

**Additional Exercises for Chapter 1 of the book: Coello
Coello, Carlos A.; Van Veldhuizen, David A. & Lamont,
Gary B. “Evolutionary Algorithms for Solving
Multi-Objective Problems”, Kluwer Academic
Publishers, New York, ISBN 0-3064-6762-3, May 2002.**

Exercises

1. Enumerate the main limitations of mathematical programming techniques for multiobjective optimization.
2. Choose a set of five mathematical programming techniques used for multiobjective optimization (see for example [1]), and implement them. Then test them using two of the (unconstrained) test functions presented in Chapter 3. Plot the Pareto fronts obtained and compare (graphically) your results with respect to the true Pareto fronts of each test function (obtained by enumeration). What advantages and disadvantages (if any) do you see in these methods? Do they present any limitations? Discuss.
3. Most mathematical programming techniques operate only with a single solution at a time. Do you think that there would be any advantages if a set of solutions was manipulated at a time instead of only one? Would that require any changes in the mathematical programming algorithms that you are familiar with? Discuss.
4. Look at your local library for some papers on mathematical programming techniques used for multiobjective optimization. Analyze the sort of test functions normally used to validate results and discuss the methodology adopted by operational researchers. Discuss.

References

- [1] Kaisa M. Miettinen. *Nonlinear Multiobjective Optimization*. Kluwer Academic Publishers, Boston, Massachusetts, 1998.