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A Hybrid of Bayesian-Based Global Search With Hooke-Jeeves Local Refinement for Multi-Objective Optimization Problems

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The proposed multi-objective optimisation algorithm hybridises random global search with a local refinement algorithm. The global search algorithm mimics the Bayesian multi-objective optimisation algorithm. The site of the current computation of the objective functions by the proposed algorithm is selected by randomised simulation of the bi-objective selection by the Bayesian-based algorithm. The advantage of the new algorithm is that it avoids the inner complexity of Bayesian algorithms. A version of the Hooke-Jeeves algorithm is adapted for the local refinement of the approximation of the Pareto front. The developed hybrid algorithm is tested under conditions previously applied to test other Bayesian algorithms so that performance can be compared. Other experiments were performed to assess the efficiency of the proposed algorithm under conditions where the previous versions of Bayesian algorithms were not appropriate because of the number of objectives and/or dimensionality of the decision space.