



# Optimization Techniques in Statistics (Statistical Modeling and Decision Science)

*By Jagdish S. Rustagi*

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## **Optimization Techniques in Statistics (Statistical Modeling and Decision Science) By Jagdish S. Rustagi**

Statistics help guide us to optimal decisions under uncertainty. A large variety of statistical problems are essentially solutions to optimization problems. The mathematical techniques of optimization are fundamental to statistical theory and practice. In this book, Jagdish Rustagi provides full-spectrum coverage of these methods, ranging from classical optimization and Lagrange multipliers, to numerical techniques using gradients or direct search, to linear, nonlinear, and dynamic programming using the Kuhn-Tucker conditions or the Pontryagin maximal principle. Variational methods and optimization in function spaces are also discussed, as are stochastic optimization in simulation, including annealing methods.

The text features numerous applications, including:

Finding maximum likelihood estimates

Markov decision processes

Programming methods used to optimize monitoring of patients in hospitals

Derivation of the Neyman-Pearson lemma

The search for optimal designs

Simulation of a steel mill

Suitable as both a reference and a text, this book will be of interest to advanced undergraduate or beginning graduate students in statistics, operations research, management and engineering sciences, and related fields. Most of the material can be covered in one semester by students with a basic background in probability and statistics.

### **Key Features**

- \* Covers optimization from traditional methods to recent developments such as Karmarkar's algorithm and simulated annealing

- \* Develops a wide range of statistical techniques in the unified context of optimization

- \* Discusses applications such as optimizing monitoring of patients and simulating steel mill operations

- \* Treats numerical methods and applications

Includes exercises and references for each chapter

- \* Covers topics such as linear, nonlinear, and dynamic programming, variational

methods, and stochastic optimization

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### **Editorial Review**

#### **Review**

It is well written, nicely organized, with a high degree of mathematical accuracy...all coming together to make the material easily digestible.

--Stergios B. Fotopoulos, Washington State University

I enjoyed reading this book and strongly recommend it for its contribution to the field of statistics. I believe that it will have a positive impact on the content of optimization courses taught in both management and mathematical graduate programs.

--Stergios B. Fotopoulos, Washington State University

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