Evolutionary Many-Objective Optimization

Evolutionary many-objective optimization has been a hot research topic in the field of evolutionary computation in the last decade. Recently, a large number of evolutionary many-objective algorithms have been proposed for the handling of multi-objective optimization problems with more than three objectives. Whereas those algorithms show high performance on frequently-used test problems, their performance is not always high on realistic test problems. In this talk, it is clearly explained that there still exist a number of challenges in evolutionary many-objective optimization. This talk starts with well-known difficulties in many-objective optimization such as the performance deterioration of Pareto dominance-based algorithms with the increase in the number of objectives and the necessity of a huge number of solutions for approximating the entire Pareto front of a many-objective problem. Next, some other difficulties are explained such as unrealistic features of many-objective test problems and difficulties of performance evaluations for many-objective optimization. Then, two important future research directions are explained. One is the design of realistic many-objective test problems, and the other is the solution subset selection from a large number of non-dominated solutions of a many-objective problem.