DE and CEM

Tags

Experimental Result

Sphere

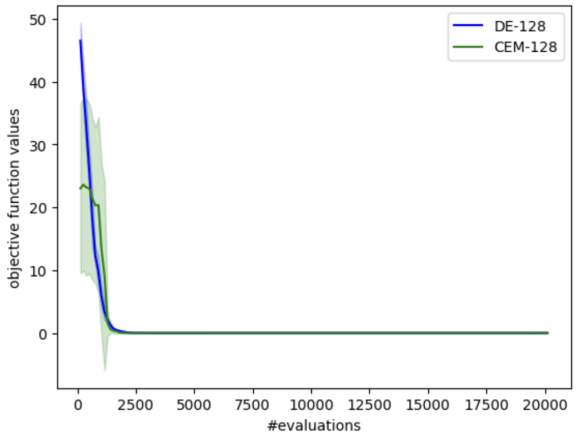
D2

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.000000**	0.000000	0.007987	0.002748	1
32	**0.000000**	0.000000	0.009683	0.002149	1
64	**0.000000**	0.000000	0.009704	0.001531	1
128	**0.000000**	0.000000	0.014298	0.004178	1
256	**0.000000**	0.000000	0.015391	0.003068	1

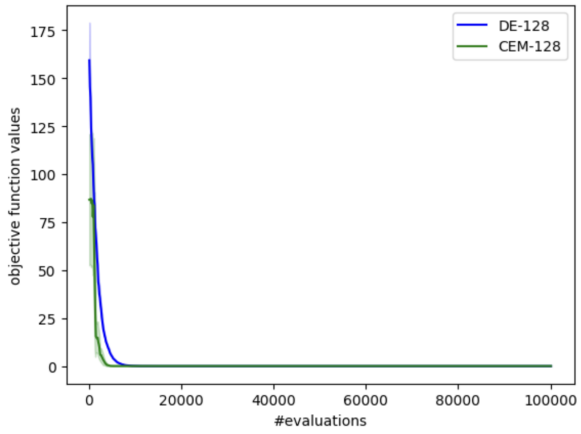
D10

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.000155**	0.000466	0.049410	0.013578	1
32	**0.000000**	0.000000	0.053006	0.018263	1
64	**0.000000**	0.000000	0.050647	0.006410	1
128	**0.000000**	0.000000	0.048331	0.005673	1
256	**0.000000**	0.000000	0.055082	0.009434	1

D2, N128



D10, N128



Griewank

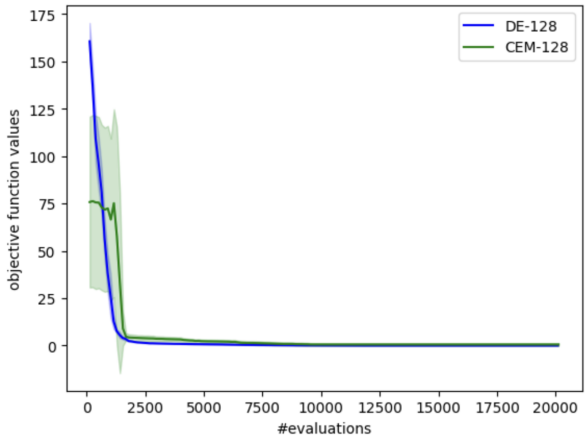
D2

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.000000**	0.000000	21.931876	20.173156	1
32	**0.000000**	0.000000	7.863825	9.468225	1
64	**0.000000**	0.000000	2.971986	5.324364	0
128	**0.000000**	0.000000	0.545533	0.762486	1
256	**0.069368**	0.017284	0.251900	0.591054	0

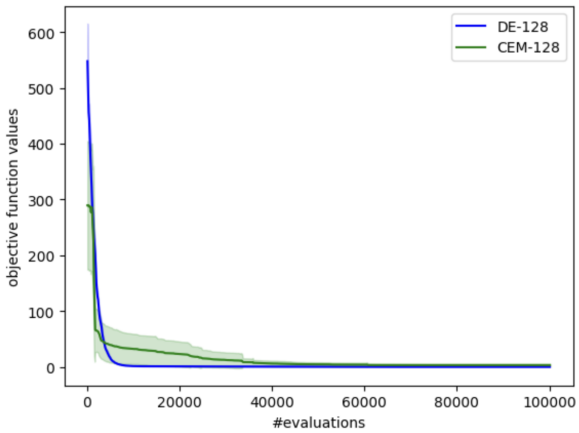
D10

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.019533**	0.039657	1.921592	1.484728	1
32	**0.002457**	0.007372	3.569188	2.994801	1
64	**0.000000**	0.000000	5.329520	4.325229	1
128	**0.000000**	0.000000	3.080582	2.436069	1
256	**0.058697**	0.065288	3.114071	2.169472	1

D2, N128



D10, N128



Rosenbrock

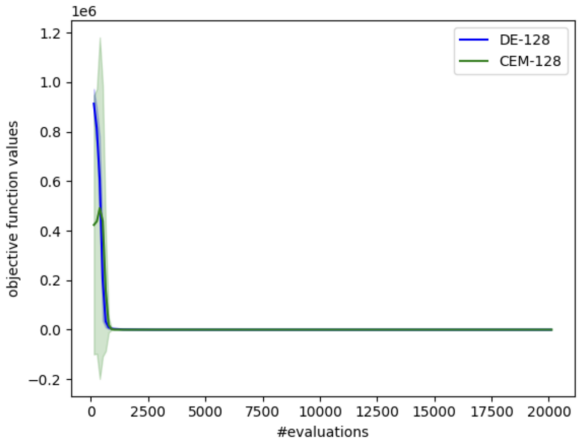
D2

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.009522**	0.028567	0.202534	0.068351	1
32	**0.014147**	0.040664	0.377321	0.130483	1
64	**0.000000**	0.000000	0.351117	0.077086	1
128	**0.000000**	0.000000	0.484732	0.158649	1
256	**0.000000**	0.000000	0.517213	0.147484	1

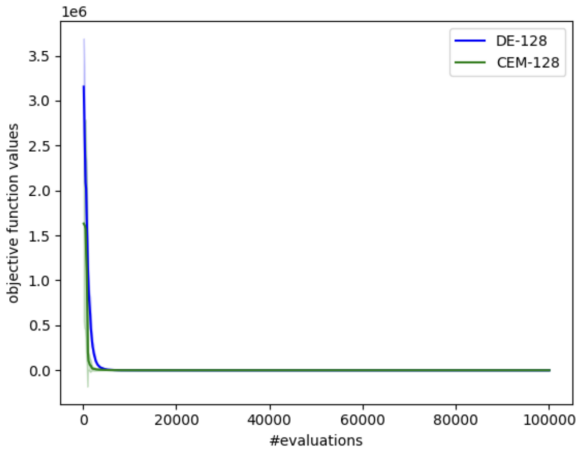
D10

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	6.725316	1.951867	**2.926322**	1.347197	1
32	5.147442	1.452719	**4.129969**	2.424380	0
64	**1.333726**	0.595738	3.925669	2.265751	1
128	**0.533727**	0.595138	2.615611	1.080683	1
256	**3.177952**	0.304107	3.546917	1.897651	0

D2, N128



D10, N128



Michalewicz

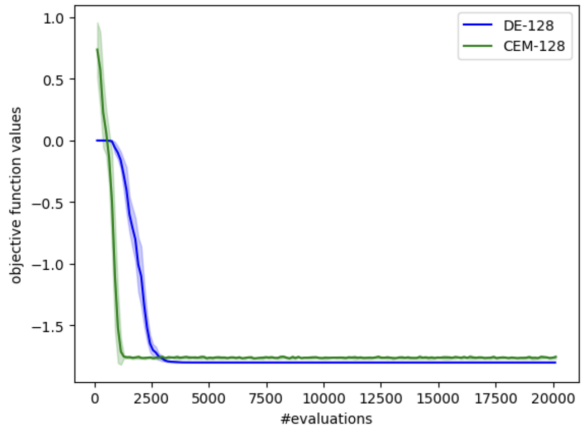
D2

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**-1.801303**	0.000000	-1.717315	0.176123	0
32	**-1.801303**	0.000000	-1.706744	0.175040	0
64	**-1.801303**	0.000000	-1.768967	0.008197	1
128	**-1.801303**	0.000000	-1.756153	0.014550	1
256	**-1.801303**	0.000000	-1.754256	0.012535	1

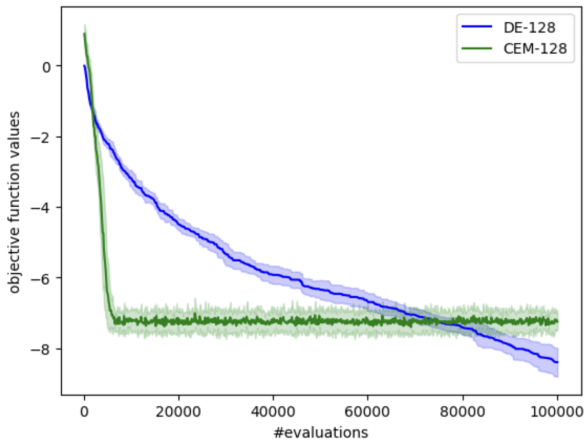
D10

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**-9.582588**	0.084216	-5.978545	0.912454	1
32	**-9.652489**	0.029196	-5.998650	0.967022	1
64	**-9.655975**	0.012529	-6.748018	0.776462	1
128	**-8.390991**	0.412264	-7.244237	0.255625	1
256	-6.026999	0.169310	**-7.954024**	0.157066	1

D2, N128



D10, N128



Ackley

D2

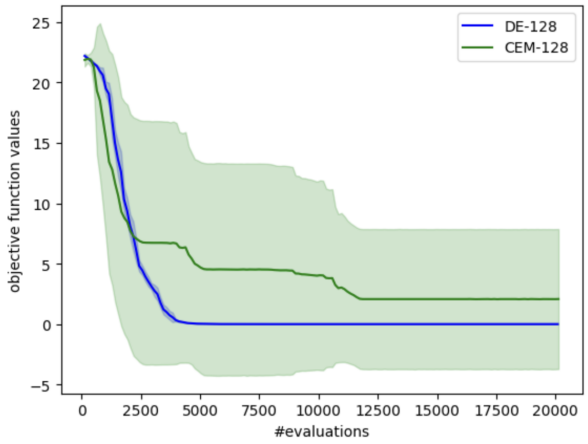
	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.000000**	0.000000	12.342457	8.307504	1
32	**0.000000**	0.000000	7.074666	8.634387	1
64	**0.000000**	0.000000	4.080055	7.928243	0
128	**0.000000**	0.000000	2.077541	5.797031	0
256	**0.000002**	0.000001	0.150692	0.018342	1

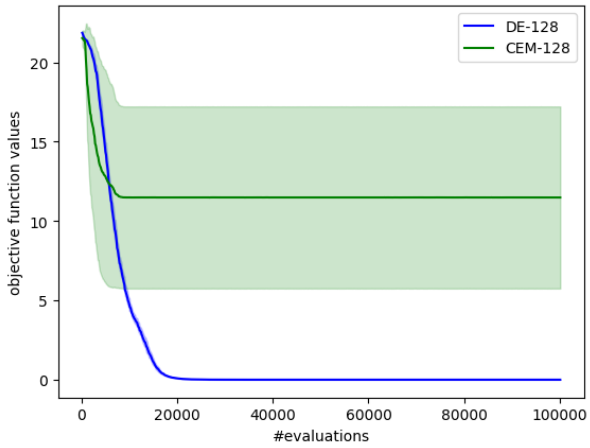
D10

	DE_mean	DE_std	CEM_mean	CEM_std	t_test
16	**0.115636**	0.346504	18.067318	2.095864	1
32	**0.000000**	0.000000	17.754382	2.504649	1
64	**0.000000**	0.000000	16.441907	3.161877	1
128	**0.000000**	0.000000	11.481259	5.735843	1
256	**0.000001**	0.000000	4.109293	5.550675	1

D2, N128

D10, N128





Comment

- DE có kết quả không những tốt hơn CEM mà còn tốt một cách vượt trội và ổn định.
- CEM có performance phụ thuộc nhiều vào giá trị σ và chiến lược để adaptive σ.

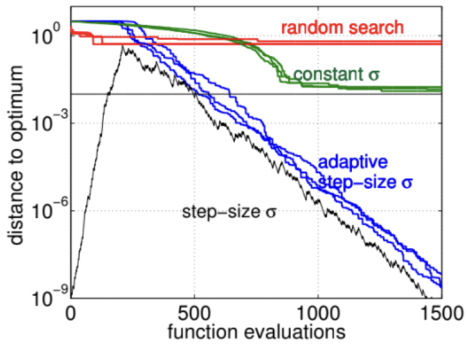


Fig: Step-size affects convergence[1]

Hình ảnh trong slide

⇒ Người dùng pro, thì CEM pro theo