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A firefly algorithm with chaotic diversity control. (Chinese. English summary) Zbl 1324.68188
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Summary: To overcome the disadvantage of premature convergence in the firefly algorithm, a firefly algorithm based on chaos diversity control (CDFA) is proposed. Applying chaotic mapping, CDFA achieves an initial firefly population that is high quality and uniformly distributed; it then disturbs some individuals with low fitness values by chaotic mapping in the process of the search so as to keep the group's activity and reduce the possibility of falling into local optimum. Meanwhile, in order to increase the diversity of the population, the proposed algorithm uses the physical reflection theory to control the position of the firefly outside the borders. Experimental results of bench mark functions show that CDFA can effectively improve the ability of the global search and local exploitation and has a better optimization precision and a convergence rate than the basic FA.

MSC:

68T20 Problem solving in the context of artificial intelligence (heuristics, search strategies, etc.)
37D45 Strange attractors, chaotic dynamics of systems with hyperbolic behavior

Keywords:

swarm intelligence; firefly algorithm; chaos; diversity

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