Summary of Results on CEC'08 Competition on Large Scale Global Optimization

Ke Tang
Nature Inspired Computation and Application Lab (NICAL)
Department Of Computer Science and Technology
University of Science and Technology of China

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University of Science and Technology of China

Motivation & Problems

- **Motivation**

To check the scalability of those algorithms performing well on low-dimensional problems, and to initialize research on large scale optimization.

- **Problems**

The test suite is designed on the basis of 7 functions.

- **Reference**: K. Tang, X. Yao, P. N. Suganthan, C. MacNish, Y. P. Chen, C. M. Chen, and Z. Yang, “Benchmark Functions for the CEC’2008 Special Session and Competition on Large Scale Global Optimization,” Technical Report, Nature Inspired Computation and Applications Laboratory,USTC, China, 2007.

- http://nical.ustc.edu.cn/cec08ss.php

Problems

	Name of Function	Type of Function	Separability
F_1	Shifted Sphere Function	Unimodal	Separable
F_2	Shifted Schwefel's Problem 2.21	Unimodal	Non-separable
F_3	Shifted Rosenbrock's Function	Multi-modal	Non-separable
F_4	Shifted Rastrigin's Function	Multi-modal	Separable
F_5	Shifted Griewank's Function	Multi-modal	Non-separable
F_6	Shifted Ackley's Function	Multi-modal	Separable
F_7	FastFractal "DoubleDip" Function	Multi-modal	Non-separable

Each function corresponds to 3 variants (problems), with 100, 500 and 1000 dimensions, respectively. Hence, we have 21 minimization problems in total.

Evaluation Criteria

- A fixed number of FEs is given for each problem. The performance of an algorithm is quantitatively measured by the value of objective functions.

$$FEs = 5000 * Dimensionality$$

- 25 independent runs for each problem.
- We focus more on 1000 dimensional problems.

Entries

- MLCC (EC418), Zhenyu Yang, et al.
- EPUS-PSO (EC439), Sheng-Ta Hsieh, et al.
- jDEdynNP-F (EC484), Janez Brest, et al.
- UEP (EC552), Cara MacNish & Xin Yao
- MTS (EC678), Lin-Yu Tseng & Chun Chen
- DEwSAcc (EC788), Ales Zamuda, et al.
- DMS-PSO (EC817), S. Z. Zhao, et al.
- LSEDA-gl (EC827), Yu Wang & Bin Li
- ALPSEA, Gregory S. Hornby

Reference for ALPSEA:
Gregory S. Hornby, “ALPS: the age-layered population structure for reducing the problem of premature convergence”, in *Proceedings of GECCO’06*, pp. 815-822.

Comparisons

Results Comparison on 1000-D problems

	F_1	F_2	F_3	F_4	F_5	F_6	F_7
MLCC	8.46E-13	1.09E+02	1.80E+03	1.37E-10	4.18E-13	1.06E-12	-1.47E+04
EPUS-PSO	5.53E+02	4.66E+01	8.37E+05	7.58E+03	5.89E+00	1.89E+01	-6.62E+03
jDEdynNP-F	1.14E-13	1.95E+01	1.31E+03	2.17E-04	3.98E-14	1.47E-11	-1.35E+04
UEP	5.37E-12	1.05E+02	1.96E+03	1.03E+04	8.87E-04	1.99E+01	-1.18E+04
MTS	0.00E+00	4.72E-02	3.41E-04	0.00E+00	0.00E+00	1.24E-11	-1.40E+04
DEwSAcc	8.79E-03	9.61E+01	9.15E+03	1.82E+03	3.58E-03	2.30E+00	-1.06E+04
DMS-PSO	0.00E+00	9.15E+01	8.98E+09	3.84E+03	0.00E+00	7.76E+00	-7.51E+03
LSEDA-gl	3.22E-13	1.04E-05	1.73E+03	5.45E+02	1.71E-13	4.26E-13	-1.35E+04
ALPSEA	3.58E+04	1.47E+02	2.33E+09	1.89E+02	3.04E+02	1.13E+01	N/A
ALPSEA-100M	1.80E-05	9.30E+01	1.77E+03	1.53E-02	1.17E-06	4.40E-04	N/A

All entries use 5 million FEs, except for ALPSEA, which employs 100 million.

Final Rank

- We asked every participant to rank the all the entries (except for their owns), and average over them.

Paper ID.	Algorithm	Rank
418	MLCC	4
439	EPUS-PSO	8
484	jDEdynNP-F	3
552	UEP	7
678	MTS	1
788	DEwSAcc	6
817	DMS-PSO	5
827	LSEDA-gl	2

(ALPSEA was not taken into account since it is not associated with a paper submitted to WCCI.)

- IEEE Computational Intelligence Society Task Force on LSGO: http://nical.ustc.edu.cn/lsgo.php

Thank You