

Preface

Nature-inspired optimization algorithms are a class of heuristic algorithms that mimic natural phenomena to solve complex optimization problems which are intractable by traditional exact algorithms. Since John Holland developed the genetic algorithms (GA) in the early 1970s, nature-inspired algorithms have aroused great research interests. The last decade has witnessed a rapid development of new nature-inspired algorithms which exhibit wide applicability and promising performance on a variety of engineering problems.

In 2008, Dan Simon proposed a new algorithm named biogeography-based optimization (BBO), which mimics the evolution process of habitats based on migration to evolve a population of solutions toward the global optimum or a near-optimum. BBO exhibits competitive performance compared with many popular algorithms and has attracted much interest from academia and industry.

Our research team has been working on nature-inspired algorithms and their applications for a decade. Since the proposal of BBO, we have done a lot of work on the improvement of BBO as well as the application of BBO to many engineering optimization problems. The results of our work have been published in well-known academic journals and conferences including Computer & Operations Research, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Fuzzy Systems, IEEE Transactions on Intelligent Systems, Applied Soft Computing, IEEE Congress on Evolutionary Computation (CEC), International Conference on Swarm Intelligence. In particular, in 2014 we proposed a major improvement of BBO, called ecogeography-based optimization (EBO). Also in 2014, our study on the application of BBO to the emergency scheduling of engineering rescue tasks in disasters won the Runner-Up of International Federation of Operational Research Societies (IFOPS) Prize for Development.

This book is primarily intended for researchers, engineers, and students who are interested in BBO and/or who want to borrow ideas from BBO in their researches in all aspects of intelligent computing. The chapters cover the basic BBO algorithm and its variants, extensions, and applications. Chapter 1 introduces the basic concepts of optimization problems and algorithms, Chap. 2 gives a brief overview of the BBO algorithm and its developments, Chaps. 3 and 4 present two

important improved versions of BBO, Chap. 5 describes hybrid BBO algorithms, and Chaps. 6–9 describe the application of BBO to optimization problems in four typical areas including transportation, job scheduling, image processing, and machine learning. A part of source code and data sets used in this book can be found in <http://compintell.cn/en/dataAndCode.html>.

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