BOOK REVIEW


Global optimization is becoming widely used in a variety of application areas. This is a high-tech field requiring advanced computer facilities and powerful numerical algorithms. The rapidly growing interest to the field is explained by advantages that can be enjoyed in practice using globally optimal solutions instead of local ones supplied by traditional local optimization approaches.

The primary objective of the book under review is to develop an original self-contained approach to the Lipschitz global optimization problem in one of its most complex formulations very often arising in practice. Namely, it is assumed that the objective function can be “black-box”, multidimensional, non-differentiable, with many global and local minima, with unknown Lipschitz constant, and undefined outside the admissible region. Similar assumptions on the constraints yield feasible regions being collections of disjoint non-convex subsets.

The approach developed by the authors provides the reader with a number of new powerful tools allowing for a reduction of the problem stated above to a one-dimensional problem over a closed interval that can be efficiently solved on traditional or parallel computers. Particularly, the multidimensional problem is reduced to one-dimensional by approximations of Peano space-filling curves (a C++ package for such a reduction is given). The constrained problem is reduced to an unconstrained one by a new interesting index scheme that does not require additional parameters for treating constraints. The authors introduce non-redundant parallel computations and...
active usage of local information during the global search opening new
frontiers for acceleration of the search (theoretical estimates on the
speed up which can be obtained are given). All of the algorithms
presented in the book are deeply studied theoretically and tested
numerically.

The book is well written and self-contained. It consists of the
following three parts:

Part 1. Global optimization algorithms as decision procedures.
Theoretical background and core univariate case.
Part 2. Generalizations for parallel computing, constrained and
multiple criteria problems.
Part 3. Global optimization in many dimensions. Generalizations
through Peano curves.

The book contains many numerical examples illustrating perform-
ance of the proposed algorithms. It is well equipped with various
indexes facilitating reading: lists of algorithms, tables figures, terminol-
gy index, and an impressive bibliography. Particularly, the list
of algorithms pointing to more than 50 numerical methods proposed
by the authors is a nice tool for the readers looking for global
optimization algorithms better fitting their specific problems.

In summary, the book presents the major development of theory and
practice of numerical global optimization algorithms. It is certainly a
very useful and interesting book and I strongly recommend it to
anyone dealing with global optimization, parallel computing, decision
making, and their applications.

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