



Particle Swarm Optimization with Voronoi Neighborhood

Ehsan Safaviieh¹, Armin Gheibi², Mohammadreza Aboelghasemi³, and Ali Mohades⁴

¹Department of Mathematics and Computer Science,
Amirkabir University of Technology, Tehran, Iran

²Laboratory of Algorithms and Computational Geometry

³⁴Hashemi, amir.gheibi, m.abolghasemi, mohades}@aut.ac.ir

Abstract

Particle Swarm Optimization (PSO) is an optimization method that is inspired by nature and is used frequently nowadays. In this paper we proposed a new dynamic geometric neighborhood based on Voronoi diagram in PSO. Voronoi diagram is a geometric naturalistic method to determine neighbors in a set of particles. It seems that in realistic swarm, particles take Voronoi neighbors into account.

Also a comparison is made between the performance of some traditional methods for choosing neighbors and new dynamic geometric methods like Voronoi and dynamic Euclidean. In this comparison it is found that PSO with geometric neighborhood can achieve better and more reliable results when the optimum value is out of the initial range.



Adaptive Parameter Selection Scheme for PSO: A Learning Automata Approach

Ali B. Hashemi M.R. Meybodi

Computer Engineering and Information Technology

Department, Amirkabir University of Technology, Tehran, Iran

{a_hashemi, mmeybodi}@aut.ac.ir

Abstract

PSO, like many stochastic search methods, is very sensitive to efficient parameter setting. As modifying a single parameter may result in a large effect. In this paper, we propose a new a new learning automata-based approach for adaptive PSO parameter selection. In this approach three learning automata are utilized to determine values of each parameter for updating particles velocity namely inertia weight, cognitive and social components. Experimental results show that the proposed algorithms compared to other schemes such as SPSO, PSO-IW, PSO TVAC, PSO-LP, DAPSO, GPSO, and DCPSO have the same or even higher ability to find better local minima. In addition, proposed algorithms converge to stopping criteria significantly faster than most of the PSO algorithms.