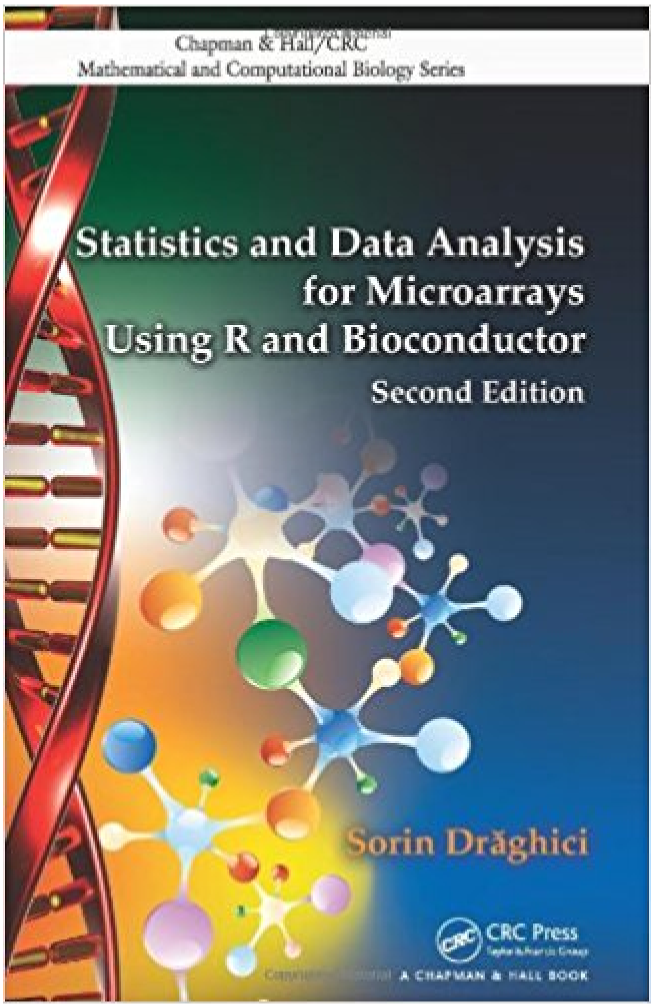
Statistics And Data Analysis For Microarrays Using R And Bioconductor, Second Edition (Chapman & Hall/CRC Mathematical And Computational Biology)



Synopsis

Richly illustrated in color, Statistics and Data Analysis for Microarrays Using R and Bioconductor, Second Edition provides a clear and rigorous description of powerful analysis techniques and algorithms for mining and interpreting biological information. Omitting tedious details, heavy formalisms, and cryptic notations, the text takes a hands-on, example-based approach that teaches students the basics of R and microarray technology as well as how to choose and apply the proper data analysis tool to specific problems. New to the Second EditionCompletely updated and double the size of its predecessor, this timely second edition replaces the commercial software with the open source R and Bioconductor environments. Fourteen new chapters cover such topics as the basic mechanisms of the cell, reliability and reproducibility issues in DNA microarrays, basic statistics and linear models in R, experiment design, multiple comparisons, quality control, data pre-processing and normalization, Gene Ontology analysis, pathway analysis, and machine learning techniques. Methods are illustrated with toy examples and real data and the R code for all routines is available on an accompanying CD-ROM. With all the necessary prerequisites included, this best-selling book guides students from very basic notions to advanced analysis techniques in R and Bioconductor. The first half of the text presents an overview of microarrays and the statistical elements that form the building blocks of any data analysis. The second half introduces the techniques most commonly used in the analysis of microarray data.

Book Information

Series: Chapman & Hall/CRC Mathematical and Computational Biology (Book 4)
Hardcover: 1036 pages
Publisher: Chapman and Hall/CRC; 2 edition (December 6, 2011)
Language: English
ISBN-10: 1439809755
ISBN-13: 978-1439809754
Product Dimensions: 9.3 x 6.2 x 1.9 inches
Shipping Weight: 4.4 pounds (View shipping rates and policies)
Average Customer Review: 5.0 out of 5 stars 13 customer reviews
Best Sellers Rank: #240,494 in Books (See Top 100 in Books) #62 inÃ Â Books > Computers & Technology > Computer Science > Bioinformatics #151 inÃ Â Books > Engineering & Transportation > Engineering > Bioengineering > Biotechnology #321 inÃ Â Books > Engineering & Transportation > Engineering > Bioengineering > Biochemistry

Customer Reviews

Praise for the First EditionThe book by Draghici is an excellent choice to be used as a textbook for a graduate-level bioinformatics course. This well-written book with two accompanying CD-ROMs will create much-needed enthusiasm among statisticians.Ã¢â ¬â ¢Journal of Statistical Computation and Simulation, Vol. 74I really like Draghici's book. As the author explains in the Preface, the book is intended to serve both the statistician who knows very little about DNA microarrays and the biologist who has no expertise in data analysis. The author lays out a study plan for the statistician that excludes 5 of the 17 chapters (4-8). These chapters present the basics of statistical distributions, estimation, hypothesis testing, ANOVA, and experimental design. What that leaves for the statistician is the three-chapter primer on microarrays and image processing, plus all of the data analysis tools specific to the microarray situation. Ã¢â ¬Â¦Ã Â it includes two CDs with trial versions of several specialised software packages. Anyone who uses microarray data should certainly own a copy.Ã¢â ¬â ¢Technometrics, Vol. 47, No. 1, February 2005

Sorin DrÃ„Æ'ghici holds the Robert J. Sokol MD Endowed Chair in Systems Biology in the Department of Obstetrics and Gynecology, and is a professor in the Department of Clinical and Translational Science and the Department of Computer Science, as well as the head of the Intelligent Systems and Bioinformatics Laboratory at Wayne State University. He is also the chief of the Bioinformatics and Data Analysis Section in the Perinatology Research Branch of the National Institute for Child Health and Development. A senior member of IEEE, Dr. DrÃ„Æ'ghici is an editor of IEEE/ACM Transactions on Computational Biology and Bioinformatics, Journal of Biomedicine and Biotechnology, and International Journal of Functional Informatics and Personalized Medicine. He earned a Ph.D. in computer science from the University of St. Andrews, UK.

This book is extremely rich yet readable. It covers a lot of different topics, and chapters can be read in order or referred to as needed.However, if you take the time to read it through carefully, you will enjoy yourself, because the author is a master of pedagogy, and often humorous.While expression microarrays are the platforms covered by this book, most of the material has much broader application beyond that. Cell biology, R, statistics, experiment design, molecular pathways, and machine learning are all covered. Even if you don't work with microarrays, there is something in this book for you, anyway you should know the basics of microarray analysis.Computer scientists or other non biologists may want to start at the beginning, which is an introduction to the cell and its basic mechanisms. It may seem like a lot of memorization and daunting to those who have never learned biology, but this chapter is well written with plenty of color images. It gives all of the fundamental biology needed to understand microarrays.The author knows which topics need to be covered in more depth than other authors are generally willing to do. I especially appreciated the section on degrees of freedom. If you never really had a grasp on this topic (but used it anyway) you will be grateful for section 8.4!Another chapter that I especially appreciated was "Experiment Design", which is so critical to any scientist of molecular biology and bioinformatics. How many of us in bioinformatics have been asked to analyze data from poorly designed experiments? Thanks to the extremely thorough preceding chapter on ANOVA, the chapter on experiment design is naturally set up for a straightforward and clear presentation of the rules, guidelines and concepts of experiment design. It presents the classic design models and several examples used by professionals in the field. The reader will feel confident designing basic experiments without having to refer the big hard core texts on the subject.Throughout the book, very essential snippets of R code are revealed. You won’t need much more or less than what you see here, once you have a little R under your belt. Dr Draghici’s specialty is pathway analysis, and he is the coauthor of the R package "SPIA", available on bioconductor. The pros and cons of the different pathway analysis methods are discussed in detail.

What a great book. The author is an excellent teacher who is skilled in transferring his in-depth knowledge to people unfamiliar with the material. The book is engaging and highly readable. In his short, but densely-packed chapter on GO-Terms, I learned more from him in a couple hours than I did from TAs in a 3-hour class augmented by many additional hours of my own independent searching on the web to "fill in the gaps". Fantastic book! Draghici highlights the gotchas and pitfalls researchers inadvertently run into and don’t know it. I constantly read and re-read sections of his book which are relevant to corners of my current research where I wonder if there was something that I might have missed. It is amazing how many "golden nuggets" of non-obvious information packs into a readable and concise format. I feel like I have a second adviser in my Doctoral research.

Readers of all backgrounds will find much to be pleased about with this book. Whether you need to learn basic biology or just need a refresher, this book will serve you well. Starting with basic biology, Draghici moves on to illuminate the basic issues confronting both Affymetrix and cDNA microarrays. The section on basic R programming is simple enough for a non-computer scientist to understand and yet moves rapidly enough to satisfy experienced programmers who will appreciate the commentary which helps to dispel some of the initial "weirdness" of R. I used this section to brush up on my R after being away for a while. Next the book covers statistics in a way that I found to be very readable. Many books will teach you statistics, but what sets this book apart from others is the way that it helps the reader to develop intuition about the statistics without sacrificing rigor. Later chapters focus on a variety of topics including machine learning / gene ontology / pathway analysis etc.The color illustrations were an unexpected surprise in such a technical book and very useful in illuminating the material. In summary, this is a great book and a great price. You will want to keep it as a reference.

So much useful information in this book it unreal. Plus the author explains the concepts in a clear and concise way without too much filler.

This book is perfect for anyone who is trying to begin programming with R. I did have previous experience with C++ and python before purchasing this book, but my experience was minimal at best. The fact that I wish to apply R to some microarray work that I have on going made this the absolute perfect purchase! The concepts would however apply well to nearly any biological application of R, making it a good all around beginner guide regardless.

it is very good.fast and excellent

Even I could follow it. This book connects the biology with the statistics with the R code using plain English and very helpful graphics. If you have a foundation in statistics and need a primer on genetic biology and the technology used to analyze genomic data, this book is wonderful.Chapters 6 and 7 are an intro to R and BioConductor,and Chapter 8 and 9 as mini-refresher courses on Statistics and Probability are a bonus.This will be a great reference even after the current micro-array technology is outmoded.

My Draghici know how to write for both the expert and the layman. I highly recommend any work produced by this professor.

Statistics and Data Analysis for Microarrays Using R and Bioconductor, Second Edition (Chapman & Hall/CRC Mathematical and Computational Biology) RNA-seq Data Analysis: A Practical Approach (Chapman & Hall/CRC Mathematical and Computational Biology) Computational

Statistics Handbook with MATLAB, Third Edition (Chapman & Hall/CRC Computer Science & Data Analysis) An Introduction to Systems Biology: Design Principles of Biological Circuits (Chapman & Hall/CRC Mathematical and Computational Biology) Introduction to Computational Biology: Maps, Sequences and Genomes (Chapman & Hall/CRC Interdisciplinary Statistics) Introduction to Proteins: Structure, Function, and Motion (Chapman & Hall/CRC Mathematical and Computational Biology) Algorithms in Bioinformatics: A Practical Introduction (Chapman & Hall/CRC Mathematical and Computational Biology) Environmental and Ecological Statistics with R, Second Edition (Chapman & Hall/CRC Applied Environmental Statistics) Variational Methods in Image Processing (Chapman & Hall/CRC Mathematical and Computational Imaging Sciences Series) Data Classification: Algorithms and Applications (Chapman & Hall/CRC Data Mining and Knowledge Discovery Series) Data Analytics: Applicable Data Analysis to Advance Any Business Using the Power of Data Driven Analytics (Big Data Analytics, Data Science, Business Intelligence Book 6) Dynamic Prediction in Clinical Survival Analysis (Chapman & Hall/CRC Monographs on Statistics & Applied Probability) Generalized Linear Models, Second Edition (Chapman & Hall/CRC Monographs on Statistics & Applied Probability) Analytics: Data Science, Data Analysis and Predictive Analytics for Business (Algorithms, Business Intelligence, Statistical Analysis, Decision Analysis, Business Analytics, Data Mining, Big Data) Introduction to High Performance Computing for Scientists and Engineers (Chapman & Hall/CRC Computational Science) Using R for Numerical Analysis in Science and Engineering (Chapman & Hall/CRC The R Series) Introduction to Scientific Programming and Simulation Using R, Second Edition (Chapman & Hall/CRC The R Series) Measure and Integral: An Introduction to Real Analysis, Second Edition (Chapman & Hall/CRC Pure and Applied Mathematics) Modeling and Analysis of Stochastic Systems, Second Edition (Chapman & Hall/CRC Texts in Statistical Science) Data Analytics: What Every Business Must Know About Big Data And Data Science (Data Analytics for Business, Predictive Analysis, Big Data Book 1)