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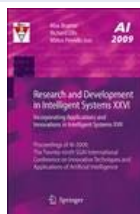
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Research and Development in Intelligent Systems XXVI
Incorporating Applications and Innovations in Intelligent Systems
XVII

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Max Bramer, Richard Ellis and Miltos Petridis

Zahra Afsahi^{1, 2} and **Mohammadreza Meybodi³**

- (1) Systems & Quality V.P. MAPNA, Tehran, Iran
- (2) Computer Engineering and Information Technology Department, Qazvin Azad University, Qazvin, Iran
- (3) Computer Engineering and Information Technology Department, Amirkabir University, Tehran, Iran

Abstract

PSO is a population-based technique for optimization, which simulates the social behaviour of the fish schooling or bird flocking. Two significant weaknesses of this method are: first, falling into local optimum and second, the curse of dimensionality. In this work we present the FCPSO-H to overcome these weaknesses. Our approach was implemented in the cooperative PSO, which employs fuzzy logic to control the acceleration coefficients in velocity equation of each particle. The proposed approach is validated by function optimization problem from the standard literature simulation result indicates that the approach is highly competitive specifically in its better general convergence performance.

Zahra Afsahi (Corresponding author)

Email: afsahi_z@mapna.com

Email: afsahi_ai@yahoo.com

Mohammadreza Meybodi

Email: mmevbodi@ce.aut.ac.ir

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Improving Cooperative PSO using Fuzzy Logic

Zahra Afsahi¹, Mohammadreza Meybodi²

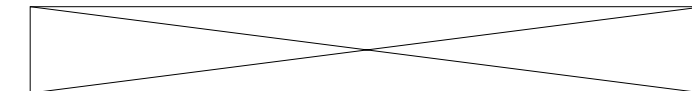
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1 Introduction

Particle swarm optimization (PSO) was motivated from the simulation of simplified social behavior of animals (Kennedy and Eberhart 1995). It has already been applied successfully in many application areas where GA can be applied to (Eberhart and Shi 1998 b). However, the original PSO has difficulties in controlling the balance between exploration and exploitation where the environment itself is dynamically changed over the time. PSO cannot able to adapt dynamically to the changing environment and quickly converging toward an optimum in the first period of iteration. Another main drawback of the original PSO is that it may get stuck in a sub-optimal solution region and the problem usually gets harder for high-dimensional problems usually known as “curse of dimensionality”. Hence, a new hybrid PSO algorithm is proposed in this paper. The proposed algorithm integrates both fuzzy logic and cooperative learning within a unified framework to further improve the performance. The use of fuzzy logic is suitable for dynamically tuning the programming coefficient C_1, C_2 , since

¹ Zahra Afsahi
Systems & Quality V.P. MAPNA, Tehran, Iran, e-mail: afsahi_z@mapna.com.
Computer Engineering and Information Technology Department, Qazvin Azad University,
Qazvin, Iran, e-mail: afsahi_ai@yahoo.com.

² Mohammad Reza Meybodi
Computer Engineering and Information Technology Department, Amirkabir University,
Tehran, Iran, e-mail: mmeybodi@ce.aut.ac.ir.



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