can be formulated in terms of basis functions and discuss the difficulties in posterior simulations due to interdependence of these functions. Such interdependence affects the efficiency of the sampling algorithms to draw from posterior distribution of the tree structures. Different strategies that are suggested in the literature for dealing with the sampling problem are discussed, and a detailed example using binary classification is presented to illustrate the Bayesian analysis.

To alleviate the problems that arise in tree models, Chapter 7 introduces partition models. The partition models can be considered a generalization of tree models, and they allow for sampling from the posterior distributions of the tree structure. As noted by the authors, these models suffer from lack of interpretability in high dimensions. The authors present one-dimensional partition models whose analysis provides a general framework for the changepoint problems. Multidimensional partition models, where partitions are defined by Dirichlet tessellations, are considered, and Bayesian inference for classification problems is discussed. Disease mapping models are presented as an application of partition models for spatial problems.

Chapter 8 is a short chapter describing Bayesian nearest-neighbor modeling. The nearest-neighbor classification algorithm, which is used commonly in pattern recognition, is given a probabilistic formulation by introducing a parameter that controls the degree of association between the neighboring classes.

In Chapter 9 the authors generalize the single-response case to multiple-response models where the observed response is a collection of values. The chapter focuses on regression models and does not consider classification models such as the multivariate probit models. Multivariate Bayesian regression framework is introduced where basis functions can be determined from the data using methods of Chapter 3. A generalization is considered using seemingly unrelated regression (SUR) models and their Bayesian analysis is presented. Prior specification for basis function matrix are discussed, and computational details of the MCMC methods are given for both models.

The book has a comprehensive bibliography, and each chapter (except Chap. 1) has a section on further reading. There are two appendixes at the end. Appendix B gives a summary of posterior inference results that are helpful for some of the development in the text.

In summary, this book presents recent developments in Bayesian nonlinear modeling and provides a complete treatment of regression and classification problems by emphasizing a data-driven approach in determining appropriate models. Its in-depth coverage of implementation issues and detailed discussion of pros and cons of different modeling strategies make it attractive for many researchers. It definitely makes my list of recommended texts in Bayesian statistics.

Refik SOYER
George Washington University

REFERENCE

Breiman, L., Friedman, J. H., Olshen, R., and Stone, C. J. (1984), *Classification and Regression Trees*, Belmont, CA: Wadsworth.

Resampling Methods for Dependent Data, by S. N. LAHIRI, New York: Springer-Verlag, 2003, ISBN 0-387-00928-0, xiv + 374 pp., $79.95.

This book provides a rigorous and technical treatment toward "resampling methods for temporal and spatial data exhibiting various forms of dependence." The authors state that "There are mainly two target audiences for the book, with the level of exposition tailored to each audience. The first five chapters are written in a pedantic way, giving full details of the theoretical results and step-by-step instructions for implementation of the methodology. This part of the book, together with selected materials from the later chapters, can be used as a text for a graduate-level course."

After a brief introductory motivational chapter, Chapter 2 presents the case that bootstrap methods typically used for the iid sample setting are not generally appropriate for time series models. This is followed by an introduction of various methods used to deal with the non-iid setting, including several block bootstrap methods, a discrete Fourier transform approach, and sieve methods. The corresponding theory and proofs are given in detail. Chapters 3–7 explore in even finer detail extensions, theoretical properties, comparisons, and implementation of the block bootstrap methods. Chapter 8 introduces model-based bootstrap methods. Chapter 9 introduces the frequency domain bootstrap (transformation-based bootstrap). Chapters 10–12 revisit implementing the block bootstrap method for long-range dependence processes, followed by extremes and heavy-tailed data and ending with a detailed chapter involving various spatial data patterns.

In summary, this book is a well-written, highly technical, and primarily theorem-proof treatment of the various block bootstrap methods for time series and spatial data with a few other approaches sprinkled in. The book's kernel is the compilation of several years of the author's notable work on bootstrap methods for time series and spatial data. Most of the treatments include technical proofs involving the standard properties of interest, such as asymptotic efficiency, consistency, and block length selection. The book does not contain examples using real datasets, examples of computer code for the various methods, or possible homework problems at the end of the chapters. Overall, I would recommend this book as a technical reference to a specialized niche of advanced doctoral students and researchers interested in bootstrap methods for time series and spatial data. The material covered could also be useful as supplemental material for any advanced time series course.

Alan D. HUTSON
State University of New York at Buffalo

Random Number Generation and Monte Carlo Methods (2nd. ed.), by James E. GENTLE, New York: Springer-Verlag, 2003, ISBN 0-387-00178-6, xv + 381 pp., $79.95.

I can do no better than to quote the review of the first edition: "This book represents a valuable contribution to the field of statistical computing for theoretical researchers and applied practitioners alike" (Borkowf 2000). The only difference is that the second edition covers advances since the first edition appeared in 1998, so this second edition is even more valuable than the first. This edition, like the first, is aimed at the graduate level and would be useful for a course on random numbers. It also would serve well for self-tuition. I gave a careful read to the penultimate draft of this edition, and learned a great deal. At that time I informed the author (who was for several years the director of research at IMSL) of my criticisms and some errors that I found, which he duly corrected. The reader will forgive me, therefore, if I neither criticize the book nor report the existence of errors. The chapters have been substantially reorganized, so simply referring the interested reader to the review of the first edition would be of no avail.

Chapter One, "Simulating Random Numbers from a Uniform Distribution" (60 pp.), focuses the bulk of its attention on linear and nonlinear congruential generators and feedback shift register generators. It also addresses "other sources of uniform random numbers" (cellular automate, chaotic systems, etc.), combining generators, independent streams and parallel random number generation, and portability. Chapter Two, "Quality of Random Number Generators" (32 pp.), discusses the desirable properties of random number generators, measures of lack of fit, and empirical assessments. This chapter uses the well-known DIEHARD test suite by Marsaglia to illustrate methods of empirical testing, but correctly points out that the not-so-well-known (for now!) TESTU01 program by L'Ecuyer and Simard (2003) is much more extensive; for example, to run DIEHARD on a 1.8-GHz PC takes a few seconds. The smallest of the TESTU01 suites, called Small Crush, takes several minutes, while the Big Crush suite can take 20–30 hours.

Chapter Three, "Quasirandom Numbers" (8 pp.), defines "low discrepancy" and compares and contrasts the Halton and Sobol sequences. Chapter Four, "Transformations of Uniform Deviates: General Methods" (64 pp.), presents various methods of transformation, including "inverse CDF" and "acceptance/rejection," including the "alias" method and the use of characteristic functions. Chapter Five, "Simulating Random Numbers from Specific Distributions" (52 pp.), lists methods for univariate (e.g., normal, power, gamma) and multivariate (e.g., normal, correlation matrices, points on a sphere) distributions.

Chapter Six, "Generation of Random Samples, Permutations and Stochastic Processes," (12 pp.), considers taking random samples from finite sets, as well as the generation of nonindependent samples and sequences. Chapter Seven, "Monte Carlo Methods" (54 pp.), constitutes a useful primer on a topic to which entire books usually are devoted. Essentially, the purpose of this chapter is to provide the raison d'etre for the other chapters: to show how random numbers are used. To this end, the chapter very briefly touches on a wide range of issues, including evaluation of integrals, variance reduction, bootstrap methods, and evaluation of a posterior distribution.

Chapter Eight, "Software for Random Number Generation" (14 pp.), discusses controlling seeds for Monte Carlo studies and the generation of random numbers in programming languages and in IMSL, as well as in the software packages S-PLUS and R. The RNG facility of R is truly superb. In addition to being fully documented (source code is available), R (Ihaka and Gentleman 1996) offers the user a choice of six uniform generators and five transforms to normality, as well as transforms to many other distributions. R is rapidly updated to reflect the latest in RNG technology. For example, there is an error in the usual Kinderman–Ramage algorithm (Tirler et al. in press), and R (as of v1.7) offers both "buggy Kinderman–Ramage" and "correct Kinderman–Ramage" transformations, whereas other packages still offer (unknowingly) only the buggy version. Moreover, the user is not beholden to the developer's choice of methods, but can call his or her own RNG by linking to compiled code.

Chapter Nine, "Monte Carlo Studies in Statistics" (16 pp.), presents examples of the use of the Monte Carlo method in statistics and includes advice on the design of the experiment and other details. The remainder of the book comprises two appendixes (one on notation and the other on hints and solutions to selected exercises), an extensive list of references, and both author and subject indices. Each chapter concludes with several exercises.

In summary, the first edition of the book was a valuable contribution, and this second edition is even more so.

B. D. MCCULLOUGH
Drexel University

REFERENCES

Borkowf, C. B. (2000), A Review of *Random Number Generation and Monte Carlo Methods*, by James E. Gentle, *Technometrics*, 42, 431–432.

Ihaka, R., and Gentleman, R. (1996), "R: A Language for Data Analysis and Graphics," *Journal of Computational and Graphical Statistics*, 5, 299–314.

L'Ecuyer, P., and Simard, R. (2003), "TESTU01: A Software Libray in ANSI C for Empirical Testing of Random Number Generators," manuscript, University of Montreal, Dept. of Information and Operations Research.

Tirler, G., Dalgaard, P., Hörmann, W., and Leydold J. (in press), "An Error in the Kinderman–Ramage Method and How to Fix It," *Computational Statistics and Data Analysis*.

Data Matters: Conceptual Statistics for a Random World, by Nicholas MAXWELL, Emeryville, CA: Key College Publishing, 2004, ISBN 1-930190-89-1, xiv + 450 pp., $54.95 (softcover).

Data Matters is an introductory statistics text for undergraduates in all disciplines, requiring only high school algebra as a prerequisite. This is not a classic introductory statistics text like that of Moore and McCabe (2002), nor does it attempt to fill this role; rather, it is intended to promote statistical literacy for all students. According to the author, "Every student needs to know enough about statistics to think sensibly about news reports. Some students need to learn enough to read reports in the sciences, and a few need a foundation for further study in statistics." This book serves each of these audiences competently and engagingly.

The first half of the book focuses on categorical data analysis:

Part I: Statistics in the News; Basic Concepts of Statistical Thinking Presented in the Context of Categorical Data:

- Proportions in Samples, Proportions in Populations
- The Pattern in Random Sample Proportions
- Making Inferences
- Testing Locations and Differences of Proportions
- Averages and Other Number Line Statistics in the News.

In this section the author does an excellent job explaining some concepts that we professors of statistics might take for granted: for example, proportions are explained thoroughly, including their relation to raw counts and their interpretation with respect to the population and subpopulations. In contrast to the usual practice of introducing sampling distributions to explain inference from samples, Maxwell starts by demonstrating that samples are representative of the population, and only later introduces inference from properties of samples to population attributes. The examples are from topical, attention-grabbing news stories about, for example, college student binge drinking, Super Bowl viewership, and employment trends. By the end of this section, readers should have an intuitive understanding of sampling, inference, and testing, and they will attain this level of comprehension without seeing a single integral sign.

The second half of the book is concerned with continuous data:

Part II: Statistics in Science; Descriptive and Inferential Statistics for Continuous Data:

- What Sample Data Distribution Reveals About the Population
- Testing Treatments
- Analysis of Variance
- Best Lines
- Tests of Regression.

One-way analysis of variance and simple linear regression are presented, with discussion of their typical uses, the necessary calculations, and the assumptions underlying the validity of estimates and tests. Maxwell makes the distinction between correlational studies and deliberate experiments and clarifies the difference between observing correlation and inferring causation. The effects of violations of assumptions for analysis of variance and regression are explained. Graphical methods to test for these violations are demonstrated, and alternative analysis methods are given in some cases. Common regression diagnostics, such as standardized residuals, leverage point identification, and the PRESS statistic, are not covered.

The book's content seems appropriate for the intended audience, and it is delivered in a lucid and jargon-free style. The topics chosen for the text are treated thoroughly and correctly—Maxwell doesn't try to cover too many topics like so many authors of introductory statistics texts. The sequence of topics is logical and flows well from one chapter to the next. Critical thinking and principles of logic are incorporated effectively throughout the text, somewhat reminiscent of the book by Huff (1954). Although some may think the lack of engineering and scientific examples should preclude the use of this text for more technically-oriented students, I must disagree; the deeply intuitive understanding of important statistical topics that can be obtained by a thoughtful reader is of value to students in any discipline. Even future students of advanced statistics could benefit from reading this text, and Maxwell facilitates their transition to more advanced topics by including "Algebra and Greek Symbols" sections that translate heuristic understanding into standard statistical notation.

The book's pedagogical standards are exceptional. Its layout and organization make the text easy to follow. Word choice and sentence structure are effective for conveying complex concepts to a broad audience. For example, rather than saying that one fails to reject the null hypothesis (convoluted and confusing to most students), or that the null hypothesis is accepted (just plain wrong), Maxwell says that the null hypothesis is "retained" and explains exactly what he means by this terminology. The number and quality of problems are impressive: 530 problems are included, and answers to odd-numbered exercises appear at the end of every section. This is a huge convenience for the instructor and gives the student immediate feedback and reinforcement. No software is required for the text, and the only computer outputs included are graphical. Computer exercises are found at the end of each section, and the publisher intends to provide support for these through a website. (This site was not available for review at the time of this writing.) Other teaching aids available but not reviewed are an instructor manual, instructions for several computer packages, an instructor demonstrations CD, and a test generator.

The book seems free of typographical and technical errors. Some common failings of elementary texts are notably absent; the interpretation given for confidence intervals is technically correct, and the distinction between population parameters and sample statistics is made often and well. Some readers may find an occasional example controversial, but this is part of the reason I would expect this book to be appealing to its undergraduate audience. Other readers may object to Maxwell's characterization of Bayesian statistics—"It is not the dominant thinking in statistics, and William of Occam would not approve of it; it requires complex assumptions and algebra that we won't be using"—but this long-standing disagreement is probably of little concern to students.

My opinion of *Data Matters* is uniformly positive. The choice of topics, the quality of writing and graphics, the attention-grabbing examples, and the copious problem sets all have convinced me that this text will meet its objective