



# Introduction to Stochastic Search and Optimization

By James C. Spall

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## Introduction to Stochastic Search and Optimization By James C. Spall

A unique interdisciplinary foundation for real-world problem solving

Stochastic search and optimization techniques are used in a vast number of areas, including aerospace, medicine, transportation, and finance, to name but a few. Whether the goal is refining the design of a missile or aircraft, determining the effectiveness of a new drug, developing the most efficient timing strategies for traffic signals, or making investment decisions in order to increase profits, stochastic algorithms can help researchers and practitioners devise optimal solutions to countless real-world problems.

Introduction to Stochastic Search and Optimization: Estimation, Simulation, and Control is a graduate-level introduction to the principles, algorithms, and practical aspects of stochastic optimization, including applications drawn from engineering, statistics, and computer science. The treatment is both rigorous and broadly accessible, distinguishing this text from much of the current literature and providing students, researchers, and practitioners with a strong foundation for the often-daunting task of solving real-world problems.

The text covers a broad range of today's most widely used stochastic algorithms, including:

- Random search
- Recursive linear estimation
- Stochastic approximation
- Simulated annealing
- Genetic and evolutionary methods
- Machine (reinforcement) learning
- Model selection
- Simulation-based optimization
- Markov chain Monte Carlo
- Optimal experimental design

The book includes over 130 examples, Web links to software and data sets, more than 250 exercises for the reader, and an extensive list of references. These features help make the text an invaluable resource for those interested in the

theory or practice of stochastic search and optimization.

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"This volume deserves a prominent role not only as a textbook, but also as a desk reference for anyone who must cope with noisy data..." (*Computing Reviews.com*, January 6, 2006)

"...well written and accessible to a wide audience...a welcome addition to the control and optimization community." (*IEEE Control Systems Magazine*, June 2005)

"...a step toward learning more about optimization techniques that often are not part of a statistician's training." (*Journal of the American Statistical Association*, December 2004)

"...provides easy access to a very broad, but related, collection of topics..." (*Short Book Reviews*, August 2004)

"Rather than simply present various stochastic search and optimization algorithms as a collection of distinct techniques, the book compares and contrasts the algorithms within a broader context of stochastic methods." (*Technometrics*, August 2004, Vol. 46, No. 3)

#### Review

This book should be on the desk of anyone interested in the theory and application of stochastic search and optimization.

--Kevin Passino, Department of Electrical Engineering, The Ohio State University

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