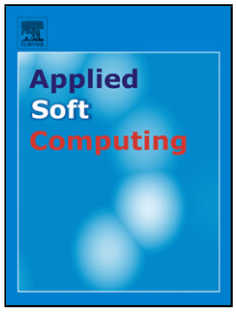

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A Radial Space Division Based Evolutionary Algorithm for Many-Objective Optimization

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Abstract

In evolutionary many-objective optimization, diversity maintenance plays an important role in pushing the population towards the Pareto optimal front. Existing many-objective evolutionary algorithms mainly focus on convergence enhancement, but pay less attention to diversity enhancement, which may fail to obtain uniformly distributed solutions or fall into local optima. This paper proposes a radial space division based evolutionary algorithm for many-objective optimization, where the solutions in high-dimensional objective space are projected into the grid divided 2-dimensional radial space for diversity maintenance and convergence enhancement. Specifically, the diversity of the population is emphasized by selecting solutions from different grids, where an adaptive penalty based approach is proposed to select a better converged solution from the grid with multiple solutions for convergence enhancement. The proposed algorithm is compared with five state-of-the-art many-objective evolutionary algorithms on a variety of benchmark test problems. Experimental results demonstrate the competitiveness of the proposed algorithm in terms of both convergence enhancement and diversity maintenance.

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