Improving Convergence of Evolutionary Multi-Objective Optimization with Local search - A Concurrent-Hybrid Algorithm

Karthik Sindhya

Department of Mathematical Information Technology, P.O. Box 35, FI-40014
University of Jyväskylä, Finland,
`karthik.s.sindhya@jyu.fi`

Abstract. A local search method is often introduced in an evolutionary optimization algorithm to enhance its speed and accuracy of convergence to optimal solutions. In multi-objective optimization problems, the implementation of a local search is a non-trivial task as determining a goal for a local search in presence of multiple conflicting objectives becomes a difficult proposition. In this paper, we borrow a multiple criteria decision making concept of employing a reference point based approach of minimizing an achievement scalarizing function and integrate it as a search operator with a concurrent approach in an evolutionary multi-objective algorithm. Simulation results of the hybrid algorithm, on a number of two to four-objective problems with concurrent and serial approaches clearly show the importance of local search in aiding a computationally faster and an accurate convergence to the Pareto-optimal front. The algorithm is now ready to be coupled with a faster and an accurate diversity-preserving procedure to make the overall procedure a competitive algorithm for multi-objective optimization.