An Introduction to Bootstrap Methods with Applications to R
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DESCRIPTION

A comprehensive introduction to bootstrap methods in the R programming environment

Bootstrap methods provide a powerful approach to statistical data analysis, as they have more general applications than standard parametric methods. An Introduction to Bootstrap Methods with Applications to R explores the practicality of this approach and successfully utilizes R to illustrate applications for the bootstrap and other resampling methods. This book provides a modern introduction to bootstrap methods for readers who do not have an extensive background in advanced mathematics. Emphasis throughout is on the use of bootstrap methods as an exploratory tool, including its value in variable selection and other modeling environments.

The authors begin with a description of bootstrap methods and its relationship to other resampling methods, along with an overview of the wide variety of applications of the approach. Subsequent chapters offer coverage of improved confidence set estimation, estimation of error rates in discriminant analysis, and applications to a wide variety of hypothesis testing and estimation problems, including pharmaceutical, genomics, and economics. To inform readers on the limitations of the method, the book also exhibits counterexamples to the consistency of bootstrap methods.

An introduction to R programming provides the needed preparation to work with the numerous exercises and applications presented throughout the book. A related website houses the book's R subroutines, and an extensive listing of references provides resources for further study.
Discussing the topic at a remarkably practical and accessible level, An Introduction to Bootstrap Methods with Applications to R is an excellent book for introductory courses on bootstrap and resampling methods at the upper-undergraduate and graduate levels. It also serves as an insightful reference for practitioners working with data in engineering, medicine, and the social sciences who would like to acquire a basic understanding of bootstrap methods.

ABOUT THE AUTHOR

MICHAEL R. CHERNICK, PhD, is Manager of Biostatistical Services at Lankenau Institute for Medical Research, where he conducts statistical design and analysis for pharmaceutical research. He has more than thirty years of experience in the application of statistical methods to such areas as medicine, energy, engineering, insurance, and pharmaceuticals. Dr. Chernick is the author of Bootstrap Methods: A Guide for Practitioners and Researchers, Second Edition and The Essentials of Biostatistics for Physicians, Nurses, and Clinicians, and the coauthor of Introductory Biostatistics for the Health Sciences: Modern Applications Including Bootstrap, all published by Wiley.

ROBERT A. LaBUDDE, PhD, is President of Least Cost Formulations, Ltd., a mathematical software development company that specializes in optimization and process control software for manufacturing companies. He has extensive experience in industry and academia and currently serves as Adjunct Associate Professor in the Department of Mathematics and Statistics at Old Dominion University.

FEATURES

• The book includes a listing of the most extensive and detailed bootstrap bibliography available on the market, including more than 2,500 references.

• Solutions to bootstrap failures are presented, such as finite populations and extreme values.

• Historical notes at the end of each chapter, as well as extensive illustrations, charts and tables and showcased throughout the book.

• Great care is given to craft smooth transitions amongst chapters and between sections.

• Examples and explanations of when and why the bootstrap is not effective are presented for learning and comparative purposes.
• Discussions of applications to a wide variety of confidence intervals, hypothesis testing, and estimation problems (including pharmaceutical, genomics, and economics) are given, oftentimes at the expense of detailed explanations and/or needless theoretical justification.

• R subroutines are illustrated throughout the presentation and redeployed on an author-maintained web site, along with helpful hints to more than 300 exercises in the book.

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