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# Statistical Computing With R

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*Statistical Computing With R*

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**Statistical Computing with R, Second Edition** *CRC Press*

Computational statistics and statistical computing are two areas that employ computational, graphical, and numerical approaches to solve statistical problems, making the versatile R language an ideal computing environment for these fields. This second edition continues to encompass the traditional core material of computational statistics, with an

**Statistical Computing with R** *CRC Press*

Computational statistics and statistical computing are two areas that employ computational, graphical, and numerical approaches to solve statistical problems, making the versatile R language an ideal computing environment for these fields. One of the first books on these topics to feature R, *Statistical Computing with R* covers the traditiona

**Learning RStudio for R Statistical Computing** *Packt Publishing Ltd*

A practical tutorial covering how to leverage RStudio functionality to effectively perform R Development, analysis, and reporting with RStudio. The book is aimed at R developers and analysts who wish to do R statistical development while taking advantage of RStudio functionality to ease their development efforts. Familiarity with R is assumed. Those who want to get started with R development using RStudio will also find the book useful. Even if you already use R but want to create reproducible statistical analysis projects or extend R with self-written packages, this book shows how to quickly achieve this using RStudio.

**Statistical Computing in C++ and R** *CRC Press*

With the advancement of statistical methodology inextricably linked to the use of computers, new methodological ideas must be translated into usable code and then numerically evaluated relative to competing procedures. In response to this, *Statistical Computing in C++ and R* concentrates on the writing of code rather than the development and study of numerical algorithms per se. The book discusses code development in C++ and R and the use of these symbiotic languages in unison. It emphasizes that each offers distinct features that, when used in tandem, can take code writing beyond what can be obtained from either language alone. The text begins with some basics of object-oriented languages, followed by a "boot-camp" on the use of C++ and R. The authors then discuss code development for the solution of specific computational problems that are relevant to statistics including optimization, numerical linear algebra, and random number generation. Later chapters introduce abstract data structures (ADTs) and parallel computing concepts. The appendices cover R and UNIX Shell programming. Features Includes numerous student exercises ranging from elementary to challenging Integrates both C++ and R for the solution of statistical computing problems Uses C++ code in R and R functions in C++ programs Provides downloadable programs, available from the authors' website The translation of a mathematical problem into its computational analog (or analogs) is a skill that must be learned, like any other, by actively solving relevant problems. The text reveals the basic principles of algorithmic thinking essential to the modern statistician as well as the fundamental skill of communicating with a computer

through the use of the computer languages C++ and R. The book lays the foundation for original code development in a research environment.

### **Handbook of Statistics** *Elsevier*

R is open source statistical computing software. Since the R core group was formed in 1997, R has been extended by a very large number of packages with extensive documentation along with examples freely available on the internet. It offers a large number of statistical and numerical methods and graphical tools and visualization of extraordinarily high quality. R was recently ranked in 14th place by the Transparent Language Popularity Index and 6th as a scripting language, after PHP, Python, and Perl. The book is designed so that it can be used right away by novices while appealing to experienced users as well. Each article begins with a data example that can be downloaded directly from the R website. Data analysis questions are articulated following the presentation of the data. The necessary R commands are spelled out and executed and the output is presented and discussed. Other examples of data sets with a different flavor and different set of commands but following the theme of the article are presented as well. Each chapter presents a hands-on-experience. R has superb graphical outlays and the book brings out the essentials in this arena. The end user can benefit immensely by applying the graphics to enhance research findings. The core statistical methodologies such as regression, survival analysis, and discrete data are all covered. Addresses data examples that can be downloaded directly from the R website. No other source is needed to gain practical experience

Focus on the essentials in graphical outlays

### **Introductory Statistics with R** *Springer Science & Business Media*

This book provides an elementary-level introduction to R, targeting both non-statistician scientists in various fields and students of statistics. The main mode of presentation is via code examples with liberal commenting of the code and the output, from the computational as well as the statistical viewpoint. Brief sections introduce the statistical methods before they are used. A supplementary R package can be downloaded and contains the data sets. All examples are directly runnable and all graphics in the text are generated from the examples. The statistical methodology covered includes statistical standard distributions, one- and two-sample tests with continuous data, regression analysis, one- and two-way analysis of variance, regression analysis, analysis of tabular data, and sample size calculations. In addition, the last four chapters contain introductions to multiple linear regression analysis, linear models in general, logistic regression, and survival analysis.

### **Statistical Computing with R** *CRC Press*

Computational statistics and statistical computing are two areas that employ computational, graphical, and numerical approaches to solve statistical problems, making the versatile R language an ideal computing environment for these fields. One of the first books on these topics to feature R, *Statistical Computing with R* covers the traditional core material of computational statistics, with an emphasis on using the R language via an examples-based

approach. Suitable for an introductory course in computational statistics or for self-study, it includes R code for all examples and R notes to help explain the R programming concepts. After an overview of computational statistics and an introduction to the R computing environment, the book reviews some basic concepts in probability and classical statistical inference. Each subsequent chapter explores a specific topic in computational statistics. These chapters cover the simulation of random variables from probability distributions, the visualization of multivariate data, Monte Carlo integration and variance reduction methods, Monte Carlo methods in inference, bootstrap and jackknife, permutation tests, Markov chain Monte Carlo (MCMC) methods, and density estimation. The final chapter presents a selection of examples that illustrate the application of numerical methods using R functions. Focusing on implementation rather than theory, this text serves as a balanced, accessible introduction to computational statistics and statistical computing.

### **The R Software** *Springer Science & Business*

The contents of The R Software are presented so as to be both comprehensive and easy for the reader to use. Besides its application as a self-learning text, this book can support lectures on R at any level from beginner to advanced. This book can serve as a textbook on R for beginners as well as more advanced users, working on Windows, MacOS or Linux OSes. The first part of the book deals with the heart of the R language and its fundamental concepts, including data organization, import and export, various manipulations, documentation, plots, programming and maintenance. The last chapter in this part deals with oriented

object programming as well as interfacing R with C/C++ or Fortran, and contains a section on debugging techniques. This is followed by the second part of the book, which provides detailed explanations on how to perform many standard statistical analyses, mainly in the Biostatistics field. Topics from mathematical and statistical settings that are included are matrix operations, integration, optimization, descriptive statistics, simulations, confidence intervals and hypothesis testing, simple and multiple linear regression, and analysis of variance. Each statistical chapter in the second part relies on one or more real biomedical data sets, kindly made available by the Bordeaux School of Public Health (Institut de Santé Publique, d'Épidémiologie et de Développement - ISPED) and described at the beginning of the book. Each chapter ends with an assessment section: memorandum of most important terms, followed by a section of theoretical exercises (to be done on paper), which can be used as questions for a test. Moreover, worksheets enable the reader to check his new abilities in R. Solutions to all exercises and worksheets are included in this book.

### **A First Course in Statistical Programming with R** *Cambridge University Press*

This is the only introduction you'll need to start programming in R, the open-source language that is free to download, and lets you adapt the source code for your own requirements. Co-written by one of the R Core Development Team, and by an established R author, this book comes with real R code that complies with the standards of the language. Unlike other introductory books on the ground-breaking R system, this book emphasizes programming,

including the principles that apply to most computing languages, and techniques used to develop more complex projects. Learning the language is made easier by the frequent exercises and end-of-chapter reviews that help you progress confidently through the book. Solutions, datasets and any errata will be available from the book's web site. The many examples, all from real applications, make it particularly useful for anyone working in practical data analysis.

### **An Introduction to Statistical Computing** *John Wiley & Sons*

A comprehensive introduction to sampling-based methods in statistical computing The use of computers in mathematics and statistics has opened up a wide range of techniques for studying otherwise intractable problems. Sampling-based simulation techniques are now an invaluable tool for exploring statistical models. This book gives a comprehensive introduction to the exciting area of sampling-based methods. An Introduction to Statistical Computing introduces the classical topics of random number generation and Monte Carlo methods. It also includes some advanced methods such as the reversible jump Markov chain Monte Carlo algorithm and modern methods such as approximate Bayesian computation and multilevel Monte Carlo techniques An Introduction to Statistical Computing: Fully covers the traditional topics of statistical computing. Discusses both practical aspects and the theoretical background. Includes a chapter about continuous-time models. Illustrates all methods using examples and exercises. Provides answers to the exercises (using the statistical computing environment R); the corresponding source code is available online. Includes an

introduction to programming in R. This book is mostly self-contained; the only prerequisites are basic knowledge of probability up to the law of large numbers. Careful presentation and examples make this book accessible to a wide range of students and suitable for self-study or as the basis of a taught course

### **RStudio for R Statistical Computing Cookbook** *Packt Publishing Ltd*

Over 50 practical and useful recipes to help you perform data analysis with R by unleashing every native RStudio feature About This Book 54 useful and practical tasks to improve working systems Includes optimizing performance and reliability or uptime, reporting, system management tools, interfacing to standard data ports, and so on Offers 10-15 real-life, practical improvements for each user type Who This Book Is For This book is targeted at R statisticians, data scientists, and R programmers. Readers with R experience who are looking to take the plunge into statistical computing will find this Cookbook particularly indispensable. What You Will Learn Familiarize yourself with the latest advanced R console features Create advanced and interactive graphics Manage your R project and project files effectively Perform reproducible statistical analyses in your R projects Use RStudio to design predictive models for a specific domain-based application Use RStudio to effectively communicate your analyses results and even publish them to a blog Put yourself on the frontiers of data science and data monetization in R with all the tools that are needed to effectively communicate your results and even transform your work into a

data product In Detail The requirement of handling complex datasets, performing unprecedented statistical analysis, and providing real-time visualizations to businesses has concerned statisticians and analysts across the globe. RStudio is a useful and powerful tool for statistical analysis that harnesses the power of R for computational statistics, visualization, and data science, in an integrated development environment. This book is a collection of recipes that will help you learn and understand RStudio features so that you can effectively perform statistical analysis and reporting, code editing, and R development. The first few chapters will teach you how to set up your own data analysis project in RStudio, acquire data from different data sources, and manipulate and clean data for analysis and visualization purposes. You'll get hands-on with various data visualization methods using ggplot2, and you will create interactive and multidimensional visualizations with D3.js. Additional recipes will help you optimize your code; implement various statistical models to manage large datasets; perform text analysis and predictive analysis; and master time series analysis, machine learning, forecasting; and so on. In the final few chapters, you'll learn how to create reports from your analytical application with the full range of static and dynamic reporting tools that are available in RStudio so that you can effectively communicate results and even transform them into interactive web applications. Style and approach RStudio is an open source Integrated Development Environment (IDE) for the R platform. The R programming language is used for statistical computing and graphics, which RStudio facilitates and enhances through its integrated environment. This Cookbook will help you learn to

write better R code using the advanced features of the R programming language using RStudio. Readers will learn advanced R techniques to compute the language and control object evaluation within R functions. Some of the contents are: Accessing an API with R Substituting missing values by interpolation Performing data filtering activities R Statistical implementation for Geospatial data Developing shiny add-ins to expand RStudio functionalities Using GitHub with RStudio Modelling a recommendation engine with R Using R Markdown for static and dynamic reporting Curating a blog through RStudio Advanced statistical modelling with R and RStudio

### **The Book of R** *No Starch Press*

The Book of R is a comprehensive, beginner-friendly guide to R, the world's most popular programming language for statistical analysis. Even if you have no programming experience and little more than a grounding in the basics of mathematics, you'll find everything you need to begin using R effectively for statistical analysis. You'll start with the basics, like how to handle data and write simple programs, before moving on to more advanced topics, like producing statistical summaries of your data and performing statistical tests and modeling. You'll even learn how to create impressive data visualizations with R's basic graphics tools and contributed packages, like ggplot2 and ggvis, as well as interactive 3D visualizations using the rgl package. Dozens of hands-on exercises (with downloadable solutions) take you from theory to practice, as you learn: -The fundamentals of programming in R, including how to write data frames, create functions, and use variables, statements, and loops -Statistical

concepts like exploratory data analysis, probabilities, hypothesis tests, and regression modeling, and how to execute them in R

- How to access R's thousands of functions, libraries, and data sets
- How to draw valid and useful conclusions from your data
- How to create publication-quality graphics of your results

Combining detailed explanations with real-world examples and exercises, this book will provide you with a solid understanding of both statistics and the depth of R's functionality. Make The Book of R your doorway into the growing world of data analysis.

## Introduction to Statistical Computing Using R

### **Computational Statistics** *John Wiley & Sons*

This new edition continues to serve as a comprehensive guide to modern and classical methods of statistical computing. The book is comprised of four main parts spanning the field: Optimization Integration and Simulation Bootstrapping Density Estimation and Smoothing Within these sections, each chapter includes a comprehensive introduction and step-by-step implementation summaries to accompany the explanations of key methods. The new edition includes updated coverage and existing topics as well as new topics such as adaptive MCMC and bootstrapping for correlated data. The book website now includes comprehensive R code for the entire book. There are extensive exercises, real examples, and helpful insights about how to use the methods in practice.

### **Software for Data Analysis** *Springer Science & Business Media*

John Chambers turns his attention to R, the enormously

successful open-source system based on the S language. His book guides the reader through programming with R, beginning with simple interactive use and progressing by gradual stages, starting with simple functions. More advanced programming techniques can be added as needed, allowing users to grow into software contributors, benefiting their careers and the community. R packages provide a powerful mechanism for contributions to be organized and communicated. This is the only advanced programming book on R, written by the author of the S language from which R evolved.

### **Developing Statistical Software in Fortran 95** *Springer Science & Business Media*

Many books teach computational statistics. Until now, however, none has shown how to write a good program. This book gives statisticians, biostatisticians and methodologically-oriented researchers the tools they need to develop high-quality statistical software. Topics include how to: Program in Fortran 95 using a pseudo object-oriented style Write accurate and efficient computational procedures Create console applications Build dynamic-link libraries (DLLs) and Windows-based software components Develop graphical user interfaces (GUIs) Through detailed examples, readers are shown how to call Fortran procedures from packages including Excel, SAS, SPSS, S-PLUS, R, and MATLAB. They are even given a tutorial on creating GUIs for Fortran computational code using Visual Basic.NET. This book is for those who want to learn how to create statistical applications quickly and effectively. Prior experience with a programming language such as Basic, Fortran or C is helpful but not required.

More experienced programmers will learn new strategies to harness the power of modern Fortran and the object-oriented paradigm. This may serve as a supplementary text for a graduate course on statistical computing. From the reviews: "This book should be read by all statisticians, engineers, and scientists who want to implement an algorithm as a computer program. The book is the best introduction to programming that I have ever read. I value it as one of my important reference books in my personal library." Melvin J. Hinich for *Techonmetrics*, November 2006 "Overall, the book is well written and provides a reasonable introduction to the use of modern versions of Fortran for statistical computation. The real thrust of the book is building COM interfaces using Fortran, and it will no doubt be most useful to anyone who needs to build such interfaces." *Journal of the American Statistical Association*, June 2006 "The book is well written and is divided into chapters and sections which are coherent...Overall the book seems like a good resource for someone that already knows some dialect of FORTRAN and wants to learn a bit about what is new in FORTRAN 95..." Robert Gentleman for the *Journal of Statistical Software*, December 2006

### **Elements of Statistical Computing** *Routledge*

Statistics and computing share many close relationships. Computing now permeates every aspect of statistics, from pure description to the development of statistical theory. At the same time, the computational methods used in statistical work span much of computer science. *Elements of Statistical Computing* covers the broad usage of computing in statistics. It provides a comprehensive account of the most important computational

statistics. Included are discussions of numerical analysis, numerical integration, and smoothing. The author give special attention to floating point standards and numerical analysis; iterative methods for both linear and nonlinear equation, such as Gauss-Seidel method and successive over-relaxation; and computational methods for missing data, such as the EM algorithm. Also covered are new areas of interest, such as the Kalman filter, projection-pursuit methods, density estimation, and other computer-intensive techniques.

### **Computational Statistics** *Springer Science & Business Media*

Computational inference is based on an approach to statistical methods that uses modern computational power to simulate distributional properties of estimators and test statistics. This book describes computationally intensive statistical methods in a unified presentation, emphasizing techniques, such as the PDF decomposition, that arise in a wide range of methods.

### **Learning Statistics with R** *Lulu.com*

"*Learning Statistics with R*" covers the contents of an introductory statistics class, as typically taught to undergraduate psychology students, focusing on the use of the R statistical software and adopting a light, conversational style throughout. The book discusses how to get started in R, and gives an introduction to data manipulation and writing scripts. From a statistical perspective, the book discusses descriptive statistics and graphing first, followed by chapters on probability theory, sampling and estimation, and null hypothesis testing. After introducing the theory, the book covers the analysis of



contingency tables, t-tests, ANOVAs and regression. Bayesian statistics are covered at the end of the book. For more information (and the opportunity to check the book out before you buy!) visit <http://ua.edu.au/ccs/teaching/lr> or <http://learningstatisticswithr.com>

### **Using R for Data Management, Statistical Analysis, and Graphics** *CRC Press*

Quick and Easy Access to Key Elements of Documentation  
Includes worked examples across a wide variety of applications, tasks, and graphics  
Using R for Data Management, Statistical Analysis, and Graphics presents an easy way to learn how to perform an analytical task in R, without having to navigate through the extensive, idiosyncratic, and sometimes

### **R for Statistics** *CRC Press*

Although there are currently a wide variety of software packages suitable for the modern statistician, R has the triple advantage of being comprehensive, widespread, and free. Published in 2008, the second edition of *Statistiques avec R* enjoyed great success as an R guidebook in the French-speaking world. Translated and updated, *R for Statistics* includes a number of expanded and additional worked examples. Organized into two sections, the book focuses first on the R software, then on the implementation of traditional statistical methods with R. Focusing on the R software, the first section covers: Basic elements of the R software and data processing Clear, concise visualization of results, using simple and complex graphs Programming basics: pre-defined and user-created functions The second section of the

book presents R methods for a wide range of traditional statistical data processing techniques, including: Regression methods Analyses of variance and covariance Classification methods Exploratory multivariate analysis Clustering methods Hypothesis tests After a short presentation of the method, the book explicitly details the R command lines and gives commented results. Accessible to novices and experts alike, *R for Statistics* is a clear and enjoyable resource for any scientist. Datasets and all the results described in this book are available on the book's webpage at <http://www.agrocampus-ouest.fr/math/RforStat>

### **Modern Statistics with R** *BoD - Books on Demand*

The past decades have transformed the world of statistical data analysis, with new methods, new types of data, and new computational tools. The aim of *Modern Statistics with R* is to introduce you to key parts of the modern statistical toolkit. It teaches you: - Data wrangling - importing, formatting, reshaping, merging, and filtering data in R. - Exploratory data analysis - using visualisation and multivariate techniques to explore datasets. - Statistical inference - modern methods for testing hypotheses and computing confidence intervals. - Predictive modelling - regression models and machine learning methods for prediction, classification, and forecasting. - Simulation - using simulation techniques for sample size computations and evaluations of statistical methods. - Ethics in statistics - ethical issues and good statistical practice. - R programming - writing code that is fast, readable, and free from bugs. Starting from the very basics, *Modern Statistics with R* helps you learn R by working with R. Topics covered range from plotting data and

writing simple R code to using cross-validation for evaluating complex predictive models and using simulation for sample size determination. The book includes more than 200 exercises with fully worked solutions. Some familiarity with basic statistical concepts, such as linear regression, is assumed. No previous programming experience is needed.

### **Statistical Computing** *Routledge*

In this book the authors have assembled the "best techniques from a great variety of sources, establishing a benchmark for the field of statistical computing." ---Mathematics of Computation .  
The text is highly readable and well illustrated with examples. The reader who intends to take a hand in designing his own regression and multivariate packages will find a storehouse of information and a valuable resource in the field of statistical computing.

### **Statistical Computing** *Wiley*

Many statistical modelling and data analysis techniques can be difficult to grasp and apply, and it is often necessary to use computer software to aid the implementation of large data sets and to obtain useful results. S-Plus is recognised as one of the most powerful and flexible statistical software packages, and it enables the user to apply a number of statistical methods, ranging from simple regression to time series or multivariate analysis. This text offers extensive coverage of many basic and more advanced statistical methods, concentrating on graphical inspection, and features step-by-step instructions to help the non-statistician to understand fully the methodology. \* Extensive

coverage of basic, intermediate and advanced statistical methods  
\* Uses S-Plus, which is recognised globally as one of the most powerful and flexible statistical software packages \* Emphasis is on graphical data inspection, parameter estimation and model criticism \* Features hundreds of worked examples to illustrate the techniques described \* Accessible to scientists from a large number of disciplines with minimal statistical knowledge \* Written by a leading figure in the field, who runs a number of successful international short courses \* Accompanied by a Web site featuring worked examples, data sets, exercises and solutions A valuable reference resource for researchers, professionals, lecturers and students from statistics, the life sciences, medicine, engineering, economics and the social sciences.

### **A Computational Approach to Statistical Learning** *CRC Press*

A Computational Approach to Statistical Learning gives a novel introduction to predictive modeling by focusing on the algorithmic and numeric motivations behind popular statistical methods. The text contains annotated code to over 80 original reference functions. These functions provide minimal working implementations of common statistical learning algorithms. Every chapter concludes with a fully worked out application that illustrates predictive modeling tasks using a real-world dataset. The text begins with a detailed analysis of linear models and ordinary least squares. Subsequent chapters explore extensions such as ridge regression, generalized linear models, and additive models. The second half focuses on the use of general-purpose

algorithms for convex optimization and their application to tasks in statistical learning. Models covered include the elastic net, dense neural networks, convolutional neural networks (CNNs), and spectral clustering. A unifying theme throughout the text is the use of optimization theory in the description of predictive models, with a particular focus on the singular value decomposition (SVD). Through this theme, the computational approach motivates and clarifies the relationships between various predictive models. Taylor Arnold is an assistant professor of statistics at the University of Richmond. His work at the intersection of computer vision, natural language processing, and digital humanities has been supported by multiple grants from the National Endowment for the Humanities (NEH) and the American Council of Learned Societies (ACLS). His first book, *Humanities Data in R*, was published in 2015. Michael Kane is an assistant professor of biostatistics at Yale University. He is the recipient of grants from the National Institutes of Health (NIH), DARPA, and the Bill and Melinda Gates Foundation. His R package *bigmemory* won the Chamber's prize for statistical software in 2010. Bryan Lewis is an applied mathematician and author of many popular R packages, including *irlba*, *doRedis*, and *threejs*.

### **Modern Data Science with R** *CRC Press*

From a review of the first edition: "Modern Data Science with R... is rich with examples and is guided by a strong narrative voice. What's more, it presents an organizing framework that makes a convincing argument that data science is a course distinct from applied statistics" (*The American Statistician*). *Modern Data Science with R* is a comprehensive data science textbook for

undergraduates that incorporates statistical and computational thinking to solve real-world data problems. Rather than focus exclusively on case studies or programming syntax, this book illustrates how statistical programming in the state-of-the-art R/RStudio computing environment can be leveraged to extract meaningful information from a variety of data in the service of addressing compelling questions. The second edition is updated to reflect the growing influence of the tidyverse set of packages. All code in the book has been revised and styled to be more readable and easier to understand. New functionality from packages like *sf*, *purrr*, *tidymodels*, and *tidytext* is now integrated into the text. All chapters have been revised, and several have been split, re-organized, or re-imagined to meet the shifting landscape of best practice.

### **Using R and RStudio for Data Management, Statistical Analysis, and Graphics** *CRC Press*

Improve Your Analytical Skills! Incorporating the latest R packages as well as new case studies and applications, *Using R and RStudio for Data Management, Statistical Analysis, and Graphics*, Second Edition covers the aspects of R most often used by statistical analysts. New users of R will find the book's simple approach easy to understand while more

### **Statistical Analysis with R For Dummies** *John Wiley & Sons*

Understanding the world of R programming and analysis has never been easier. Most guides to R, whether books or online, focus on R functions and procedures. But now, thanks to *Statistical Analysis with R For Dummies*, you have access to a

trusted, easy-to-follow guide that focuses on the foundational statistical concepts that R addresses—as well as step-by-step guidance that shows you exactly how to implement them using R programming. People are becoming more aware of R every day as major institutions are adopting it as a standard. Part of its appeal is that it's a free tool that's taking the place of costly statistical software packages that sometimes take an inordinate amount of time to learn. Plus, R enables a user to carry out complex statistical analyses by simply entering a few commands, making sophisticated analyses available and understandable to a wide audience. *Statistical Analysis with R For Dummies* enables you to perform these analyses and to fully understand their implications and results. Gets you up to speed on the #1 analytics/data science software tool Demonstrates how to easily find, download, and use cutting-edge community-reviewed methods in statistics and predictive modeling Shows you how R offers intel from leading researchers in data science, free of charge Provides information on using R Studio to work with R Get ready to use R to crunch and analyze your data—the fast and easy way!

### **Bayesian Computation with R** *Springer Science & Business Media*

There has been a dramatic growth in the development and application of Bayesian inferential methods. Some of this growth is due to the availability of powerful simulation-based algorithms to summarize posterior distributions. There has been also a growing interest in the use of the system R for statistical analyses. R's open source nature, free availability, and large

number of contributor packages have made R the software of choice for many statisticians in education and industry. *Bayesian Computation with R* introduces Bayesian modeling by the use of computation using the R language. The early chapters present the basic tenets of Bayesian thinking by use of familiar one and two-parameter inferential problems. Bayesian computational methods such as Laplace's method, rejection sampling, and the SIR algorithm are illustrated in the context of a random effects model. The construction and implementation of Markov Chain Monte Carlo (MCMC) methods is introduced. These simulation-based algorithms are implemented for a variety of Bayesian applications such as normal and binary response regression, hierarchical modeling, order-restricted inference, and robust modeling. Algorithms written in R are used to develop Bayesian tests and assess Bayesian models by use of the posterior predictive distribution. The use of R to interface with WinBUGS, a popular MCMC computing language, is described with several illustrative examples. This book is a suitable companion book for an introductory course on Bayesian methods and is valuable to the statistical practitioner who wishes to learn more about the R language and Bayesian methodology. The *LearnBayes* package, written by the author and available from the CRAN website, contains all of the R functions described in the book. The second edition contains several new topics such as the use of mixtures of conjugate priors and the use of Zellner's g priors to choose between models in linear regression. There are more illustrations of the construction of informative prior distributions, such as the use of conditional means priors and multivariate normal priors in binary regressions. The new edition contains changes in the R

code illustrations according to the latest edition of the LearnBayes package.

### **The Art of R Programming** *No Starch Press*

R is the world's most popular language for developing statistical software: Archaeologists use it to track the spread of ancient civilizations, drug companies use it to discover which medications are safe and effective, and actuaries use it to assess financial risks and keep economies running smoothly. The Art of R Programming takes you on a guided tour of software development with R, from basic types and data structures to advanced topics like closures, recursion, and anonymous functions. No statistical knowledge is required, and your programming skills can range from hobbyist to pro. Along the way, you'll learn about functional and object-oriented programming, running mathematical simulations, and rearranging complex data into simpler, more useful formats. You'll also learn to: -Create artful graphs to visualize complex data sets and functions -Write more efficient code using parallel R and vectorization -Interface R with C/C++ and Python for increased speed or functionality -Find new R packages for text analysis, image manipulation, and more -Squash annoying bugs with advanced debugging techniques Whether you're designing aircraft, forecasting the weather, or you just need to tame your data, The Art of R Programming is your guide to harnessing the power of statistical computing.

### **Using R for Introductory Statistics** *CRC Press*

The second edition of a bestselling textbook, Using R for

Introductory Statistics guides students through the basics of R, helping them overcome the sometimes steep learning curve. The author does this by breaking the material down into small, task-oriented steps. The second edition maintains the features that made the first edition so popular, while updating data, examples, and changes to R in line with the current version. See What's New in the Second Edition: Increased emphasis on more idiomatic R provides a grounding in the functionality of base R. Discussions of the use of RStudio helps new R users avoid as many pitfalls as possible. Use of knitr package makes code easier to read and therefore easier to reason about. Additional information on computer-intensive approaches motivates the traditional approach. Updated examples and data make the information current and topical. The book has an accompanying package, UsingR, available from CRAN, R's repository of user-contributed packages. The package contains the data sets mentioned in the text (`data(package="UsingR")`), answers to selected problems (`answers()`), a few demonstrations (`demo()`), the errata (`errata()`), and sample code from the text. The topics of this text line up closely with traditional teaching progression; however, the book also highlights computer-intensive approaches to motivate the more traditional approach. The authors emphasize realistic data and examples and rely on visualization techniques to gather insight. They introduce statistics and R seamlessly, giving students the tools they need to use R and the information they need to navigate the sometimes complex world of statistical computing.

### **Doing Data Science in R** *SAGE*

This approachable introduction to doing data science in R provides step-by-step advice on using the tools and statistical methods to carry out data analysis. Introducing the fundamentals of data science and R before moving into more advanced topics like Multilevel Models and Probabilistic Modelling with Stan, it builds knowledge and skills gradually. This book: Focuses on providing practical guidance for all aspects, helping readers get to grips with the tools, software, and statistical methods needed to provide the right type and level of analysis their data requires. Explores the foundations of data science and breaks down the processes involved, focusing on the link between data science and practical social science skills. Introduces R at the outset and includes extensive worked examples and R code every step of the way, ensuring students see the value of R and its connection to methods while providing hands-on practice in the software. Provides examples and datasets from different disciplines and locations demonstrate the widespread relevance, possible applications, and impact of data science across the social sciences.

**A Handbook of Statistical Analyses using R** *CRC Press*

Like the best-selling first two editions, *A Handbook of Statistical Analyses using R*, Third Edition provides an up-to-date guide to data analysis using the R system for statistical computing. The book explains how to conduct a range of statistical analyses, from simple inference to recursive partitioning to cluster analysis. New to the Third Edition

**An R Companion to Applied Regression** *SAGE Publications*

*An R Companion to Applied Regression* is a broad introduction to the R statistical computing environment in the context of applied regression analysis. John Fox and Sanford Weisberg provide a step-by-step guide to using the free statistical software R, an emphasis on integrating statistical computing in R with the practice of data analysis, coverage of generalized linear models, and substantial web-based support materials. The Third Edition has been reorganized and includes a new chapter on mixed-effects models, new and updated data sets, and a de-emphasis on statistical programming, while retaining a general introduction to basic R programming. The authors have substantially updated both the *car* and *effects* packages for R for this edition, introducing additional capabilities and making the software more consistent and easier to use. They also advocate an everyday data-analysis workflow that encourages reproducible research. To this end, they provide coverage of RStudio, an interactive development environment for R that allows readers to organize and document their work in a simple and intuitive fashion, and then easily share their results with others. Also included is coverage of R Markdown, showing how to create documents that mix R commands with explanatory text.

**R by Example** *Springer Science & Business Media*

*R by Example* is an example-based introduction to the statistical computing environment that does not assume any previous familiarity with R or other software packages. R functions are presented in the context of interesting applications with real data. The purpose of this book is to illustrate a range of statistical and probability computations using R for people who are learning,

teaching, or using statistics. Specifically, this book is written for users who have covered at least the equivalent of (or are currently studying) undergraduate level calculus-based courses in statistics. These users are learning or applying exploratory and inferential methods for analyzing data and this book is intended to be a useful resource for learning how to implement these procedures in R.

### **Beginning R** *John Wiley & Sons*

Conquer the complexities of this open source statistical language R is fast becoming the de facto standard for statistical computing and analysis in science, business, engineering, and related fields. This book examines this complex language using simple statistical examples, showing how R operates in a user-friendly context. Both students and workers in fields that require extensive statistical analysis will find this book helpful as they learn to use R for simple summary statistics, hypothesis testing, creating graphs, regression, and much more. It covers formula notation, complex statistics, manipulating data and extracting components, and rudimentary programming. R, the open source statistical language increasingly used to handle statistics and produces publication-quality graphs, is notoriously complex This book makes R easier to understand through the use of simple statistical examples, teaching the necessary elements in the context in which R is actually used Covers getting started with R and using it for simple summary statistics, hypothesis testing, and graphs Shows how to use R for formula notation, complex statistics, manipulating data, extracting components, and regression Provides beginning programming instruction for those

who want to write their own scripts Beginning R offers anyone who needs to perform statistical analysis the information necessary to use R with confidence.

### **Beginning R** *Apress*

Beginning R: An Introduction to Statistical Programming is a hands-on book showing how to use the R language, write and save R scripts, build and import data files, and write your own custom statistical functions. R is a powerful open-source implementation of the statistical language S, which was developed by AT&T. R has eclipsed S and the commercially-available S-Plus language, and has become the de facto standard for doing, teaching, and learning computational statistics. R is both an object-oriented language and a functional language that is easy to learn, easy to use, and completely free. A large community of dedicated R users and programmers provides an excellent source of R code, functions, and data sets. R is also becoming adopted into commercial tools such as Oracle Database. Your investment in learning R is sure to pay off in the long term as R continues to grow into the go to language for statistical exploration and research. Covers the freely-available R language for statistics Shows the use of R in specific uses case such as simulations, discrete probability solutions, one-way ANOVA analysis, and more Takes a hands-on and example-based approach incorporating best practices with clear explanations of the statistics being done

### **Applied Econometrics with R** *Springer Science & Business Media*



R is a language and environment for data analysis and graphics. It may be considered an implementation of S, an award-winning language initially developed at Bell Laboratories since the late 1970s. The R project was initiated by Robert Gentleman and Ross Ihaka at the University of Auckland, New Zealand, in the early 1990s, and has been developed by an international team since mid-1997. Historically, econometricians have favored other computing environments, some of which have fallen by the wayside, and also a variety of packages with canned routines. We believe that R has great potential in econometrics, both for research and for teaching. There are at least three reasons for this: (1) R is mostly platform independent and runs on Microsoft Windows, the Mac family of operating systems, and various flavors of Unix/Linux, and also on some more exotic platforms. (2) R is free software that can be downloaded and installed at no cost from a family of mirror sites around the globe, the Comprehensive R Archive Network (CRAN); hence students can easily install it on their own machines. (3) R is open-source software, so that the full source code is available and can be inspected to understand what it really does, learn from it, and modify and extend it. We also like to think that platform independence and the open-source philosophy make R an ideal environment for reproducible econometric research.

### **Data Science in R** *CRC Press*

Effectively Access, Transform, Manipulate, Visualize, and Reason about Data and Computation Data Science in R: A Case Studies Approach to Computational Reasoning and Problem Solving illustrates the details involved in solving real computational

problems encountered in data analysis. It reveals the dynamic and iterative process by which data analysts approach a problem and reason about different ways of implementing solutions. The book's collection of projects, comprehensive sample solutions, and follow-up exercises encompass practical topics pertaining to data processing, including: Non-standard, complex data formats, such as robot logs and email messages Text processing and regular expressions Newer technologies, such as Web scraping, Web services, Keyhole Markup Language (KML), and Google Earth Statistical methods, such as classification trees, k-nearest neighbors, and naïve Bayes Visualization and exploratory data analysis Relational databases and Structured Query Language (SQL) Simulation Algorithm implementation Large data and efficiency Suitable for self-study or as supplementary reading in a statistical computing course, the book enables instructors to incorporate interesting problems into their courses so that students gain valuable experience and data science skills. Students learn how to acquire and work with unstructured or semistructured data as well as how to narrow down and carefully frame the questions of interest about the data. Blending computational details with statistical and data analysis concepts, this book provides readers with an understanding of how professional data scientists think about daily computational tasks. It will improve readers' computational reasoning of real-world data analyses.

### **Efficient R Programming** *O'Reilly Media, Inc.*

There are many excellent R resources for visualization, data science, and package development. Hundreds of scattered

vignettes, web pages, and forums explain how to use R in particular domains. But little has been written on how to simply make R work effectively—until now. This hands-on book teaches novices and experienced R users how to write efficient R code. Drawing on years of experience teaching R courses, authors Colin Gillespie and Robin Lovelace provide practical advice on a range of topics—from optimizing the set-up of RStudio to leveraging C++—that make this book a useful addition to any R user’s bookshelf. Academics, business users, and programmers from a wide range of backgrounds stand to benefit from the guidance in

Efficient R Programming. Get advice for setting up an R programming environment Explore general programming concepts and R coding techniques Understand the ingredients of an efficient R workflow Learn how to efficiently read and write data in R Dive into data carpentry—the vital skill for cleaning raw data Optimize your code with profiling, standard tricks, and other methods Determine your hardware capabilities for handling R computation Maximize the benefits of collaborative R programming Accelerate your transition from R hacker to R programmer