for doing this, I still believe that this material will be helpful to students. The best chapter in this section is Chapter 5, in which the author gives a nice treatment of variance reduction techniques through sampling, stratified sampling, and importance sampling.

The book's third part consists of Chapter 6, in which material related to finance is introduced, including derivatives, various types of options, and the standard stochastic volatility model. The exposition is quite mathematical, and the linkage to simulation and the use of Maple is, unfortunately, sketchy. The last core segment, Chapters 7 and 8, covers random processes and then MCMC methods. Although I enjoyed the presentation of this material, I think that those trying to learn the subject would be frustrated by the tenuous connections to finance and the limited number of examples, the main one being the estimation of pump failure rates. One additional bonus chapter provides detailed computer solutions to the problems in earlier chapters, which I am sure will be greatly appreciated by readers.

In summary, this book has some appealing features, but in my mind the failure to bridge the gap between finance applications and the simulation-random process material is a significant deficiency. It would take a masterful classroom instructor to overcome this problem; without such an effort, the untrained reader would be left with the impression that for finance and the probabilistic material, the twain have not yet met.

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Statistical Analysis of Cost-Effectiveness Data.

Andrew R. WILLAN and Andrew H. BRIGGS. Chichester, U.K.: Wiley, 2006. ISBN 0-470-85626-2. xii + 196 pp. $90.00.

A vast amount of research incorporating statistical methods into cost-effectiveness analysis (CEA) has taken place over the last decade or so. Both Willan and Briggs have made important contributions to this research. Their book is a thorough and authoritative exposition of the subject that can serve as an immensely valuable up-to-date guide to the literature on the statistical analysis of cost and effectiveness data collected alongside clinical trials.

The book comprises nine chapters. The first five chapters, arguably the core of the book, provide a self-contained presentation of the basic concepts of CEA and the statistical methods for estimating key statistics, such as the mean, variance, and covariance of costs and effectiveness, as well as the mean incremental cost-effectiveness ratio (ICER) and the mean incremental net benefits (INB), and their corresponding confidence intervals. These chapters also discuss methods for dealing with such issues as skewed and censored data and provide several examples illustrating the methods developed. The remainder of the book is specialized in nature and addresses issues related to power and sample size determination, using baseline covariates to adjust for confounding, challenges of using data from multilevel and multinational trials, and statistical modeling for the purpose of indirectly estimating ICER.

Professional biostatisticians and health economists conducting CEA and graduate students interested in the subject will find the book well written and very useful. Nonetheless, the authors could have made their book more readable and garner a larger audience by making some changes to their style of presentation and including other topics.

The authors did a great job of illustrating the methods described in Chapters 1–4 by providing real data examples in Chapter 5; however, it may have been better to integrate these examples with the description of each method. Before reading Chapter 5, the reader is kept wondering about the real-life applications of these methods. (A very nice illustration of methods with examples is presented in Chap. 7.) Also, the presentation of some of the examples in Chapter 5 is monotonous; almost exact wording is used for all of them.

There were several other ways in which the book could have been improved. Not all methods were illustrated with examples (e.g., Lin's direct method). The Bayesian approach to INB is not accessible to readers without a good background in Bayesian analysis. A simpler introduction with references to concepts of Bayesian analysis may have been helpful. Perhaps some readers also may have preferred to find a chapter devoted solely to the Bayesian approach. Some formulas are presented without derivation, although the references are provided for many. In some cases, properties of estimators are stated without a proof or a reference to where a proof is provided (e.g., p. 119). Although all chapters include an introduction outlining the theme of the chapter and a summary, some need to be better motivated. For example, in Chapter 6 the authors do not explain why it is important to discuss issues related to power and sample size determination. Providing real-life examples of why this is needed and examples of sample size calculation would help. Also, there is no discussion at the outset of why a system of seemingly unrelated regressions is needed instead of a simple ordinary least squares model. What makes these regressions related? I managed to find only a few typos (e.g., p. 53, last paragraph). Readers interested in learning more about probabilistic sensitivity analysis of cost-effectiveness models will be disappointed to know that this is not covered. Finally, this is a growing field, and this book cannot be expected to provide an exhaustive treatment of all the issues related to statistical analysis of cost and effectiveness data (e.g., specification and measurement errors, heteroscedasticity, and autocorrelation). It would have been nice if the authors had provided a discussion of the issues not covered by the book (and the literature) and developed an agenda for future research that either the authors themselves or other researchers can tackle.

Notwithstanding these areas for improvement, Willan and Briggs have written a thorough, balanced, and useful book. I look forward to reading an enlarged, revised second edition.

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TELEGRAPHIC REVIEWS

Bayesian Inference for Gene Expression and Proteomics.

Kim-Anh DO, Peter MÜLLER, and Marina VANNUCCI (eds.). New York: Cambridge University Press, 2006. ISBN 0-521-86092-X. xviii + 437 pp. $80.00.

This edited volume presents Bayesian statistical methodologies and applications for analyzing high-throughput bioinformatics data arising from medical research and molecular and structural biology. The book begins by reviewing three high-throughput biotechnologies: microarrays, serial analysis of gene expression, and mass spectrometry. The data structures and Bayesian analysis strategies (many times hierarchical mixture models) are explained. The rest of the book collates chapters addressing each of these biotechnologies. Chapters 2–11 focus on Bayesian methods for microarrays; Chapters 12–15, on protein spectrometry; and Chapters 16–21, on DNA motif discovery and regulatory networks. A final chapter focuses on choosing sample size for microarray experiments.

The book clearly demonstrates how Bayesian methods have moved this field forward while also demonstrating where further comparisons to other methodologies and further research is still needed. Discussions in each chapter outline these unfinished areas and suggest possible new directions for research.

The editors have done a great job keeping the writing of diverse authors readable without great redundancy. Although the book does require prerequisite reading on Bayesian methods (perhaps Gelman, Carlin, Stern, and Rubin 2003), this book should be required reading for all graduate students of statistics, statistical researchers in this field, and students and researchers in other fields that use these technologies.

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REFERENCE

Gelman, A., Carlin, J. B., Stern, H. S., and Rubin, D. B. (2003), *Bayesian Data Analysis* (2nd ed.), Boca Raton, FL: Chapman & Hall/CRC.

Bayesian Process Monitoring, Control and Optimization.

Bianca M. COLOSIMO and Enrique DEL CASTILLO (eds.). Boca Raton, FL Chapman & Hall/CRC, 2007. ISBN 1-58488-544-0. 336 pp. $94.95.

This text is a compilation of chapters written by several leading industrial statisticians. Bayesian approaches are commonplace in many applied statistics disciplines, including biostatistics, econometrics, and environmetrics, but, as the editors correctly point out in the Preface, the use of Bayesian techniques is sparse at best among industrial engineers and industrial statisticians. Although Bayesian methods have been appearing in the more technical industrial statistics journals, such as *Technometrics* and the *Journal of Quality Technology*, these methods have been slow to catch on among practitioners. The editors express their belief that Bayesian methods will be used more in practice with the availability of more books on Bayesian statistics that emphasize engineering applications. They go on to state that the motivation for this text stems from the desire to make Bayesian techniques more available to the practitioner. The book's intended audience includes applied industrial statisticians, process and quality engineers, professors and graduate students whose interests include industrial and manufacturing applications, and individuals in operations research. I concur that the intended audience is as described, but add the important caveat that, with the exception of a few chapters, only those individuals who keep up with the more technical journals will have the necessary background to appreciate the text.

The book is organized into four parts. The first part includes two chapters introducing Bayesian statistics. The second chapter describes methods of conducting Bayesian analysis via simulation (ex. Markov Chain Monte Carlo, Metropolis-Hastings, Gibbs Sampling, etc.). Both chapters are carefully written and provide a nice reference for anyone interested in Bayesian methods. The second section includes five chapters on process monitoring. Topics covered include a theoretical overview of Bayesian approaches to statistical process control, empirical Bayes process monitoring techniques, monitoring the mean of a multivariate normal process, control charts for short production runs and monitoring the manufacture of integrated circuits. The third section of the text has two chapters devoted to the analysis of time series data. The text wraps up with a fourth section devoted to process optimization. This section is the most applied of any in the text. Interesting examples are provided and enough details are discussed that the section can be appreciated by practitioners and researchers alike.

Overall, this is a nice reference text, especially for those with a strong statistical background. The editors have done a nice job keeping the notation consistent throughout, and the book is well organized. An invaluable component of each chapter is the accompanying extensive list of references; more citations on the use of statistical software would be useful. Those individuals with at least some exposure to Bayesian methods will appreciate this book more than someone with little background in Bayesian methods.

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Disease Surveillance: A Public Health Informatics Approach.

Joseph S. LOMBARDO and David BUCKERIDGE (eds.). Hoboken, NJ: Wiley, 2007. ISBN 978-0-470-06812-0. xxi + 458 pp. $105.00.

Pandemic influenza, West Nile virus, severe acute respiratory syndrome (SARS), and bioterrorism are but a few examples that remind us of the need for improved systems for the detection, notification, and response to emerging health threats. This edited volume presents research, development, implementation and operational strategies for an effective disease surveillance program using modern technology. The book is divided into three parts:

Part I focuses on the informatics knowledge needed to design and implement a disease surveillance system. It includes chapters on understanding the data (the health indicators collected from schools, emergency rooms, testing labs, hospitals, and other sources), on obtaining access, on collecting and safeguarding the data, on outbreak alerting algorithms, and on putting these pieces together into a biosurveillance information system.

Part II provides case studies of the development of modern disease surveillance systems. Cases represent experiences in the United States, England, Wales, Canada, Peru, and Southeastern Asia.

Part III addresses practical issues concerning the evaluation of disease surveillance systems, the education of future informatics, and their role in practical disease surveillance. Various chapters explain the why, what, and how of evaluation; the competencies needed; and the training required for professionals in the field, as well as the integration of surveillance systems with other public health networks.

This book is essential reading for those learning about public health disease surveillance and for statisticians working with public health professionals to improve the sensitivity, specificity, timeliness, and cost-effectiveness of current surveillance systems.

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Knowledge Discovery in Bioinformatics: Techniques, Methods, and Applications.

Xiaohua HU and Yi PAN (eds.). Hoboken, NJ: Wiley, 2007. ISBN 978-0-471-77796-0. xxi + 363 pp. $99.95.

This volume bridges data mining and bioinformatics research. The book introduces readers to the principal techniques of data mining in the context of examples from bioinformatics research. It also identifies areas for additional research and development. For example, in Chapter 1, the authors review the history of predicting protein secondary structures using empirical and information theory statistical approaches and machine learning approaches, including nearest-neighbor, hidden Markov models, neural networks, and kernel-based methods. The authors then introduce the support vector machine (SVM) method. The authors explain, using statistical learning theory, that the SVM algorithm creates a hyperplane that separates data into classes with maximal margin. The authors outline how the SVM components, the encoding profile, kernel function, and tertiary classifier have been optimized in studies for protein secondary structure prediction. Advantages and disadvantages of the SVM over other methods are discussed. The chapter ends by listing recent research and calling for further research to improve upon the largest drawback of SVM, their poor comprehensibility, that is, their ability to extract rules that are biologically meaningful. This chapter, like most in the book, is an educational and interesting read and a reminder of just how much the worlds of statistics, biology, and computer science have melded. The rest of the book similarly demonstrates this melding in chapters that demonstrate data mining techniques to answer research questions in RNA and protein structure analysis, DNA computing, sequence mapping, genome comparison, gene expression, metabolic network modeling, phyloinformatics, biomedical literature data mining, and biological data integration and searching.

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Niche Modeling: Predictions From Statistical Distributions.

David STOCKWELL. Boca Raton, FL: Chapman & Hall/CRC, 2007. ISBN 1-58488-494-0. 201 pp. + CD. $94.95.

This text is an attempt to introduce the topic of niche modeling to the layman. Unfortunately, the book has gone so awry that I cannot recommend it. This is because of numerous factual errors, erroneous explanations of concepts, and ubiquitous vagueness in its exposition.

The text is flat wrong or vague in many places. For an example of vagueness, page 14 defines independent and identical distributed series as follows: "IID series refer to series where every y value is a simple random number with no reference to any other number." An example of a factual error is the author's definition of continuity in the topology chapter on page 61—a function $f : B \longrightarrow N$ is continuous if for each subset of X of N, the set defined by the inverse function $f^{-1}(Y)$ is an open set of B—which, besides writing Y for X, omits the important qualifier that X must be an open set. Another factual error is on page 53, where it is stated that countable additivity of a probability measure implies that $P(\bigcup_{i=1}^{\infty} E_i) = \sum_{i=1}^{\infty} P(E_i)$ for any sets of $\{E_i\}_{i=1}^{\infty}$ (of course, the E_i's must be disjoint). These are just two examples; errors abound elsewhere.

The errors are not limited to technical issues. After reading this text, I did not have a good idea of what niche modeling was, nor could I find a succinct definition or explanation of the term within the book. My readings did impart a clear opinion, however: I do not recommend this book.

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Random Dynamical Systems: Theory and Applications.

Rabi BHATTACHARYA and Mukul MAJUMDAR. New York, NY: Cambridge University Press, 2007. ISBN 0-521-82562-2. xv + 461 pp. $90.00 (H). ISBN 0-521-53272-8. $39.99 (P).

The book is an introduction to nonlinear random dynamical systems in discrete time. Random dynamical systems are modeled as Markov chains, typically on general state spaces. The authors show that for many examples, there is sufficient structure to characterize equilibrium or invariant distributions. Indeed, characterizing invariant distributions is the book's main focus. The book is well written, giving complete proofs of theorems and providing numerous examples that not only demonstrate the applicability of the material, but also demonstrate the bizarre behavior possible in nonlinear systems. I believe that this book will be enjoyable to anyone having a background in Markov chains or an interest in nonlinear time series models.

The first two chapters, roughly half the book, contain prerequisite material. Chapter 1 also reviews deterministic dynamical systems. The last section, nearly 60 pages, examines examples of dynamical systems. Chapter 2 reviews Markov chain theory first when the state space is discrete and then for Markov chains having general state spaces. Chapters 3 and 4 present the theory of random dynamical systems while applying the theory to several examples. Chapter 5 discusses estimation of invariant distributions. Finally, Chapter 6 is devoted to dynamic programming.

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Restricted Parameter Space Estimation Problems: Admissibility and Minimaxity Properties.

Constance VAN EEDEN. New York: Springer, 2006. ISBN 0-387-33747-4. x + 167 pp. $59.95 (P).

The subject of statistical inference under order restrictions has more than 50 years of history. To date, three major books have been written on the subject (Barlow, Bartholemew, Bremner, and Brunk 1972; Robertson, Wright, and Dykstra 1988; Silvapulle and Sen 2004), and all three focus primarily on testing problems. However, a large portion of the literature on the estimation of parameters subject to order restrictions is not well documented in any book until now, and the author should be congratulated for writing an important book that fills this gap. The book provides an excellent summary of several major results available in the literature on the estimation of parameters subject to order restrictions. Topics covered in the book include computational algorithms for the restricted maximum likelihood estimator, a variety of inadmissibility and minimaxity results, and Pitman and other estimation procedures. An impressive feature is that the author performed a thorough literature search and cited many interesting results published in journals that are not easily accessible. Thus the 16-page bibliography, covering over 250 publications, serves as an excellent reference for researchers interested in this field.

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