Handbook of Global Optimization
Volume 2

Nonconvex Optimization and Its Applications

Volume 62

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Preface

In 1995 the Handbook of Global Optimization (edited by Reiner Horst and Panos Pardalos) was published. This handbook was very well received by the optimization community. However, may topics that are used by practioners were not included in the 1995 handbook. We decided to edit a second volume with the hope to fill this gap. Together, the two volumes of the handbook cover a more complete and broad spectrum of approaches for dealing with global optimization problems.

Many large-scale optimization problems encountered in practice cannot be solved to optimality using traditional optimization techniques. Over the last decade, a large variety of heuristic techniques been proposed for specific optimization problems. Etymologically, the word "heuristic" comes from the Greek `heuriskein` (to find). Recall the famous "Eureka, Eureka!" (I have found it! I have found it!) by Archimedes (287-212 B.C.). Heuristics play a key role in the solution of large unstructured global optimization problems. As H. Wilf writes in his 1986 book "Algorithms and Complexity" about heuristics: "*... methods that seem to work well in practice, for reasons nobody understands ...*". The application areas in which heuristics can and have been successfully applied include machine and crew scheduling problems, vehicle routing problems, telecommunications, supply chain management, and finance.

This second volume of the handbook of global optimization is comprised of articles written by the experts in the fields dealing with modern approaches to global optimization, including different types of heuristics. Our goal was to provide a true handbook that does not focus on particular applications of the heuristics and algorithms, but rather describes the state of the art for the different methodologies. Topics covered in the handbook include various metaheuristics, such as simulated annealing, genetic algorithms, neural networks, taboo search, shake-and-bake methods, and deformation methods. In addition, the book contains chapters on new exact stochastic and deterministic approaches to continuous and mixed-integer global optimization, such as stochastic adaptive search, two-phase methods, branch-and-bound methods with new relaxation

and branching strategies, algorithms based on local optimization, and dynamical search. Finally, the book contains chapters on experimental analysis of algorithms and software, test problems, and applications.

The target audience of the handbook is graduate students in engineering and operations research, academic researchers, as well as practitioners, who can tailor the general approaches described in the handbook to their specific needs and applications.

We would like to take the opportunity to thank the authors of the chapters, the anonymous referees, and Kluwer Academic Publishers for making the publication of this volume possible.

PANOS PARDALOS, EDWIN ROMEIJN