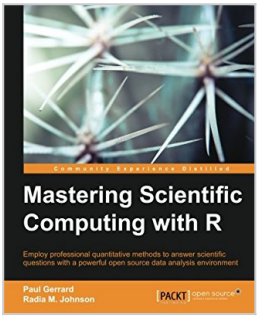

Mastering Scientific Computing with R

By Paul Gerrard, Radia M. Johnson

Mastering Scientific Computing with R By Paul Gerrard, Radia M. Johnson

Employ professional quantitative methods to answer scientific questions with a powerful open source data analysis environment

About This Book

- Perform publication-quality science using R
- Use some of R's most powerful and least known features to solve complex scientific computing problems
- Learn how to create visual illustrations of scientific results

Who This Book Is For

If you want to learn how to quantitatively answer scientific questions for practical purposes using the powerful R language and the open source R tool ecosystem, this book is ideal for you. It is ideally suited for scientists who understand scientific concepts, know a little R, and want to be able to start applying R to be able to answer empirical scientific questions. Some R exposure is helpful, but not compulsory.

What You Will Learn

- Master data management in R
- Perform hypothesis tests using both parametric and nonparametric methods
- Understand how to perform statistical modeling using linear methods
- Model nonlinear relationships in data with kernel density methods
- Use matrix operations to improve coding productivity
- Utilize the observed data to model unobserved variables
- Deal with missing data using multiple imputations
- Simplify high-dimensional data using principal components, singular value decomposition, and factor analysis

In Detail

With this book, you will learn not just about R, but how to use R to answer

conceptual, scientific, and experimental questions.

Beginning with an overview of fundamental R concepts, you'll learn how R can be used to achieve the most commonly needed scientific data analysis tasks: testing for statistically significant differences between groups and model relationships in data. You will delve into linear algebra and matrix operations with an emphasis not on the R syntax, but on how these operations can be used to address common computational or analytical needs. This book also covers the application of matrix operations for the purpose of finding structure in high-dimensional data using the principal component, exploratory factor, and confirmatory factor analysis in addition to structural equation modeling. You will also master methods for simulation and learn about an advanced analytical method.

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Editorial Review

About the Author

Paul Gerrard

Paul Gerrard is a physician and healthcare researcher who is based out of Portland, Maine, where he currently serves as the medical director of the cardiopulmonary rehabilitation program at New England Rehabilitation Hospital of Portland. He studied business economics in college. After completing medical school, he did a residency in physical medicine and rehabilitation at Harvard Medical School and Spaulding Rehabilitation Hospital, where he served as chief resident and stayed on as faculty at Harvard before moving to Portland. He continues to collaborate on research projects with researchers at other academic institutions within the Boston area and around the country. He has published and presented research on a range of topics, including traumatic brain injury, burn rehabilitation, health outcomes, and the epidemiology of disabling medical conditions.

Radia M. Johnson

Radia M. Johnson has a doctorate degree in immunology and currently works as a research scientist at the Institute for Research in Immunology and Cancer at the Universite de Montreal, where she uses genomics and bioinformatics to identify and characterize the molecular changes that contribute to cancer development. She routinely uses R and other computer programming languages to analyze large data sets from ongoing collaborative projects. Since obtaining her PhD at the University of Toronto, she has also worked as a research associate at the University of Cambridge in Hematology, where she gained experience using system biology to study blood cancer.

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Melanie Archer:

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