论文

正交免疫克隆粒子群多目标优化算法

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摘要
该文基于抗体克隆选择学说理论，提出了一种求解多目标优化问题的粒子群算法——正交免疫克隆粒子群算法(Orthogonal Immune Clone Particle Swarm Optimization, OICPSO)。根据多目标的特点，提出了适合粒子群算法的克隆算子，免疫基因算子，克隆选择算子。免疫基因操作中采用了离散正交交叉算子来获得目标空间解的均匀采样，得到理想的Pareto解集，并引入拥挤距离来减少获得Pareto解集的大小，同时获得具有良好均匀性和宽广性的Pareto最优解集。实验中，与NSGA-II和MOPSO算法进行了比较，并对算法的性能指标进行了分析。结果表明，OICPSO不仅增加了种群解的多样性而且可以得到分布均匀的Pareto有效解集，对于多目标优化问题是有效地。
关键词   粒子群优化；人工免疫系统；克隆选择；正交设计；多目标优化
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Orthogonal Immune Clone Particle Swarm Algorithm on Multiobjective Optimization

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Abstract
Based on the particle swarm optimization and antibody clonal selection theory, a novel Orthogonal Immune Clone Particle Swarm Algorithm (OICPSO) is presented to solve multiobjective optimization. According to the problem characters, clone operator, immune gene operator and clone selection operator are designed in this paper. And discrete orthogonal crossover operator is used in immune gene operations to obtain uniformity of the objective space and the idea Pareto solutions. And crowding-comparison approach is adopted to obtain the uniformity of the population distribution. In experiments, the results of OICPSO are compared with NSGA-II and MOPSO, and the quality of solutions is analyzed with parameters. The results indicate that OICPSO not only can increase the solutions′ diversity but also can obtain the Pareto solutions. OICPSO is effective on multiobjective optimizations.
Key words   Particle swarm optimization   Aartificial immune system   Clone selection Orthogonal design   Multiobjective optimization

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