"A New Method for Fastening the Convergence of Immune Algorithms Using an Adaptive Mutation Approach"

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Abstract:

This paper presents a new adaptive mutation approach for fastening the convergence of immune algorithms (IAs). This method is adopted to realize the twin goals of maintaining diversity in the population and sustaining the convergence capacity of the IA. In this method, the mutation rate (pm) is adaptively varied depending on the fitness values of the solutions. Solutions of high fitness are protected, while solutions with sub-average fitness are totally disrupted. A solution to the problem of deciding the optimal value of pm is obtained. Experiments are carried out to compare the proposed approach to traditional one on a set of optimization problems. These are namely: 1) an exponential multi-variable function; 2) a rapidly varying multimodal function and 3) design of a second order 2-D narrow band recursive LPF. Simulation results show that the proposed method efficiently improves IA's performance and prevents it from getting stuck at a local optimum.

Keywords:

Adaptive Mutation; Immune Algorithm; Convergence; Traditional Mutation

Published In:

Journal of Signal and Information Processing , Vol.3 , PP.86-91