COMPREHENSIVE LEARNING PARTICLE SWARM OPTIMIZER (CLPSO) FOR GLOBAL OPTIMIZATION OF MULTIMODAL FUNCTIONS

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Abstract

Particle Swarm Optimizer (PSO) is one of the evolutionary computation techniques based on swarm intelligence for optimization of continuous nonlinear functions. The PSO algorithm is simple in concept, easy to implement, and computationally efficient. Though there are numerous versions of PSO, premature convergence when solving multimodal problems is still the main deficiency of the PSO.

This final project presents a variant of particle swarm optimizers (PSOs) that we call the comprehensive learning particle swarm optimizer (CLPSO), which uses a novel learning strategy whereby all other particles’ historical best information is used to update a particle’s velocity. This strategy enables the diversity of the swarm to be preserved to discourage premature convergence.

Experiments were conducted on multimodal test functions such as Rosenbrock, Griewank, Rastrigin, Ackley, and Schwefel and composition functions both with and without coordinate rotation. The results compared with the Modified PSO (PSO that also uses inertia weight/PSO-w).
Key Words: Composition benchmark functions, comprehensive Learning Particle Swarm Optimizer (CLPSO), global numerical optimization, Particle Swarm Optimizer (PSO), Modified Particle Swarm Optimizer/PSO with Inertia weight (MPSO/PSO-w).