

## **Improving the performance of multiobjective evolutionary optimization algorithms using coevolutionary learning**

### **Abstract**

This chapter introduces two algorithms for multiobjective optimization. These algorithms are based on a state-of-the-art Multiobjective Evolutionary Algorithm (MOEA) called Strength Pareto Evolutionary Algorithm 2 (SPEA2). The first proposed algorithm implements a competitive coevolution technique within SPEA2. In contrast, the second algorithm introduces a cooperative coevolution technique to SPEA2. Both novel coevolutionary approaches are then compared to the original SPEA2 in seven scalable DTLZ test problems with 3 to 5 objectives. Overall, the optimization results show that the two proposed approaches are superior to the original SPEA2 with regard to the average distance of the nondominated solutions to the true Pareto front, the diversity of the obtained solutions and also the coverage level. In addition, t-tests have been conducted to validate the significance of the improvements obtained by the augmented algorithms over the original SPEA2. Finally, cooperative coevolution is found to be better than competitive coevolution in terms of enhancing the performance of the original SPEA2. © 2009 Springer-Verlag Berlin Heidelberg.