Málaga, January 2013

Executive Summary

TITLE: D4.4.2: Analysis and evaluation of different metaheuristics on benchmarks of continuous optimization problems (CEC/GECCO benchmarks)

PAPERS RELATED: J. García-Nieto, E. Alba. **Hybrid PSO6 for Hard Continuous Optimization**. Soft Computing, In Press (2013). DOI: http://dx.doi.org/10.1007/s00500-010-0648-1

José García-Nieto, and Enrique Alba. **Why Six Informants Is Optimal in PSO**. In ACM Proceedings of the Genetic and Evolutionary Computation Conference (GECCO'12). pp.25-32, Phyladelpia, USA, July 2012

ABSTRACT: When designing new optimization algorithms, the structured evaluation and analysis by means of different benchmarks of academic problems is a must [SHLDCAT05]. These benchmarks will allow measuring the efficiency, efficacy, scalability, and robustness of new algorithmic proposals in relation to existing ones in the field. The target benchmarking problems comprise continuous (CEC/SOCO/GECCO-BBOB) competition sets for constrained/unconstrained, mono/multi-objective, large-scale, etc. optimization problems. Our new proposals, based on restarting methods RPSO-vm, velocity modulation SMPSO, optimally informed Particle Swarm Optimization (PSO6), and different hybrids with MTS local search (PSO6-LS1 and PSO6-LS2), are then validated in the scope of standard benchmarks (CEC'05, BBOB'10, and SOCO,10), and compared with other sophisticated algorithms in the current state of the art.

GOALS:

1. Generation of new proposal PSO6 based on the empirically validated number of informant particles.
2. Our developed methods are empirically located in the top of most outstanding algorithms in the current state of the art.

CONCLUSIONS:

1. The use of standard benchmarks provides a validation framework for testing the actual performance of new algorithmic proposals in comparison with the most outstanding methods.

RELATION WITH PAST DELIVERABLES: PRE: D4.1.1-2012 (advisable reading)

OTHERS: [SHLDCAT05] P. N. Suganthan, N. Hansen, J. J. Liang, K. Deb, Y.-P. Chen, A. Auger and S. Tiwari. Problem Definitions and Evaluation Criteria for the CEC 2005 Special Session on Real-Parameter Optimization, Technical Report, Nanyang Technological University, Singapore, May 2005 AND KanGAL Report #2005005, IIT Kanpur, India