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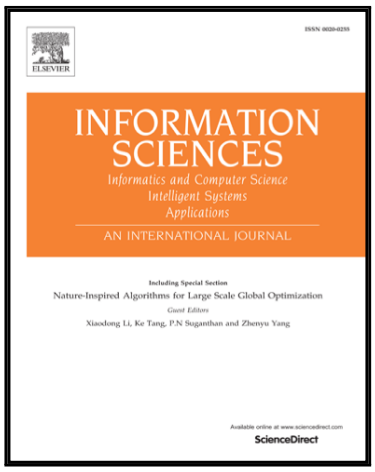

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M.R. Tanweer, S. Suresh, N. Sundararajan

PII: S0020-0255(15)00531-9
DOI: 10.1016/j.ins.2015.07.035
Reference: INS 11681

To appear in: *Information Sciences*

Received date: 24 February 2015
Revised date: 22 May 2015
Accepted date: 14 July 2015

Please cite this article as: M.R. Tanweer, S. Suresh, N. Sundararajan, Dynamic Mentoring and Self-Regulation based Particle Swarm Optimization Algorithm for solving Complex Real-world Optimization Problems, *Information Sciences* (2015), doi: 10.1016/j.ins.2015.07.035

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Dynamic Mentoring and Self-Regulation based Particle Swarm Optimization Algorithm for solving Complex Real-world Optimization Problems

M.R. Tanweer[a], S. Suresh[a,*], N. Sundararajan[b]

[a]*School of Computer Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore - 639798, ph: (+65) 6790 6185*
[b]*School of Electrical and Electronics Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore - 639798*

Abstract

In this paper, a dynamic mentoring scheme along with a self-regulation scheme have been incorporated in the standard Particle Swarm Optimization (PSO) algorithm to empower the searching particles with human-like characteristics. The algorithm is referred to as a Dynamic Mentoring and Self-Regulation based Particle Swarm Optimization (DMeSR-PSO) algorithm. Based on their experiences, the particles are divided into three groups, viz., the mentor group, the mentee group and the independent learner group where the number of particles in each group is dynamically changing in every iteration. In human learning psychology, mentoring is regarded as a powerful and effective learning process and independent learners are the ones who do not need mentoring and are capable of performing self-regulation of their own knowledge. Therefore, the particles in each of the above three groups have different learning strategies for their velocity updates where the mentors are equipped with a strong self-belief based search, the mentees are taking guidance from the mentors and the independent learners employ self-perception strategy. The DMeSR-PSO algorithm has been extensively evaluated using the simple unimodal and multimodal benchmark functions from CEC2005, more complex shifted and rotated benchmark functions

*Corresponding Author
Email addresses: muhammad170@e.ntu.edu.sg (M.R. Tanweer), ssundaram@ntu.edu.sg (S. Suresh), ensundara@ntu.edu.sg (N. Sundararajan)

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