多重自适应性遗传算法的研究

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摘　要：为了改善遗传算法“早熟”的问题，增强算法的全局收敛能力并加快收敛速度，提出了一种新的多重自适应遗传算法.由于种群在不同的遗传阶段具有不同的特征，所以将遗传代数分为三个阶段，每一阶段采用不同的选择策略，加快算法的收敛，并且设计了一种基于种群多样性和个体适应度的多重自适应交叉概率和变异概率，增强算法的全局搜索能力.通过分别对两处改进的仿真对比，验证了改进的有效性，对交叉和变异概率的改进加快了收敛速度和精度，改善了“早熟”问题，对选择策略的改进在不影响收敛精确度的前提下，进一步加快了收敛速度.新算法在搜索全局最优解和收敛速度上具有较好的综合表现.

关键词：自适应；遗传算法；种群多样性；收敛速度；“早熟”问题

Research on multiple adaptive genetic algorithm

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Abstract：An improved multiple adaptive genetic algorithm is proposed to solve the "premature" problem of genetic algorithm, enhance the global convergence ability of the algorithm and accelerate the convergence speed. For the population has different characteristics in different genetic stages, the generation number is divided into three stages, and each stage adopts different selection strategies to accelerate the convergence of the algorithm. A new kind of population diversity and individual fitness based adaptive crossover probability and mutation probability are also designed to enhance the global search ability of the algorithm. Through the comparison of two improved simulations, the effectiveness of the improvement is verified. The improvement of the crossover and mutation probabilities accelerates the convergence speed and accuracy and solves the “premature” problem. By improving the selection strategy, the speed of convergence is further accelerated without affecting the convergence accuracy. The new algorithm has a good overall performance in the search for global optimal solution and convergence speed.

Key words：adaptive; genetic algorithm; population diversity; convergence speed; prematurity

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