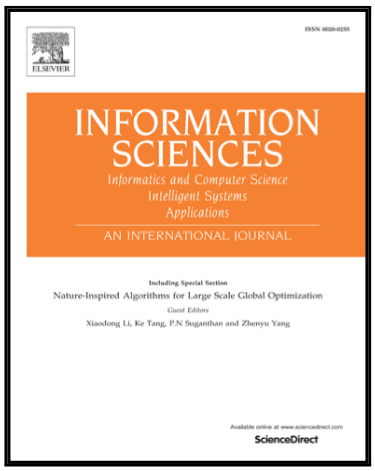

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A Hybrid Particle Swarm Optimization Algorithm Using Adaptive Learning Strategy

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Abstract

Many optimization problems in reality have become more and more complex, which promote the research on the improvement of different optimization algorithms. The particle swarm optimization (PSO) algorithm has been proved to be an effective tool to solve various kinds of optimization problems. However, for the basic PSO, the updating strategy is mainly aims to learn the global best, and it often suffers premature convergence as well as performs poorly on many complex optimization problems, especially for multimodal problems. A hybrid PSO algorithm which employs an adaptive learning strategy (ALPSO) is developed in this paper. In ALPSO, we employ a self-learning based candidate generation strategy to ensure the exploration ability, and a competitive learning based prediction strategy to guarantee exploitation of the algorithm. To balance the exploration ability and the exploitation ability well, we design a tolerance based search direction adjustment mechanism. The experimental results on 40 benchmark test functions demonstrate that, compared with five representative PSO algorithms, ALPSO performs much better than the others in more cases, on both convergence accuracy and convergence speed.

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