4.32E+05 - (1.33E+05)	2.03E+04 - (1.27E+04)	4.46E+02 - (9.47E+02)	2.52E+01 - (5.49E+01)	1.54E+01 (5.54E+01)
	F2	4.18E+03 - (3.74E+03)	7.54E+01 - (2.29E+02)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	5.81E-08 - (3.83E-07)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F3	1.30E+00 - (2.41E+00)	2.14E+01 - (3.68E+01)	1.79E-04 - (7.58E-04)	2.98E+03 - (2.26E+03)	1.47E-08 = (8.49E-08)	3.37E+03 - (2.18E+03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F4	6.01E+01 = (4.18E+01)	2.48E+01 = (3.13E+01)	2.91E+01 = (3.94E+01)	2.02E+01 + (3.33E+01)	8.12E+01 - (2.03E+01)	2.02E+01 + (3.90E+01)	2.72E+01 = (4.19E+01)	5.22E+01 = (4.92E+01)	4.87E+01 (4.90E+01)
	F5	2.11E+01 - (3.98E-02)	2.00E+01 + (4.87E-02)	2.05E+01 - (4.92E-02)	2.00E+01 + (1.64E-01)	2.05E+01 - (3.28E-02)	2.04E+01 - (3.23E-02)	2.03E+01 - (3.19E-02)	2.11E+01 - (6.20E-02)	2.01E+01 (1.27E-01)
	F6	1.24E+01 - (2.80E+00)	8.67E+00 - (3.31E+00)	7.19E+00 - (2.39E+00)	6.06E+00 - (2.72E+00)	5.99E+00 - (6.46E+00)	1.56E+01 - (6.46E+00)	3.94E-01 - (7.08E-01)	6.03E-02 - (1.74E-01)	7.03E-02 (2.08E-01)
	F7	7.63E-03 - (8.86E-03)	1.21E-03 - (3.46E-03)	3.86E-03 - (6.57E-03)	3.38E-03 - (5.85E-03)	0.00E+00 = (0.00E+00)	2.80E-03 - (5.57E-03)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F8	1.18E+01 - (3.47E+00)	4.29E-01 - (7.77E-01)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 = (0.00E+00)	0.00E+00 (0.00E+00)
	F9	7.33E+01 - (1.57E+01)	7.67E+01 - (2.12E+01)	5.55E+01 - (1.25E+01)	4.44E+01 - (1.36E+01)	8.98E+01 - (1.08E+01)	5.29E+01 - (6.71E+00)	1.15E+01 - (2.66E+00)	1.58E+01 - (3.40E+00)	6.70E+00 (3.11E+00)
	F10	8.95E+01 - (7.79E+01)	5.92E+00 - (4.03E+00)	6.36E-01 - (2.95E-01)	4.22E-01 - (2.06E-01)	2.20E-03 + (4.81E-03)	1.18E-02 + (1.13E-02)	4.15E-02 - (2.18E-02)	1.01E+01 - (3.30E+00)	2.55E-02 (1.76E-02)
	F11	8.72E+03 - (2.16E+03)	4.39E+03 - (8.61E+02)	5.06E+03 - (8.20E+02)	3.42E+03 - (5.47E+02)	5.11E+03 - (4.15E+02)	3.85E+03 - (3.41E+02)	3.28E+03 - (2.67E+02)	3.25E+03 - (3.52E+02)	2.98E+03 (4.71E+02)
	F12	2.58E+00 - (2.99E-01)	9.46E-02 + (5.10E-02)	5.61E-01 - (1.14E-01)	8.67E-02 + (3.21E-02)	4.93E-01 - (7.43E-02)	2.60E-01 - (2.59E-02)	2.13E-01 - (3.31E-02)	3.83E-01 - (4.55E-01)	1.51E-01 (6.43E-02)
	F13	4.07E-01 - (5.39E-02)	3.35E-01 - (6.39E-02)	2.95E-01 - (3.07E-02)	1.91E-01 - (4.19E-02)	3.84E-01 - (3.44E-02)	3.14E-01 - (5.06E-02)	1.60E-01 - (1.48E-02)	1.99E-01 - (2.69E-02)	1.36E-01 (3.08E-02)
	F14	3.17E-01 - (3.85E-02)	2.84E-01 = (5.99E-02)	3.10E-01 - (3.33E-02)	3.36E-01 - (2.91E-02)	3.09E-01 - (6.57E-02)	3.01E-01 - (5.54E-02)	3.13E-01 - (2.54E-02)	2.91E-01 - (3.80E-02)	2.72E-01 (3.02E-02)
	F15	9.63E+00 - (2.38E+00)	7.31E+00 - (2.00E+00)	6.13E+00 - (1.91E+00)	5.45E+00 - (1.11E+00)	1.21E+01 - (1.07E+00)	7.52E+00 - (8.35E-01)	5.11E+00 - (4.02E-01)	5.22E+00 - (6.25E-01)	4.72E+00 (5.82E-01)
	F16	2.12E+01 - (3.67E-01)	1.79E+01 - (1.02E+00)	1.85E+01 - (5.13E-01)	1.63E+01 - (8.36E-01)	1.81E+01 - (4.30E-01)	1.77E+01 - (4.08E-01)	1.69E+01 - (3.88E-01)	1.70E+01 - (7.89E-01)	1.55E+01 (7.88E-01)
Hybrid Functions	F17	2.87E+04 - (1.42E+04)	1.48E+04 - (7.05E+03)	1.93E+03 - (5.34E+02)	2.39E+03 - (8.29E+02)	2.42E+04 - (1.68E+04)	2.62E+03 - (7.69E+02)	1.43E+03 - (4.26E+02)	3.59E+02 + (2.01E+02)	4.50E+02 (2.32E+02)
	F18	5.84E+02 - (5.26E+02)	3.58E+02 - (4.88E+02)	1.28E+02 - (3.07E+01)	1.47E+02 - (3.94E+01)	3.94E+02 - (3.71E+02)	1.63E+02 - (4.37E+01)	1.02E+02 - (1.30E+01)	1.17E+01 + (3.96E+00)	1.70E+01 (5.09E+00)
	F19	1.77E+01 - (1.21E+01)	6.40E+00 + (1.29E+00)	7.09E+00 + (1.07E+00)	1.31E+01 - (8.69E+00)	1.33E+01 - (5.02E+00)	1.74E+01 - (7.85E+00)	8.07E+00 + (1.70E+00)	9.62E+00 = (5.78E-01)	9.73E+00 (1.19E+00)
	F20	3.32E+02 - (1.18E+02)	2.19E+02 - (1.90E+02)	5.71E+01 - (3.14E+01)	2.90E+03 - (3.37E+03)	5.18E+01 - (1.98E+01)	6.67E+03 - (6.61E+03)	1.28E+01 - (3.81E+00)	5.63E+00 + (2.14E+00)	7.86E+00 (2.23E+00)
	F21	1.85E+04 - (1.02E+04)	7.56E+03 - (1.03E+04)	7.89E+02 - (2.80E+02)	5.79E+03 - (3.09E+04)	1.01E+04 - (1.24E+04)	1.26E+04 - (8.09E+04)	4.79E+02 - (1.05E+02)	2.63E+02 + (1.05E+02)	3.13E+02 (8.83E+01)
	F22	3.33E+02 - (1.60E+02)	6.43E+02 - (2.43E+02)	5.58E+02 - (2.08E+02)	5.77E+02 - (1.96E+02)	4.84E+02 - (1.41E+02)	4.75E+02 - (1.58E+02)	1.17E+02 = (7.07E+01)	1.44E+02 = (7.48E+01)	1.32E+02 (8.44E+01)
Composition Functions	F23	3.44E+02 - (2.85E-13)	3.44E+02 + (2.87E-13)	3.44E+02 - (4.67E-13)	3.44E+02 - (4.59E-13)	3.44E+02 - (4.22E-13)	3.44E+02 - (4.59E-13)	3.44E+02 = (3.59E-13)	3.44E+02 = (3.03E-13)	3.44E+02 (3.59E-13)
	F24	2.75E+02 = (3.02E+00)	2.72E+02 + (2.51E+00)	2.75E+02 = (2.11E+00)	2.75E+02 = (2.28E+00)	2.68E+02 + (1.95E+00)	2.74E+02 = (2.00E+00)	2.75E+02 - (6.35E-01)	2.73E+02 + (1.90E+00)	2.75E+02 (8.84E-01)
	F25	2.15E+02 - (9.84E+00)	2.11E+02 - (7.40E+00)	2.09E+02 - (7.99E+00)	2.23E+02 - (2.01E+00)	2.07E+02 - (1.25E+00)	2.23E+02 - (3.49E+00)	2.05E+02 - (2.74E-01)	2.05E+02 = (1.66E-01)	2.05E+02 (2.95E-01)
	F26	1.65E+02 - (4.81E+01)	1.04E+02 - (1.96E+01)	1.00E+02 - (3.22E-02)	1.18E+02 - (3.84E+01)	1.06E+02 - (2.37E+01)	1.10E+02 - (2.99E+01)	1.00E+02 - (1.94E-02)	1.00E+02 - (3.21E-02)	1.00E+02 (2.90E-02)
	F27	6.63E+02 - (6.82E+01)	5.33E+02 - (7.33E+01)	4.64E+02 - (6.13E+01)	4.28E+02 - (5.34E+01)	3.94E+02 - (6.89E+01)	4.30E+02 - (5.69E+01)	3.34E+02 - (3.37E+01)	3.06E+02 = (1.48E+01)	3.24E+02 (2.66E+01)
	F28	1.29E+03 - (1.44E+02)	1.18E+03 - (5.86E+01)	1.14E+03 - (6.94E+01)	1.12E+03 = (5.89E+01)	1.13E+03 - (4.19E+01)	1.15E+03 - (3.78E+01)	1.11E+03 = (3.03E+01)	1.09E+03 = (2.93E+01)	1.10E+03 (2.63E+01)
	F29	1.12E+03 - (2.03E+02)	9.48E+02 - (1.28E+02)	7.03E+05 - (5.01E+06)	8.94E+02 - (6.16E+01)	1.00E+03 - (1.53E+02)	8.92E+02 - (5.67E+01)	8.08E+02 = (4.02E+01)	8.07E+02 + (4.54E+01)	8.10E+02 (4.37E+01)
	F30	1.05E+04 - (1.21E+03)	9.05E+03 - (4.86E+02)	9.56E+03 - (7.40E+02)	1.01E+04 - (7.72E+02)	8.64E+03 = (4.29E+02)	9.73E+03 - (6.63E+02)	8.64E+03 + (4.16E+02)	8.35E+03 + (3.85E+02)	8.80E+03 (4.62E+02)
win		**28**	**23**	**25**	**23**	**24**	**25**	**19**	**12**	
tie		**2**	**2**	**4**	**4**	**4**	**3**	**9**	**11**	
lose		**0**	**5**	**1**	**3**	**2**	**2**	**2**	**7**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S11 Performance comparisons of EaDE with state-of-the art DEs on 100-D CEC2014 benchmark set

		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE
Unimodal Functions	F1	1.11E+06- (1.93E+05)	8.78E+05- (2.56E+05)	2.42E+05- (8.54E+04)	1.77E+05- (6.22E+04)	1.57E+06- (4.44E+05)	1.63E+05- (8.53E+04)	1.60E+05- (3.75E+04)	1.27E+05= (3.88E+04)	1.14E+05 (4.23E+04)
	F2	1.88E+04- (1.19E+04)	1.52E+04- (1.36E+04)	0.00E+00= (0.00E+00)	1.06E-09= (4.05E-09)	1.23E-06- (6.62E-06)	1.75E-09= (5.61E-09)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F3	4.12E+01- (1.04E+02)	4.29E+02- (4.35E+02)	7.75E+02- (6.48E+02)	4.43E+03- (3.51E+03)	7.97E-05- (1.36E-04)	5.63E+03- (3.93E+03)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F4	1.77E+02= (5.34E+01)	1.48E+02+ (4.16E+01)	8.90E+01+ (5.82E+01)	1.10E+02+ (4.37E+01)	1.75E+02= (3.10E+01)	1.07E+02+ (5.31E+01)	1.62E+02= (2.67E+01)	1.63E+02= (3.31E+01)	1.68E+02 (3.29E+01)
	F5	2.13E+01- (3.04E-02)	2.00E+01+ (1.57E-02)	2.08E+01- (4.27E-02)	2.03E+01= (5.50E-01)	2.07E+01- (3.74E-02)	2.05E+01- (9.96E-02)	2.05E+01- (4.21E-02)	2.12E+01- (1.70E-01)	2.02E+01 (1.69E-01)
	F6	5.84E+01- (5.93E+00)	4.59E+01- (6.01E+00)	4.26E+01- (6.30E+00)	3.97E+01- (5.18E+00)	3.26E+01- (1.10E+01)	4.56E+01- (1.31E+01)	9.04E+00- (2.58E+00)	4.05E+00+ (1.78E+00)	5.69E+00 (2.70E+00)
	F7	1.42E-02- (4.46E-02)	1.23E-03= (3.81E-03)	2.38E-03- (4.17E-03)	2.54E-03- (6.01E-03)	0.00E+00= (0.00E+00)	1.72E-03= (8.11E-03)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F8	6.99E+01- (1.23E+01)	1.63E+01- (4.44E+00)	9.95E-02+ (3.04E-01)	0.00E+00+ (0.00E+00)	0.00E+00+ (0.00E+00)	0.00E+00+ (0.00E+00)	1.22E-03- (7.46E-04)	3.92E-03- (2.36E-03)	5.94E-05 (2.95E-05)
	F9	2.20E+02- (4.00E+01)	2.15E+02- (3.62E+01)	1.47E+02- (2.23E+01)	1.29E+02- (1.81E+01)	2.40E+02- (2.30E+01)	1.54E+02- (1.77E+01)	3.64E+01- (5.47E+00)	4.25E+01- (6.77E+00)	2.16E+01 (5.54E+00)
	F10	6.84E+02- (2.27E+02)	7.89E+01= (9.75E+01)	6.88E-01+ (4.09E-01)	1.49E+00+ (6.76E-01)	3.96E-03+ (5.56E-03)	1.21E-02+ (1.05E-02)	1.90E+01= (4.61E+00)	8.96E+01- (2.53E+01)	1.85E+01 (5.63E+00)
	F11	1.36E+04- (9.00E+02)	1.29E+04- (1.17E+03)	1.14E+04- (9.97E+02)	9.70E+03= (1.02E+03)	1.33E+04- (6.29E+02)	1.05E+04- (6.45E+02)	1.07E+04- (5.27E+02)	1.02E+04- (3.98E+02)	9.37E+03 (8.74E+02)
	F12	3.34E+00- (2.03E-01)	3.09E-01= (1.93E-01)	7.70E-01- (1.49E-01)	4.67E-01+ (9.35E-01)	6.59E-01- (7.18E-02)	3.37E-01- (3.43E-02)	4.18E-01- (3.84E-02)	4.48E-01- (4.92E-02)	2.87E-01 (7.59E-02)
	F13	4.71E-01- (6.05E-02)	4.14E-01- (5.40E-02)	3.56E-01- (3.36E-02)	3.51E-01- (3.82E-02)	4.87E-01- (3.31E-02)	4.13E-01- (4.40E-02)	2.33E-01= (2.33E-02)	3.06E-01- (4.41E-02)	2.31E-01 (3.37E-02)
	F14	2.44E-01+ (1.62E-02)	2.11E-01+ (1.66E-02)	2.21E-01+ (2.02E-02)	2.56E-01+ (1.95E-02)	2.33E-01+ (1.30E-02)	2.26E-01+ (1.67E-02)	3.33E-01- (1.25E-02)	3.37E-01= (3.62E-02)	3.21E-01 (1.93E-02)
	F15	4.49E+01- (1.12E+01)	2.63E+01- (5.28E+00)	1.69E+01= (2.94E+00)	2.50E+01- (4.79E+00)	3.08E+01- (2.53E+00)	3.37E+01- (4.36E+00)	1.59E+01= (1.08E+00)	1.55E+01= (1.57E+00)	1.53E+01 (1.10E+00)
	F16	4.51E+01- (3.76E-01)	4.27E+01- (9.82E-01)	4.05E+01- (6.08E-01)	3.84E+01- (9.44E-01)	4.02E+01- (3.90E-01)	4.00E+01- (5.77E-01)	3.92E+01- (6.04E-01)	3.88E+01- (5.72E-01)	3.74E+01 (7.83E-01)
Hybrid Functions	F17	2.66E+05- (1.04E+05)	1.19E+05- (4.01E+04)	1.90E+04- (7.39E+03)	1.89E+04- (9.90E+03)	1.38E+05- (6.06E+04)	1.83E+04- (7.89E+03)	4.20E+03= (6.71E+02)	3.53E+03+ (5.08E+02)	4.42E+03 (5.95E+02)
	F18	1.00E+03- (1.01E+03)	9.36E+02- (1.15E+03)	2.89E+02- (8.04E+01)	8.71E+02- (7.50E+02)	5.91E+02- (6.54E+02)	6.56E+02- (5.65E+02)	2.14E+02= (1.79E+01)	2.23E+02= (1.80E+01)	2.21E+02 (1.62E+01)
	F19	7.29E+01+ (3.14E+01)	8.70E+01- (2.19E+01)	9.71E+01- (1.67E+01)	9.94E+01- (1.56E+01)	9.32E+01= (4.17E+00)	9.22E+01- (1.88E+01)	9.66E+01- (2.43E+00)	9.10E+01+ (1.24E+00)	9.26E+01 (1.71E+00)
	F20	7.61E+02- (2.43E+02)	1.89E+03- (1.02E+03)	5.44E+02- (2.02E+02)	1.96E+03- (5.71E+03)	3.15E+02- (1.07E+02)	6.00E+03- (1.29E+04)	1.42E+02- (4.22E+01)	5.20E+01= (1.20E+01)	5.63E+01 (1.26E+01)
	F21	1.08E+05- (3.41E+04)	5.72E+04- (1.85E+04)	6.68E+03- (7.44E+03)	4.53E+03- (1.39E+03)	5.83E+04- (3.39E+04)	5.18E+03- (2.46E+03)	2.27E+03- (5.65E+02)	9.23E+02+ (3.24E+02)	1.36E+03 (4.97E+02)
	F22	1.53E+03- (3.62E+02)	1.77E+03- (3.64E+02)	1.84E+03- (3.67E+02)	1.52E+03- (3.01E+02)	1.73E+03- (2.56E+02)	1.56E+03- (2.51E+02)	1.06E+03- (1.83E+02)	1.06E+03- (2.69E+02)	8.91E+02 (2.23E+02)
Composition Functions	F23	3.48E+02- (1.58E-12)	3.48E+02= (2.53E-13)	3.48E+02- (2.46E-13)	3.48E+02- (2.58E-12)	3.48E+02- (7.90E-13)	3.48E+02- (1.42E-12)	3.48E+02= (8.44E-14)	3.48E+02= (8.44E-14)	3.48E+02 (0.00E+00)
	F24	4.01E+02- (6.93E+00)	3.86E+02+ (5.45E+00)	3.97E+02- (6.60E+00)	3.97E+02- (4.21E+00)	3.73E+02+ (2.48E+00)	4.01E+02- (4.63E+00)	3.94E+02- (2.60E+00)	3.87E+02+ (1.89E+00)	3.92E+02 (2.19E+00)
	F25	2.35E+02- (2.59E+01)	2.50E+02- (1.85E+01)	2.06E+02- (1.53E+01)	2.57E+02- (6.58E+00)	2.65E+02- (6.04E+00)	2.67E+02- (7.15E+00)	2.00E+02= (3.14E-13)	2.16E+02- (4.45E+00)	2.08E+02 (1.73E+01)
	F26	2.00E+02- (1.63E-02)	2.00E+02- (1.46E-02)	2.00E+02- (3.52E-02)	2.00E+02- (2.82E-02)	2.00E+02- (2.46E-02)	2.00E+02- (1.73E-02)	2.00E+02- (1.19E-13)	2.00E+02= (2.79E-13)	2.00E+02 (3.29E-13)
	F27	1.61E+03- (1.18E+02)	1.15E+03- (1.69E+02)	1.12E+03- (1.26E+02)	1.09E+03- (7.25E+01)	6.54E+02- (1.08E+02)	1.13E+03- (8.74E+01)	3.89E+02- (2.85E+01)	3.44E+02= (3.02E+01)	3.60E+02 (3.25E+01)
	F28	3.00E+03- (6.85E+02)	2.34E+03- (1.13E+02)	2.33E+03- (1.07E+02)	2.36E+03- (2.30E+02)	2.15E+03= (1.16E+02)	2.32E+03- (1.84E+02)	2.25E+03- (5.98E+01)	2.15E+03+ (6.90E+01)	2.20E+03 (5.41E+01)
	F29	1.42E+03- (1.10E+02)	1.51E+03- (1.73E+02)	1.07E+03- (2.34E+02)	1.36E+03- (9.11E+01)	1.50E+03- (2.49E+02)	1.37E+03- (1.05E+02)	7.53E+02= (3.60E+01)	7.41E+02= (4.02E+01)	7.49E+02 (4.41E+01)
	F30	8.79E+03- (1.41E+03)	8.58E+03- (8.90E+02)	6.93E+03+ (1.43E+03)	8.89E+03- (9.53E+02)	7.53E+03+ (1.03E+03)	8.40E+03= (1.22E+03)	7.88E+03= (8.31E+02)	5.00E+03+ (1.15E+03)	8.04E+03 (1.08E+03)
win		**27**	**22**	**23**	**22**	**21**	**23**	**17**	**10**	
tie		**1**	**4**	**2**	**3**	**4**	**3**	**13**	**13**	
lose		**2**	**4**	**5**	**5**	**5**	**4**	**0**	**7**	
		SaDE	CoDE	MPEDE	CIPDE	jDE	JADE	L-SHADE	jSO	EaDE

Table S12 Performance comparisons of EaDE with other EAs and SIs
on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		10-D					30-D				
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE
Unimodal Functions	F1	7.44E-03- (3.85E-02)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	1.20E-01 - (5.81E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	1.72E+06- (1.22E+06)	7.35E-04- (8.85E-04)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	8.24E+06 - (3.53E+06)	6.39E-04 - (4.57E-04)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F3	1.35E+08- (3.24E+08)	7.13E+04- (1.74E+05)	0.00E+00+ (0.00E+00)	1.80E-05= (6.95E-05)	8.39E-03 (2.32E-02)	8.12E+08 - (1.02E+09)	1.68E+07 - (1.97E+07)	6.84E+01 - (4.87E+02)	4.06E+00= (2.45E+01)	8.13E-04 (4.85E-03)
	F4	1.20E+04- (4.97E+03)	1.34E-02- (2.01E-02)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	1.51E+04 - (7.11E+03)	2.05E-02 - (3.01E-02)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F5	5.66E-02- (1.56E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	4.87E-01 - (1.46E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	8.11E+00- (3.64E+00)	1.31E+00= (3.39E+00)	4.25E+00- (4.95E+00)	3.60E+00- (4.81E+00)	1.73E+00 (3.78E+00)	3.68E+01 - (2.11E+01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	8.46E-03 - (4.49E-02)	0.00E+00 (0.00E+00)
	F7	2.03E+01- (8.81E+00)	1.14E+01- (5.65E+00)	2.47E-03= (7.66E-03)	2.69E+00- (2.17E+00)	8.59E-06 (2.59E-05)	7.81E+01 - (1.99E+01)	5.71E+01 - (1.06E+01)	3.76E+00+ (1.89E+01)	8.92E+00 - (4.97E+00)	3.38E-01 (3.67E-01)
	F8	2.04E+01- (8.64E-02)	2.03E+01- (1.38E-01)	2.11E+01- (2.28E-01)	2.03E+01- (1.03E-01)	2.01E+01 (1.51E-01)	2.09E+01 - (3.90E-02)	2.09E+01 - (6.90E-02)	2.15E+01 - (9.05E-02)	2.10E+01 - (4.72E-02)	2.07E+01 (1.83E-01)
	F9	4.47E+00- (1.21E+00)	4.02E+00- (8.65E-01)	3.11E+00- (2.76E+00)	2.22E+00- (5.08E-01)	1.34E+00 (1.18E+00)	2.87E+01 - (3.56E+00)	2.77E+01 - (1.58E+00)	1.55E+01+ (1.29E+01)	1.01E+01+ (2.21E+00)	2.24E+01 (2.86E+00)
	F10	4.35E+00- (3.47E+00)	1.80E-01- (1.20E-01)	0.00E+00+ (0.00E+00)	4.93E-04+ (1.88E-03)	5.17E-03 (1.29E-02)	1.43E+00 - (2.40E-01)	9.57E-02 - (3.86E-02)	0.00E+00= (0.00E+00)	8.22E-04 - (2.55E-03)	0.00E+00 (0.00E+00)
	F11	3.35E-01- (6.56E-01)	0.00E+00= (0.00E+00)	6.13E+00- (3.15E+01)	4.64E-01- (5.68E-01)	0.00E+00 (0.00E+00)	1.49E+00 - (2.01E+00)	0.00E+00= (0.00E+00)	5.93E+00 - (2.25E+01)	5.62E+00 - (2.42E+00)	0.00E+00 (0.00E+00)
	F12	1.49E+01- (6.61E+00)	8.16E+00- (2.50E+00)	9.95E-02+ (4.01E-01)	1.16E+00+ (1.20E+00)	1.89E+00 (1.31E+00)	4.78E+01 - (1.36E+01)	7.21E+01 - (1.39E+01)	1.72E+00+ (5.46E+00)	6.91E+00 - (3.26E+00)	2.73E+00 (2.45E+00)
	F13	2.73E+01- (1.02E+01)	1.40E+01- (4.37E+00)	6.15E+00+ (3.17E+01)	1.20E+00= (1.08E+00)	1.21E+00 (1.12E+00)	1.18E+02 - (3.62E+01)	1.23E+02 - (1.92E+01)	9.29E+00= (3.02E+01)	1.07E+01 - (9.12E+00)	1.63E+00 (2.40E+00)
	F14	6.04E+00- (9.28E+00)	9.37E-02- (5.86E-02)	7.11E+02- (8.26E+02)	1.51E+01- (4.44E+01)	2.33E-02 (3.74E-02)	6.82E+00 - (2.14E+01)	8.72E+00 - (3.06E+01)	3.19E+03 - (1.85E+03)	1.45E+03 - (4.80E+02)	1.10E-02 (1.34E-02)
	F15	7.18E+02- (2.83E+02)	5.36E+02- (1.21E+02)	9.76E+02= (9.86E+02)	1.70E+02+ (8.13E+01)	3.00E+02 (1.06E+02)	3.82E+03- (9.15E+02)	3.42E+03 - (4.75E+02)	2.71E+03+ (2.95E+03)	9.08E+02+ (4.04E+02)	2.59E+03 (3.05E+02)
	F16	6.93E-01- (2.44E-01)	4.83E-01- (2.43E-01)	3.09E+00- (2.27E+00)	5.08E-02= (7.35E-02)	1.38E-01 (1.74E-01)	2.45E+00 - (3.13E-01)	8.75E-01 - (4.59E-01)	5.20E+00 - (3.08E+00)	2.24E-02 + (2.51E-02)	2.18E-01 (1.86E-01)
	F17	1.05E+01- (5.06E-01)	1.01E+01= (1.44E-14)	4.51E+01- (8.78E+01)	1.20E+01- (1.09E+00)	1.01E+01 (1.35E-14)	3.09E+01 - (5.45E-01)	3.04E+01+ (3.37E-03)	1.52E+02= (2.85E+02)	4.06E+01 - (5.99E+00)	3.04E+01 (9.43E-07)
	F18	2.48E+01- (5.88E+00)	2.01E+01- (4.43E+00)	5.49E+01- (8.39E+01)	1.21E+01= (1.51E+00)	1.23E+01 (1.84E+00)	1.14E+02 - (1.58E+01)	7.93E+01 - (1.06E+01)	1.99E+02 - (6.21E+01)	4.19E+01= (5.91E+00)	4.05E+01 (4.59E+00)
	F19	4.21E-01- (1.88E-01)	1.62E-01+ (1.08E-01)	2.40E+00- (8.89E-01)	9.48E-01- (1.84E-01)	2.32E-01 (5.60E-02)	1.19E+00= (4.03E-01)	9.42E-01 + (1.81E-01)	1.08E+02 - (2.85E+02)	2.79E+00 - (6.66E-01)	1.15E+00 (1.27E-01)
	F20	3.14E+00- (4.70E-01)	2.59E+00- (3.85E-01)	3.14E+00- (7.83E-01)	2.84E+00- (4.87E-01)	1.89E+00 (3.04E-01)	1.11E+01 - (8.26E-01)	1.12E+01= (7.36E-01)	1.02E+01= (2.14E+00)	1.23E+01 - (1.98E+00)	1.05E+01 (1.41E+00)
Composition Functions	F21	4.00E+02- (3.08E-01)	1.77E+02+ (7.74E+01)	4.00E+02- (2.10E-08)	4.00E+02= (2.89E-13)	4.00E+02 (0.00E+00)	2.79E+02= (7.32E+01)	2.61E+02 - (6.59E+01)	2.98E+02 - (1.40E+01)	3.06E+02 - (2.81E+01)	2.92E+02 (2.72E+01)
	F22	7.16E+01- (6.98E+01)	1.24E+01- (7.64E+00)	4.00E+02- (1.83E+02)	2.00E+01- (5.29E+00)	1.03E+01 (2.34E+01)	1.20E+02 - (2.68E+01)	9.93E+01 - (3.35E+01)	2.99E+03 - (1.90E+03)	9.82E+02 - (4.22E+02)	1.07E+02 (1.73E+00)
	F23	7.39E+02- (2.55E+02)	6.90E+02- (1.80E+02)	5.16E+02= (6.15E+02)	1.97E+02= (1.61E+02)	2.04E+02 (1.15E+02)	3.90E+03 - (7.09E+02)	4.15E+03 - (4.20E+02)	2.49E+03+ (2.66E+03)	1.17E+03+ (4.57E+02)	2.24E+03 (3.87E+02)
	F24	2.14E+02- (4.10E+00)	1.46E+02+ (3.09E+01)	2.10E+02= (1.36E+01)	2.00E+02= (1.17E+00)	2.04E+02 (3.59E+00)	2.64E+02 - (7.71E+00)	2.64E+02 - (9.27E+00)	2.03E+02+ (2.12E+01)	2.00E+02+ (8.94E-01)	2.00E+02 (5.33E-01)
	F25	2.12E+02- (3.82E+00)	1.94E+02- (2.61E+01)	2.09E+02- (7.74E+00)	2.00E+02- (1.34E-10)	1.99E+02 (1.42E+01)	2.83E+02 - (6.86E+00)	2.91E+02 - (4.84E+00)	2.52E+02 - (1.81E+01)	2.15E+02+ (2.24E+01)	2.39E+02 (3.91E+00)
	F26	1.58E+02- (4.29E+01)	1.10E+02- (2.69E+00)	2.09E+02- (8.14E+01)	1.36E+02= (4.83E+01)	1.40E+02 (4.84E+01)	2.32E+02 - (6.41E+01)	2.00E+02 - (4.19E-02)	3.00E+02 - (3.82E-01)	2.91E+02 - (2.77E+01)	2.00E+02 (1.11E-13)
	F27	4.49E+02- (8.12E+01)	3.18E+02- (1.16E+01)	4.16E+02- (1.49E+02)	3.00E+02- (9.80E-11)	3.04E+02 (2.54E+01)	9.42E+02- (1.03E+02)	9.93E+02 - (5.25E+01)	3.10E+02+ (4.63E+01)	3.01E+02+ (5.14E+00)	3.00E+02 (2.78E-01)
	F28	3.16E+02- (8.32E+01)	2.00E+02+ (1.02E+02)	3.49E+02- (1.89E+02)	3.00E+02- (6.43E-13)	3.00E+02 (0.00E+00)	3.68E+02 - (2.54E+02)	3.00E+02 - (3.38E-13)	3.00E+02 - (1.30E-02)	3.00E+02 - (6.47E-13)	3.00E+02 (0.00E+00)
win		**28**	**19**	**16**	**13**		**26**	**21**	**12**	**15**	
tie		**0**	**5**	**8**	**12**		**2**	**5**	**9**	**6**	
lose		**0**	**4**	**4**	**3**		**0**	**2**	**7**	**7**	
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE

Table S12 (Continued) Performance comparisons of EaDE with other EAs and SIs on 10-D, 30-D, 50-D and 100-D CEC2013 benchmark set

		50-D					100-D				
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE
Unimodal Functions	F1	8.15E-01 - (3.28E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	1.21E-02- (6.08E-03)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)
	F2	1.21E+07 - (5.01E+06)	3.00E-03 + (1.39E-03)	0.00E+00+ (0.00E+00)	2.96E-09 + (1.38E-08)	1.99E+01 (5.33E+01)	2.03E+07- (1.89E+06)	5.10E-03+ (1.34E-03)	0.00E+00+ (0.00E+00)	6.41E-02+ (7.34E-02)	1.03E+05 (2.54E+04)
	F3	1.06E+09 - (1.11E+09)	2.13E+08 - (1.77E+08)	2.90E+02+ (1.23E+03)	7.37E-01 + (2.34E+00)	2.31E+03 (5.30E+03)	9.54E+09- (4.37E+09)	3.77E+09- (2.29E+09)	1.51E+05+ (1.71E+05)	8.33E+04+ (2.07E+05)	2.81E+06 (2.51E+06)
	F4	2.83E+04 - (1.25E+04)	4.85E-03 - (4.03E-03)	0.00E+00= (0.00E+00)	5.44E-10 = (2.75E-09)	0.00E+00 (0.00E+00)	6.59E+04- (3.27E+04)	3.50E-03- (4.75E-03)	0.00E+00+ (0.00E+00)	6.90E-09+ (2.12E-08)	4.81E-04 (3.61E-04)
	F5	2.70E-01 - (1.15E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	2.78E-09 - (9.78E-09)	0.00E+00 (0.00E+00)	1.19E-01- (3.18E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	1.28E-07- (2.50E-07)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F6	4.71E+01 - (1.48E+00)	4.34E+01 - (1.30E-07)	4.34E+01 - (1.22E-05)	4.34E+01 - (1.45E-07)	4.34E+01 (0.00E+00)	2.43E+02= (3.41E+01)	2.92E+01+ (6.07E+01)	2.32E+02- (5.04E+01)	2.01E+01+ (4.77E+01)	2.16E+02 (2.88E+01)
	F7	8.22E+01 - (9.98E+00)	7.30E+01 - (8.24E+00)	1.37E+01= (2.91E+01)	2.46E+00 - (2.65E+00)	7.01E-01 (7.35E-01)	1.45E+02- (1.47E+01)	9.49E+01- (1.33E+01)	4.49E+01- (1.94E+01)	1.16E+01+ (1.56E+01)	6.29E+00 (2.26E+00)
	F8	2.11E+01 - (3.42E-02)	2.11E+01 - (3.52E-02)	2.15E+01 - (7.44E-02)	2.11E+01 - (3.57E-02)	2.10E+01 (1.24E-01)	2.12E+01= (1.42E-02)	2.13E+01- (4.53E-02)	2.15E+01- (8.35E-02)	2.13E+01- (3.24E-02)	2.12E+01 (8.77E-02)
	F9	5.72E+01 - (4.11E+00)	5.47E+01 - (2.15E+00)	4.36E+01= (2.47E+01)	1.46E+01+ (2.31E+00)	4.53E+01 (8.18E+00)	1.35E+02- (7.30E+00)	1.28E+02= (4.44E+00)	8.30E+01+ (5.25E+01)	3.00E+01+ (3.70E+00)	1.23E+02 (1.09E+01)
	F10	2.30E+00 - (6.25E-01)	1.76E-01 - (7.93E-02)	0.00E+00+ (0.00E+00)	7.59E-03 - (5.83E-03)	3.58E-03 (4.25E-03)	3.78E+00- (6.83E-01)	2.07E-01- (1.31E-01)	0.00E+00+ (0.00E+00)	1.31E-02= (9.17E-03)	1.40E-02 (1.04E-02)
	F11	1.01E+00 - (1.23E+00)	0.00E+00= (0.00E+00)	2.69E+01 - (1.58E+01)	9.75E-01 - (5.45E-01)	0.00E+00 (0.00E+00)	1.53E+00- (3.52E+00)	9.95E-02+ (3.04E-01)	1.39E+03- (1.07E+03)	1.29E+00- (9.48E-01)	6.73E-05 (2.56E-05)
	F12	1.03E+02 - (2.46E+01)	1.71E+02 - (2.30E+01)	1.41E+00+ (1.05E+00)	1.27E+00+ (8.92E-01)	9.63E+00 (3.26E+00)	3.18E+02- (4.33E+01)	4.55E+02- (5.18E+01)	1.02E+03- (6.27E+02)	8.44E+01- (1.82E+01)	4.24E+01 (9.24E+00)
	F13	2.45E+02 - (4.84E+01)	2.90E+02 - (2.83E+01)	1.53E+00+ (1.07E+00)	5.52E+01 - (4.07E+01)	1.03E+01 (7.26E+00)	5.79E+02- (4.46E+01)	7.45E+02- (6.88E+01)	9.10E+02- (9.21E+02)	2.15E+02- (3.44E+01)	1.10E+02 (3.19E+01)
	F14	1.34E+00 - (1.70E+00)	6.78E+00 - (7.51E+00)	5.20E+03 - (3.19E+03)	1.93E+02 - (2.24E+02)	1.53E-01 (5.05E-02)	6.64E+00+ (6.86E+00)	4.52E+01+ (4.65E+01)	1.21E+04- (1.32E+03)	9.93E+02- (4.56E+02)	8.68E+01 (1.88E+01)
	F15	9.00E+03 - (2.72E+03)	7.05E+03 - (6.16E+02)	5.06E+03+ (4.56E+03)	3.74E+03+ (1.10E+03)	6.06E+03 (5.96E+02)	2.97E+04- (3.59E+02)	1.33E+04= (1.27E+03)	1.13E+04+ (1.93E+03)	7.35E+03+ (2.65E+03)	1.30E+04 (1.16E+03)
	F16	3.25E+00 - (3.80E-01)	1.28E+00 - (9.50E-01)	6.42E+00 - (2.56E+00)	1.77E-02 + (2.70E-02)	5.85E-01 (4.49E-01)	3.99E+00- (2.63E-01)	1.53E+00- (5.81E-01)	6.99E+00- (4.73E-01)	8.11E-03+ (3.68E-03)	8.20E-01 (3.98E-01)
	F17	5.12E+01 - (4.99E-01)	5.08E+01+ (1.30E-03)	4.31E+02 - (3.40E+02)	7.31E+01 - (7.78E+00)	5.08E+01 (2.81E-04)	1.02E+02= (5.19E-01)	1.02E+02+ (5.77E-03)	1.70E+02- (1.49E+02)	1.71E+02- (1.36E+01)	1.02E+02 (1.77E-01)
	F18	2.41E+02 - (3.43E+01)	1.53E+02 - (3.53E+01)	3.59E+02 - (1.41E+02)	7.14E+01= (9.83E+00)	7.51E+01 (8.04E+00)	7.41E+02- (9.47E+01)	3.44E+02- (4.12E+01)	2.94E+02= (2.82E+02)	1.73E+02+ (1.77E+01)	2.10E+02 (2.81E+01)
	F19	1.59E+00 + (3.00E-01)	2.01E+00+ (3.22E-01)	7.95E+04 - (3.56E+05)	3.94E+00 - (1.24E+00)	2.34E+00 (2.92E-01)	3.24E+00+ (5.01E-01)	5.63E+00+ (6.89E-01)	3.47E+05- (1.90E+06)	8.75E+00- (1.81E+00)	6.90E+00 (5.35E-01)
	F20	2.00E+01 - (8.96E-01)	2.01E+01 - (1.01E+00)	2.03E+01 - (2.28E+00)	1.91E+01 - (9.87E-01)	1.73E+01 (8.16E-01)	5.00E+01= (1.27E-01)	5.00E+01- (0.00E+00)	5.00E+01= (0.00E+00)	5.00E+01= (3.36E-12)	4.99E+01 (2.44E-01)
Composition Functions	F21	7.06E+02 - (4.52E+02)	7.88E+02 - (4.07E+02)	1.35E+03 - (1.91E+03)	8.82E+02 - (3.24E+02)	5.62E+02 (4.55E+02)	3.48E+02= (5.69E+01)	3.90E+02- (3.05E+01)	4.00E+02- (1.23E-06)	4.00E+02- (2.36E-12)	3.33E+02 (4.79E+01)
	F22	3.09E+01 = (6.03E+01)	3.29E+01 - (4.39E+01)	5.03E+03 - (3.30E+03)	5.64E+01 - (5.12E+01)	1.24E+01 (1.01E+00)	7.70E+01= (6.28E+01)	1.58E+02- (6.11E+01)	1.24E+04- (1.61E+03)	3.54E+02- (1.55E+02)	8.32E+01 (1.43E+01)
	F23	7.08E+03 - (1.05E+03)	8.62E+03 - (9.45E+02)	5.61E+03+ (4.00E+03)	3.23E+03+ (1.14E+03)	5.10E+03 (6.94E+02)	2.20E+04- (7.49E+03)	1.81E+04- (1.54E+03)	1.35E+04- (2.00E+03)	6.05E+03+ (4.53E+03)	1.21E+04 (1.17E+03)
	F24	3.22E+02 - (1.08E+01)	3.36E+02 - (1.30E+01)	2.47E+02+ (9.00E+01)	2.00E+02+ (4.22E-03)	2.04E+02 (3.52E+00)	4.86E+02- (1.54E+01)	5.46E+02- (1.01E+01)	2.77E+02+ (1.46E+02)	2.00E+02+ (5.06E-03)	2.25E+02 (6.70E+00)
	F25	3.58E+02 - (9.99E+00)	3.80E+02 - (5.82E+00)	3.11E+02 - (4.34E+01)	2.93E+02 - (7.61E+00)	2.75E+02 (6.02E+00)	5.68E+02- (1.65E+01)	6.08E+02- (1.24E+01)	4.68E+02- (1.12E+02)	3.94E+02- (1.21E+01)	3.79E+02 (1.06E+01)
	F26	4.01E+02 - (6.94E+01)	2.00E+02 - (8.94E-03)	3.52E+02 - (8.58E+01)	3.00E+02 - (5.94E-03)	2.20E+02 (4.32E+01)	6.08E+02- (2.47E+01)	3.41E+02+ (2.03E+02)	3.47E+02+ (9.75E+01)	3.00E+02+ (6.53E-03)	3.45E+02 (7.56E+00)
	F27	1.55E+03 - (1.43E+02)	1.73E+03 - (7.44E+01)	4.88E+02= (3.00E+02)	3.00E+02+ (4.70E-02)	3.61E+02 (5.76E+01)	3.36E+03- (2.30E+02)	3.67E+03- (9.08E+01)	9.24E+02= (1.22E+03)	3.00E+02+ (7.20E-02)	5.52E+02 (6.21E+01)
	F28	6.54E+02 - (9.63E+02)	4.00E+02= (2.89E-13)	6.46E+02 - (1.40E+03)	4.00E+02 - (2.70E-09)	4.00E+02 (3.92E-13)	6.17E+03= (2.46E+03)	3.21E+03= (1.57E+03)	3.24E+03= (1.02E+03)	2.46E+03+ (9.75E+00)	3.32E+03 (1.04E+03)
win		**26**	**21**	**14**	**16**		**19**	**16**	**14**	**11**	
tie		**1**	**4**	**6**	**3**		**7**	**5**	**6**	**3**	
lose		**1**	**3**	**8**	**9**		**2**	**7**	**8**	**14**	
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE

Table S13 Performance comparisons of EaDE with other EAs and SIs on 10-D, 30-D, 50-D and 100-D CEC2014 benchmark set

		10-D					30-D				
		cNrGA	DMSDL-PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL-PSO	IPOP-CMA-ES	HS-ES	EaDE
Unimodal Functions	F1	1.51E+06-(1.84E+06)	9.19E-03-(8.85E-04)	0.00E+00=(0.00E+00)	0.00E+00=(0.00E+00)	0.00E+00(0.00E+00)	7.66E+06 -(4.87E+06)	1.45E-03 -(4.11E-05)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00(0.00E+00)
	F2	2.41E+04-(1.22E+05)	3.39E-02-(6.12E-02)	0.00E+00=(0.00E+00)	0.00E+00=(0.00E+00)	0.00E+00(0.00E+00)	2.82E+04 -(8.86E+04)	5.56E-05 -(1.35E-04)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00(0.00E+00)
	F3	4.29E+03-(4.72E+03)	7.16E-03-(2.28E-03)	0.00E+00=(0.00E+00)	0.00E+00=(0.00E+00)	0.00E+00(0.00E+00)	1.34E+04 -(1.06E+04)	2.26E-03 -(1.07E-03)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00(0.00E+00)
Basic Multimodal Functions	F4	2.33E+01-(1.65E+01)	0.00E+00+(0.00E+00)	3.13E+01-(1.06E+01)	3.48E+01+(4.53E-03)	2.68E+01(1.47E+01)	9.94E+01 -(2.76E+01)	1.33E-01 =(7.28E-01)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00(0.00E+00)
	F5	2.00E+01-(5.48E-03)	1.94E+01=(3.10E+00)	2.08E+01-(4.13E-01)	1.80E+01+(6.10E+00)	1.52E+01(8.56E+00)	2.00E+01 +(1.64E-02)	2.00E+01 +(6.85E-06)	2.11E+01 -(4.16E-01)	2.00E+01 +(3.34E-04)	2.01E+01(7.47E-02)
	F6	1.81E+00-(1.18E+00)	7.10E-01-(5.09E-01)	3.40E+00-(3.13E+00)	0.00E+00=(0.00E+00)	0.00E+00(0.00E+00)	1.21E+01 -(2.33E+00)	1.28E+01 -(1.07E+00)	5.27E+00 -(3.33E+00)	8.66E-01 -(1.09E+00)	3.67E-02(1.84E-01)
	F7	1.05E-01-(6.98E-02)	1.59E-02-(1.03E-02)	0.00E+00+(0.00E+00)	0.00E+00+(0.00E+00)	4.27E-03(7.42E-03)	7.89E-02 -(5.83E-02)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00 =(0.00E+00)	0.00E+00(0.00E+00)
	F8	2.35E-01-(5.37E-01)	0.00E+00=(0.00E+00)	9.03E+00-(3.59E+00)	3.98E-01-(6.18E-01)	0.00E+00(0.00E+00)	7.94E-01 -(8.34E-01)	0.00E+00 =(0.00E+00)	1.36E+02 -(4.78E+01)	7.78E+00 -(2.17E+00)	0.00E+00(0.00E+00)
	F9	8.37E+00-(3.17E+00)	3.98E+00-(1.50E+00)	3.06E+00+(1.51E+01)	7.63E-01+(8.93E-01)	1.89E+00(1.24E+00)	4.07E+01 -(1.12E+01)	4.20E+01 -(5.92E+00)	1.28E+01 +(3.31E+01)	6.87E+00 -(2.97E+00)	4.15E+00(2.15E+00)
	F10	2.14E+00-(3.51E+00)	5.74E-01-(1.16E+00)	3.05E+02-(2.57E+02)	5.16E+01-(7.99E+01)	4.16E-03(1.58E-02)	1.76E+00 -(2.59E+00)	1.39E+00 -(1.31E+00)	2.80E+03 -(1.50E+03)	3.97E+02 -(2.18E+02)	8.16E-04(4.08E-03)
	F11	2.29E+02-(1.75E+02)	1.33E+02-(7.32E+01)	5.70E+02-(5.00E+02)	4.70E+01=(1.01E+02)	1.73E+01(1.34E+01)	2.20E+03 -(4.60E+02)	1.59E+03 -(2.72E+02)	1.69E+03 =(1.61E+03)	7.33E+02 +(3.37E+02)	1.18E+03(2.06E+02)
	F12	1.28E-01-(6.38E-02)	1.00E-01-(5.72E-02)	1.64E+00-(1.83E+00)	3.10E-02+(5.01E-02)	4.05E-02(3.82E-02)	1.40E-01 -(4.36E-02)	1.61E-01 =(1.14E-01)	3.76E+00 -(2.77E+00)	1.95E-02 +(3.46E-02)	1.04E-01(3.83E-02)
	F13	1.07E-01-(5.02E-02)	9.13E-02-(3.39E-02)	4.56E-01-(6.02E-01)	9.66E-03+(4.11E-03)	2.29E-02(1.60E-02)	2.68E-01 -(8.03E-02)	2.34E-01 -(4.94E-02)	5.88E-01 -(7.67E-01)	4.70E-02 +(1.64E-02)	7.84E-02(2.56E-02)
	F14	2.06E-01-(1.12E-01)	1.27E-01-(3.88E-02)	9.33E-01-(1.26E+00)	3.17E-01-(9.00E-02)	4.27E-02(1.98E-02)	3.92E-01 -(2.15E-01)	2.21E-01 =(2.89E-02)	4.00E+00 -(1.55E+01)	3.32E-01 -(5.79E-02)	2.05E-01(2.83E-02)
	F15	1.27E+00-(4.40E-01)	5.23E-01-(1.19E-01)	2.12E+00-(7.00E-01)	9.27E-01-(2.47E-01)	3.70E-01(8.96E-02)	1.04E+01 -(4.23E+00)	3.10E+00 -(7.55E-01)	1.03E+03 -(3.69E+03)	2.81E+00 -(5.43E-01)	2.04E+00(2.54E-01)
	F16	2.00E+00-(5.33E-01)	1.67E+00-(3.22E-01)	3.12E+00-(7.47E-01)	1.52E+00-(4.37E-01)	5.23E-01(3.40E-01)	9.75E+00 -(7.99E-01)	9.24E+00 -(5.25E-01)	1.27E+01 -(7.55E-01)	1.01E+01 -(9.17E-01)	7.40E+00(8.52E-01)
Hybrid Functions	F17	2.74E+05-(3.53E+05)	1.12E+02-(1.10E+02)	6.93E+01-(7.78E+01)	3.31E+01-(8.41E+01)	9.91E-01(8.72E-01)	1.49E+06 -(8.85E+05)	1.48E+03 -(5.50E+02)	3.57E+06 -(2.34E+07)	2.85E+01 +(5.59E+01)	8.06E+01(4.95E+01)
	F18	1.12E+04-(9.34E+03)	7.04E+00-(4.06E+00)	3.51E+05-(1.90E+06)	2.93E-01=(1.84E-01)	2.94E-01(3.50E-01)	2.68E+03 -(2.76E+03)	1.04E+02 -(1.02E+02)	1.14E+03 -(4.73E+03)	6.32E+00 -(3.63E+00)	3.52E+00(1.34E+00)
	F19	1.17E+00-(8.30E-01)	2.30E-01-(1.15E-01)	3.77E+00-(5.41E+00)	6.32E-01-(4.75E-01)	8.54E-02(1.38E-01)	1.24E+01 -(1.52E+01)	6.00E+00 -(6.39E-01)	3.50E+01 -(9.95E+01)	3.02E+00 =(7.34E-01)	2.77E+00(7.05E-01)
	F20	7.54E+03-(9.38E+03)	1.45E+00-(6.78E-01)	2.31E+04-(1.08E+05)	8.74E-01-(7.48E-01)	1.82E-01(1.70E-01)	3.48E+04 -(1.95E+04)	8.91E+01 -(8.45E+01)	3.89E+03 -(2.04E+04)	1.90E+00 +(6.92E-01)	2.51E+00(9.75E-01)
	F21	1.33E+05-(2.52E+05)	2.90E+01-(4.92E+01)	1.90E+04-(5.87E+04)	2.78E+01-(8.27E+01)	3.94E-01(3.19E-01)	6.53E+05 -(5.38E+05)	9.25E+02 -(3.97E+02)	4.33E+06 -(2.94E+07)	2.75E+01 =(7.86E+01)	1.95E+01(3.62E+01)
	F22	3.60E+01-(5.63E+01)	8.36E-01-(3.04E+00)	8.44E+01-(9.67E+01)	1.82E+01-(2.42E+01)	8.00E-02(3.20E-02)	4.34E+02 -(2.01E+02)	1.87E+02 -(7.00E+01)	2.51E+02 -(1.27E+02)	1.71E+02 -(7.48E+01)	2.12E+01(4.18E+00)
Composition Functions	F23	3.29E+02-(4.46E-02)	3.07E+02=(8.36E+01)	3.29E+02-(5.77E-11)	3.29E+02-(5.37E-13)	3.29E+02(2.89E-13)	3.16E+02 -(3.04E-01)	3.15E+02 =(5.78E-14)	3.15E+02 -(8.89E-03)	3.15E+02 -(4.68E-06)	3.15E+02(4.02E-13)
	F24	1.19E+02-(6.30E+00)	1.13E+02-(2.60E+00)	1.18E+02=(2.46E+01)	1.07E+02+(1.53E+01)	1.08E+02(1.76E+00)	2.35E+02 -(5.45E+00)	2.24E+02 -(5.02E-01)	2.27E+02 -(2.90E+01)	2.24E+02 -(9.45E-01)	2.23E+02(1.04E+00)
	F25	1.78E+02-(3.03E+01)	1.29E+02-(8.79E+00)	2.01E+02-(4.80E-02)	1.97E+02-(8.04E+00)	1.35E+02(4.16E+01)	2.10E+02 -(3.34E+00)	2.04E+02 -(8.33E-01)	2.14E+02 -(2.32E+01)	2.09E+02 -(1.68E+00)	2.03E+02(4.27E-02)
	F26	1.00E+02-(5.91E-02)	1.00E+02-(2.36E-02)	1.00E+02-(5.54E-02)	1.00E+02+(4.62E-03)	1.00E+02(1.79E-02)	1.00E+02 -(1.14E-01)	1.00E+02 -(2.71E-02)	1.18E+02 -(6.24E+01)	1.39E+02 -(4.44E+01)	1.00E+02(2.55E-02)
	F27	2.81E+02-(1.41E+02)	1.06E+02-(1.47E+02)	3.00E+02-(2.98E-02)	2.49E+02-(1.26E+02)	5.83E+01(1.32E+02)	6.34E+02 -(7.11E+01)	4.07E+02 -(3.33E+00)	3.17E+02 -(8.30E+01)	3.04E+02 -(1.26E+01)	3.00E+02(1.29E-13)
	F28	4.04E+02-(4.51E+01)	3.61E+02+(1.10E+01)	4.28E+02-(1.15E+02)	3.67E+02-(1.33E+02)	3.81E+02(3.68E+01)	9.55E+02 -(5.35E+01)	8.33E+02 =(1.82E+01)	9.02E+02 -(9.21E+01)	8.87E+02 -(3.44E+01)	8.31E+02(2.03E+01)
	F29	5.43E+02-(1.68E+02)	2.86E+02-(5.04E+01)	1.58E+05-(4.97E+05)	2.17E+02-(2.34E+01)	2.22E+02(5.61E-01)	1.65E+03 -(4.92E+02)	9.69E+02 -(1.90E+02)	5.32E+06 -(3.21E+07)	2.95E+02 +(7.88E+01)	7.16E+02(2.65E+00)
	F30	7.32E+02-(1.66E+02)	5.16E+02-(4.97E+01)	5.53E+03-(1.77E+04)	5.38E+02-(4.32E+01)	4.67E+02(1.72E+01)	5.89E+03 -(6.33E+03)	2.08E+03 -(6.95E+02)	2.98E+05 -(1.83E+06)	1.75E+03 -(3.94E+02)	1.07E+03(5.08E+02)
win tie lose		**30** **0** **0**	**25** **3** **2**	**24** **4** **2**	**16** **6** **8**		**29** **0** **1**	**22** **7** **1**	**23** **6** **1**	**16** **7** **7**	
		cNrGA	DMSDL-PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL-PSO	IPOP-CMA-ES	HS-ES	EaDE

Table S13 (Continued) Performance comparisons of EaDE with other EAs and SIs on 10-D, 30-D, 50-D and 100-D CEC2014 benchmark set

		50-D					100-D				
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE
Unimodal Functions	F1	8.72E+06 - (3.00E+06)	1.21E-02 + (1.28E-03)	0.00E+00+ (0.00E+00)	0.00E+00+ (0.00E+00)	1.54E+01 (5.54E+01)	4.18E+07- (1.08E+07)	6.22E-03+ (3.62E-04)	0.00E+00+ (0.00E+00)	1.04E-01+ (9.69E-02)	1.14E+05 (4.23E+04)
	F2	2.20E+05 - (1.08E+06)	4.43E-02 - (2.14E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	3.00E+04- (3.69E+04)	1.52E-01- (1.39E-01)	0.00E+00= (0.00E+00)	1.71E-09= (5.32E-09)	0.00E+00 (0.00E+00)
	F3	3.33E+04 - (1.42E+04)	4.76E-03 - (1.13E-03)	0.00E+00= (0.00E+00)	6.50E-09 - (2.48E-08)	0.00E+00 (0.00E+00)	6.65E+04- (2.30E+04)	1.50E-02- (5.71E-03)	0.00E+00= (0.00E+00)	2.65E-08- (8.21E-08)	0.00E+00 (0.00E+00)
Basic Multimodal Functions	F4	1.18E+02 - (4.63E+01)	0.00E+00 + (0.00E+00)	8.66E-01 + (4.41E+00)	1.20E+00+ (8.59E+00)	4.87E+01 (4.90E+01)	2.40E+02- (2.59E+01)	7.17E+00+ (2.58E+01)	1.25E+02= (9.91E+01)	4.32E+01+ (6.34E+01)	1.68E+02 (3.29E+01)
	F5	2.00E+01 = (9.46E-03)	2.00E+01 + (3.84E-06)	2.15E+01 - (5.83E-02)	2.00E+01+ (1.24E-04)	2.01E+01 (1.27E-01)	2.00E+01+ (4.60E-03)	2.00E+01+ (4.89E-07)	2.15E+01- (2.83E-01)	2.00E+01+ (8.35E-05)	2.02E+01 (1.69E-01)
	F6	2.41E+01 - (3.24E+00)	2.67E+01 - (1.99E+00)	1.25E+01 - (4.22E+00)	6.00E-05 + (9.90E-05)	7.03E-02 (2.08E-01)	6.44E+01- (5.60E+00)	7.43E+01- (3.08E+00)	9.64E+01- (4.53E+01)	1.49E+00+ (1.23E+00)	5.69E+00 (2.70E+00)
	F7	1.74E-01 - (1.72E-01)	0.00E+00 = (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	0.00E+00 (0.00E+00)	1.67E-01- (1.04E-01)	0.00E+00= (0.00E+00)	0.00E+00= (0.00E+00)	1.07E-08- (3.73E-08)	0.00E+00 (0.00E+00)
	F8	6.75E-01 - (9.59E-01)	0.00E+00 = (0.00E+00)	1.22E+02 - (8.17E+01)	1.56E+00 - (1.13E+00)	0.00E+00 (0.00E+00)	7.97E-01- (1.37E+00)	9.95E-02+ (3.04E-01)	1.23E+02- (1.19E+01)	4.84E+00- (1.38E+00)	5.94E-05 (2.95E-05)
	F9	8.30E+01 - (1.89E+01)	9.14E+01 - (1.05E+01)	9.05E+00+ (4.36E+01)	9.56E-01 + (1.11E+00)	6.70E+00 (3.11E+00)	1.91E+02- (3.71E+01)	2.87E+02- (3.33E+01)	9.67E+02- (5.43E+02)	3.25E+00+ (1.73E+00)	2.16E+01 (5.54E+00)
	F10	1.13E+00 - (1.67E+00)	2.47E+00 - (1.81E+00)	4.51E+03 - (7.87E+02)	2.90E+02 - (1.82E+02)	2.55E-02 (1.76E-02)	6.21E-01+ (7.45E-01)	1.78E+01+ (3.63E+01)	1.22E+04- (1.34E+03)	5.75E+02- (4.03E+02)	1.85E+01 (5.63E+00)
	F11	4.31E+03 - (6.51E+02)	3.72E+03 - (2.70E+02)	4.56E+03= (4.25E+03)	5.65E+02+ (2.64E+02)	2.98E+03 (4.71E+02)	1.27E+04- (2.20E+03)	1.03E+04- (7.80E+02)	1.23E+04- (6.95E+03)	2.21E+03+ (3.37E+02)	9.37E+03 (8.74E+02)
	F12	1.38E-01 = (3.70E-02)	1.19E-01 + (1.03E-01)	3.90E+00 - (3.35E+00)	2.22E-02 + (1.79E-02)	1.51E-01 (6.43E-02)	2.15E-01= (4.75E-02)	1.51E-01+ (1.26E-01)	4.98E+00- (3.09E+00)	1.71E-02+ (1.70E-02)	2.87E-01 (7.59E-02)
	F13	3.40E-01 - (7.63E-02)	3.43E-01 - (5.16E-02)	3.79E-01 - (7.14E-01)	6.92E-02 + (1.51E-02)	1.36E-01 (3.08E-02)	5.57E-01- (9.96E-02)	3.88E-01- (3.71E-02)	5.48E-01- (7.41E-02)	8.38E-02+ (1.08E-02)	2.31E-01 (3.37E-02)
	F14	4.35E-01 - (1.95E-01)	2.62E-01= (2.16E-02)	3.09E+00 - (1.29E+01)	4.05E-01 - (4.53E-02)	2.72E-01 (3.02E-02)	4.62E-01- (1.72E-01)	3.00E-01+ (2.89E-02)	9.04E-01- (3.39E-01)	3.69E-01- (2.52E-02)	3.21E-01 (1.93E-02)
	F15	2.31E+01 - (5.31E+00)	6.68E+00 - (1.18E+00)	1.72E+06 - (9.28E+06)	4.90E+00= (1.05E+00)	4.72E+00 (5.82E-01)	7.38E+01- (1.23E+01)	2.02E+01- (2.55E+00)	1.50E+05+ (8.20E+05)	1.19E+01+ (1.87E+00)	1.53E+01 (1.10E+00)
	F16	1.78E+01 - (1.03E+00)	1.76E+01 - (6.35E-01)	2.22E+01 - (8.45E-01)	1.83E+01= (1.48E+00)	1.55E+01 (7.88E-01)	4.03E+01- (1.18E+00)	4.02E+01- (4.72E-01)	4.64E+01- (7.98E-01)	4.13E+01- (1.21E+00)	3.74E+01 (7.83E-01)
Hybrid Functions	F17	3.08E+06 - (1.43E+06)	2.13E+03 - (5.16E+02)	1.51E+07 - (9.76E+07)	1.08E+03 - (1.30E+03)	4.50E+02 (2.32E+02)	9.04E+06- (3.08E+06)	6.97E+03= (6.01E+03)	1.58E+07- (8.48E+07)	1.66E+03+ (2.37E+03)	4.42E+03 (5.95E+02)
	F18	1.51E+03 - (1.09E+03)	1.47E+02 - (1.93E+02)	1.38E+06 - (9.84E+06)	7.12E-01 + (4.60E-01)	1.70E+01 (5.09E+00)	2.45E+03- (2.11E+03)	1.73E+02+ (9.54E+01)	7.61E+02- (1.61E+02)	1.73E+00+ (9.16E-01)	2.21E+02 (1.62E+01)
	F19	1.95E+01 - (1.18E+00)	1.80E+01 - (7.92E+00)	1.80E+01 - (6.97E+00)	7.11E+00+ (1.29E+00)	9.73E+00 (1.19E+00)	1.14E+02- (9.85E+00)	7.07E+01+ (1.44E+01)	1.15E+02- (1.01E+01)	7.32E+01+ (2.28E+01)	9.26E+01 (1.71E+00)
	F20	7.89E+04 - (2.28E+04)	9.36E+01 - (4.14E+01)	1.80E+05 - (9.69E+05)	2.37E+00+ (5.83E-01)	7.86E+00 (2.23E+00)	2.31E+05- (6.23E+04)	1.30E+02- (3.44E+01)	9.81E+02- (7.97E+02)	3.68E+02- (2.23E+02)	5.63E+01 (1.26E+01)
	F21	3.95E+06 - (2.45E+06)	1.93E+03 - (1.14E+03)	2.09E+05 - (7.90E+05)	1.38E+03 - (5.31E+02)	3.13E+02 (8.83E+01)	8.22E+06- (2.28E+06)	3.38E+03- (7.33E+02)	3.59E+03- (6.13E+02)	3.10E+03- (4.85E+02)	1.36E+03 (4.97E+02)
	F22	1.05E+03 - (3.65E+02)	5.47E+02 - (1.53E+02)	7.14E+02 - (3.82E+02)	1.62E+02= (6.08E+01)	1.32E+02 (8.44E+01)	2.45E+03- (5.62E+02)	1.61E+03- (1.98E+02)	1.33E+03- (4.02E+02)	7.01E+02+ (3.37E+02)	8.91E+02 (2.23E+02)
Composition Functions	F23	3.44E+02 - (1.40E-02)	3.44E+02 - (2.98E-13)	3.44E+02 - (2.40E-03)	3.44E+02 - (2.36E-05)	3.44E+02 (3.59E-13)	3.50E+02- (1.27E+00)	3.48E+02- (4.15E-09)	3.49E+02- (1.51E+00)	3.48E+02- (2.91E-03)	3.48E+02 (0.00E+00)
	F24	2.67E+02 + (6.71E+00)	2.60E+02 + (4.50E+00)	2.80E+02 - (1.34E+01)	2.68E+02+ (1.71E+00)	2.75E+02 (8.84E-01)	3.55E+02+ (9.11E+00)	3.64E+02+ (3.09E+00)	3.98E+02- (1.48E+01)	3.76E+02+ (2.39E+00)	3.92E+02 (2.19E+00)
	F25	2.17E+02 - (3.73E+00)	2.08E+02 - (2.74E+00)	2.11E+02 - (1.88E+01)	2.16E+02 - (2.66E+00)	2.05E+02 (2.95E-01)	2.64E+02- (1.30E+01)	2.47E+02- (9.33E+00)	2.33E+02- (1.06E+01)	2.03E+02- (8.71E+00)	2.08E+02 (1.73E+01)
	F26	1.31E+02 - (7.23E+01)	1.00E+02 - (5.04E-02)	1.34E+02 - (9.16E+01)	1.26E+02 - (3.92E+01)	1.00E+02 (2.90E-02)	2.02E+02- (4.88E-01)	2.01E+02- (2.13E-01)	1.31E+02+ (4.72E+01)	2.00E+02- (3.38E-02)	2.00E+02 (3.29E-13)
	F27	9.50E+02 - (6.34E+01)	8.97E+02 - (2.38E+02)	3.49E+02 - (1.16E+02)	3.02E+02= (9.26E+00)	3.24E+02 (2.66E+01)	1.89E+03- (1.33E+02)	2.15E+03- (7.77E+01)	1.06E+03+ (1.74E+03)	3.00E+02+ (2.01E-05)	3.60E+02 (3.25E+01)
	F28	1.49E+03 - (1.06E+02)	1.24E+03 - (3.15E+01)	1.39E+03 - (3.69E+02)	1.22E+03 - (5.07E+01)	1.10E+03 (2.63E+01)	3.31E+03- (5.02E+02)	3.10E+03- (2.49E+02)	2.94E+03- (5.82E+02)	2.35E+03- (1.60E+02)	2.20E+03 (5.41E+01)
	F29	3.64E+03 - (2.49E+03)	1.46E+03 - (3.37E+02)	4.60E+06 - (1.43E+07)	4.92E+02+ (2.93E+01)	8.10E+02 (4.37E+01)	5.51E+03- (5.03E+02)	3.18E+03- (6.77E+02)	9.97E+02- (1.02E+02)	7.54E+02= (5.50E+01)	7.49E+02 (4.41E+01)
	F30	1.35E+04 - (1.79E+03)	9.20E+03 = (8.64E+02)	1.37E+04 - (8.54E+03)	8.85E+03= (2.80E+02)	8.80E+03 (4.62E+02)	3.82E+04- (9.06E+03)	9.08E+03- (2.83E+03)	9.40E+03- (1.43E+03)	5.91E+03+ (2.39E+03)	8.04E+03 (1.08E+03)
win tie lose		**27** **2** **1**	**21** **4** **5**	**23** **4** **3**	**10** **7** **13**		**26** **1** **3**	**18** **2** **10**	**22** **4** **4**	**12** **2** **16**	
		cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE	cNrGA	DMSDL -PSO	IPOP-CMA-ES	HS-ES	EaDE

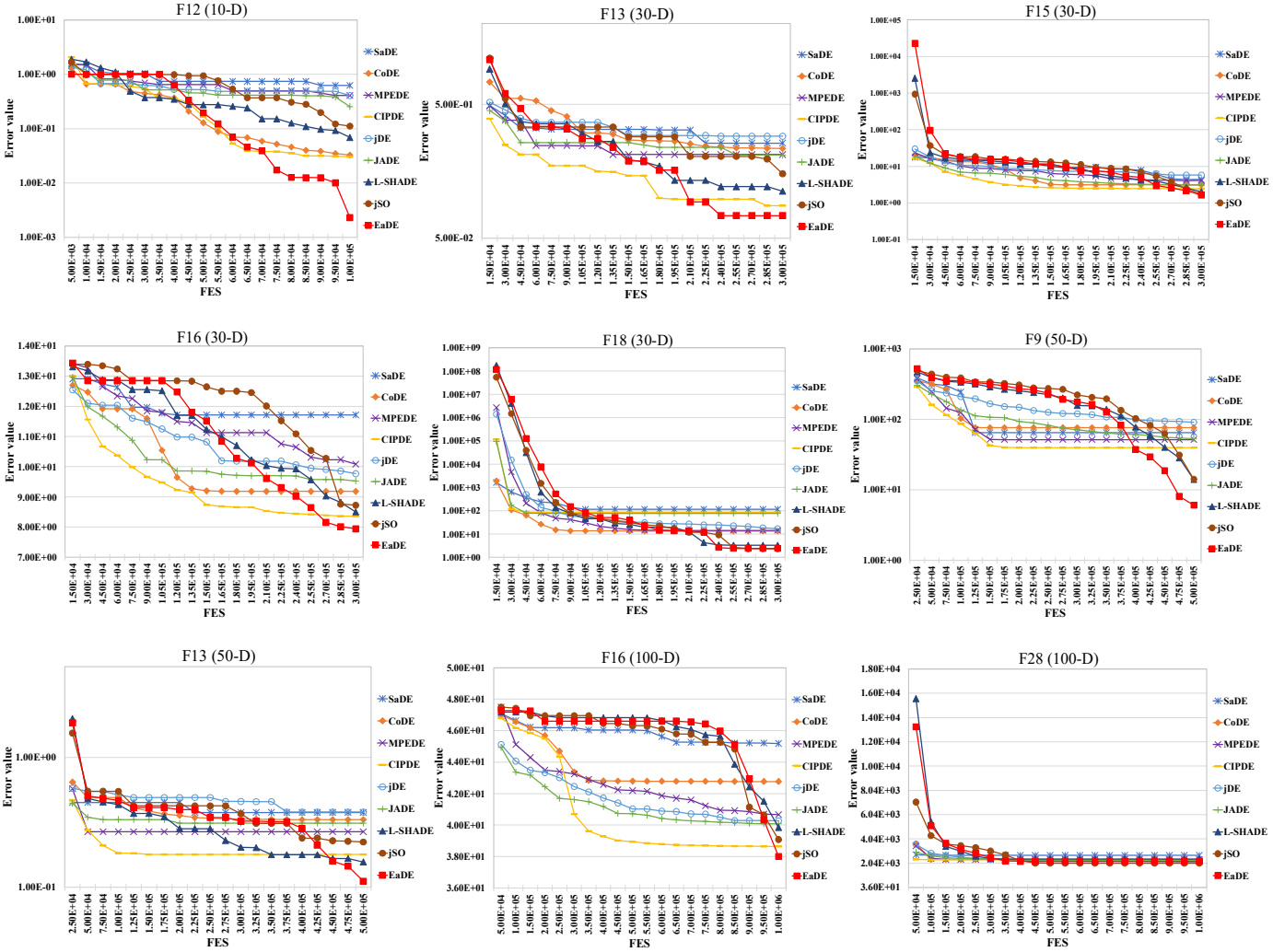

Fig. S1 Convergence plots of the considered DE algorithms on selected CEC2014 functions in the median run.

Descriptions of the mutation and crossover operations:

The current population $\boldsymbol{P}_G = \{\vec{x}_{1,G}, \vec{x}_{2,G}, ..., \vec{x}_{NP,G}\}$ is sorted from best to worst according to fitness.

"current-to-*p*best/1" mutation [1]: $\vec{v}_{i,G} = \vec{x}_{i,G} + F \cdot (\vec{x}_{pbest,G} - \vec{x}_{i,G}) + F \cdot (\vec{x}_{r1,G} - \vec{x}_{r2,G})$ (1)

CIP mutation [2]: $\vec{v}_{i,G} = \vec{x}_{i,G} + F \cdot (\vec{x}_{ci\_mbest^i,G} - \vec{x}_{i,G}) + F \cdot (\vec{x}_{r1,G} - \vec{x}_{r2,G})$ (2)

Where $\vec{x}_{pbest,G}$ is one of the top-*p* fittest solutions in $\boldsymbol{P}_G$, $\vec{x}_{ci\_mbest^i,G}$ is the collective information vector of top-*m* fittest solutions, as shown in Equation (3)

$$\vec{x}_{ci\_mbest^i,G} = \sum_{k=1}^{m} w_k \times \vec{x}_{k,G} \tag{3}$$

Where *m* is a random integer within [1, *i*] and $w_k = \frac{(m-k+1)}{(1+2+\cdots+m)}$, for $k = 1, 2, \cdots, m$,

$\vec{x}_{r1,G}$ is randomly selected from $\boldsymbol{P}_G$ and $\vec{x}_{r2,G}$ is randomly selected from the union population of $\boldsymbol{P}_G$ and recently replaced solutions [1].

Classic binomial crossover [1]: $u_{i,j,G} = \begin{cases} v_{i,j,G} & if \quad rand_j(0,1) \le CR \ or \ j = j_{rand} \\ x_{i,j,G} & otherwise \end{cases}$ (4)

CIP crossover [2]: $u_{i,j,G} = \begin{cases} v_{i,j,G} & if \quad rand_j(0,1) \le CR \ or \ j = j_{rand} \\ x_{ci\_mbest^i,j,G} & otherwise \end{cases}$ (5)

hybrid crossover [2]: **If** $UN\_UP(i) \leqslant T$

Perform classic binomial crossover, i.e. Equation (4)

Else

Perform CIP crossover, i.e. Equation (5)

End If

Where $UN\_UP(i)$ is an unsuccessful update counter for solution *i*. In the selection of DE, if the current solution is updated, $UN\_UP(i)$ is reset to 0, otherwise, it increases by 1. $T = 90$ is a threshold value [2].

[1] R. Tanabe, A.S. Fukunaga, Improving the search performance of shade using linear population size reduction, in: Evolutionary Computation (CEC), 2014 IEEE Congress on, IEEE, 2014, pp. 1658–1665.
[2] L. M. Zheng, S. X. Zhang, K. S. Tang, S. Y. Zheng, Differential evolution powered by collective information, Inf. Sci. 399 (2017) 13–29.

Algorithm S1: **Variant-oppo**

1: Trigger = 0;

2: Run SCSS-L-SHADE_GD0.5;

3: Respectively record the total fitness improvements of superior and inferior solutions within every Q generations, denoted as FI_S and FI_I.

4: **If** $FI\_S > FI\_I$

5: Trigger = 1,

6: For each interval, calculate IMP_S and IMP_I;

7: **If** $IMP\_S > IMP\_I$

8: Run SCSS-L-SHADE_GD0.1

9: **Elseif** $IMP\_S < IMP\_I$

10: Run SCSS-L-CIPDE_GD0.9

11: **Elseif** $IMP\_S = IMP\_I$

12: Run a random strategy of the above two.

13: **End If**

14: **Else**

15: Trigger = 0, run SCSS-L-SHADE_GD0.5;

16: **End If**

Algorithm S2: **Variant-random**

1: Trigger = 0;

2: Run SCSS-L-SHADE_GD0.5;

3: Respectively record the total fitness improvements of superior and inferior solutions within every Q generations, denoted as FI_S and FI_I.

4: **If** $FI\_S > FI\_I$

5: Trigger = 1,

6: Run a random strategy of SCSS-L-CIPDE_GD0.9 and SCSS-L-SHADE_GD0.1.

7: **End If**

8: **Else**

9: Trigger = 0, run SCSS-L-SHADE_GD0.5;

10: **End If**

Algorithm S3: **Variant-TAE**

1: In trial generations, SCSS-L-CIPDE_GD0.9, SCSS-L- SHADE_GD0.5 and SCSS-L-SHADE_GD0.1 have an equal chance to be used. Then record the total fitness improvements contributed by them respectively, denoted as *IMP_CIP* and *IMP_SHA_0.5* and *IMP_SHA_0.1*.

2: In the adjacent adaptive generations,

If *IMP_CIP* is the unique largest in {*IMP_CIP*, *IMP_SHA_0.5*, *IMP_SHA_0.1*}

Run SCSS-L-CIPDE_GD0.9

Elseif *IMP_SHA_0.1* is the unique largest in {*IMP_CIP*, *IMP_SHA_0.5*, *IMP_SHA_0.1*}

Run SCSS-L-SHADE_GD0.1

Elseif *IMP_SHA_0.5* is the unique largest in {*IMP_CIP*, *IMP_SHA_0.5*, *IMP_SHA_0.1*}

Run SCSS-L-SHADE_GD0.5

Elseif more than one largest value in {*IMP_CIP*, *IMP_SHA_0.5*, *IMP_SHA_0.1*}

Run a random strategy with the largest value.

End If
