Probability: The Science of Uncertainty, by Michael A. Bean, Pacific Grove, CA: Brooks/Cole, 2001, ISBN 0-534-36603-1, xiii + 448 pp., $87.95.

The author states in the Preface that "this book can be used in a variety of probability courses with a variety of teaching styles." After reviewing this text, I must agree. A Junior/Senior level probability course could be aptly taught from Chapters 1, 3, 4, 5, and 6. In addition, depending on the audience for this course (engineering undergraduate or nonengineering undergraduate), the instructor can tailor the examples and exercises. Within this context, the instructor can choose to use the Chapter 2 examples either piecemeal as the material is covered in detail in later chapters, or up front (which I do not recommend). Chapter 2 contains four very detailed excellent "case studies," but I would recommend using Section 2.1 before Chapter 3, Section 2.2 before Chapter 4, and so forth. The chapter introduces so many concepts so quickly that, at least in an undergraduate course; they would cause more frustration than they would help. Of course, with all the flexibility that this text offers comes a price: An instructor using this text must spend extra time outlining the semester course. In addition, the text's mathematical sophistication is at the paper level for a graduate-level MBA course. In fact, I would highly recommend it for an MBA curriculum, Chapters 9 and 10 in particular would be very useful at that level.

I make some observations by chapter.

Chapter 1: Presents good introduction with the right amount of history and definitions.

Chapter 2: Provides motivational examples, as discussed earlier.

Chapter 3: Covers the usual introductory concepts, but uniquely puts the probability "rules" at the end of the chapter in an appendix. The combinatoric definitions and examples are excellent.

Chapter 4: Gives very good, solid introduction to random variables and probability distributions. Especially noteworthy are the examples of real world mixed distributions. The author introduces bivariate distributions and it then becomes a natural fit for introducing the concept of independent and dependent random variables. One side comment: The proof of characterization property in a special case should have probably been placed in Chapter 4's Appendix.

Chapter 5, Special Discrete Distributions: Introduces the Binomial, Poisson, (but omits the oft quoted $np > 5$ "rule"), Negative Binomial, and Geometric distributions. Included is the relationship among all these distributions, as well as their relationship to their continuous cousins.

Chapter 6, Special Continuous Distributions: Covers the exponential, gamma, Pareto, normal, lognormal, and beta (useful for bounded data). It also covers the lifetime distributions Weibull and uniform (which the author calls DeMoivre). As an illustration of how the author uses examples to further expand the student's knowledge, one of the examples in this chapter shows how Weibull distributed random numbers can be derived from the uniform. This is excellent example since the students will need to be familiar with Monte Carlo methods.

Chapter 7, Transformations of Random Variables: This chapter should be used selectively. The demonstrations should probably be omitted except for very mathematically oriented engineers, as should Jensen's inequality. In addition, Section 7.3 (Insurance Contracts With Caps, Deductibles and Coinsurance) should be used for MBA classes, and Section 7.4 (Life Insurance and Annuity Contracts) and Section 7.5 (Reliability of Systems with Multiple Components or Processes) should be used in all classes. Section 7.6 on trigonometric transformations generally should be omitted.

Chapter 8, Sums and Products of Random Variables: Covers the law of large numbers and the central limit theorem. In an engineering class, the premium determination in insurance should be omitted and a suitable engineering motivating example substituted. Also, the proof of the law of large numbers and the central limit theorem should be omitted.

Chapter 9, Mixtures and Compound Distributions, and Chapter 10, Markowitz Investment Portfolio Selection Model: Should be considered only when the text is being used in an MBA program.

In summary, I believe that this text would be extremely valuable for an MBA course and also could be used at several levels for an undergraduate course. It also would be a valuable addition to the library of any practitioner who uses statistical/probabilistic methods in his or her work.

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Regularized Radial Basis Function Networks: Theory and Applications, by Paul V. Yee and Simon Haykin, New York: Wiley, 2001, ISBN 0-471-35349-3, xvi + 191 pp., $79.95.

In the relatively new field of artificial neural networks, the class of radial basis function networks (RBFNs) has met with considerable success in such applications as nonlinear process estimation and control. But there remains a fundamental gap between the theory and practice of *designing* and *applying* these networks. Designing relates to the question of "how a RBFN should be designed to fulfill a particular task", whereas applying concerns itself with "for which tasks are RBFNs a justifiably good choice."

To answer these questions, this book links the rich theoretical results from nonparametric kernel-based regression estimators to RBFNs. Hence the book serves as a bridge between the two areas of nonparametric kernel estimations and artificial neural networks. It examines their interplay under the principle of regularization. The special vehicle for this study is the regularized strict interpolation RBFN estimator or neural network.

The book comprises six chapters. Chapter 1 provides a theoretical understanding of the strict interpolation RBFN, specifically in terms of how its mean square (MS) consistency can be related to that of the Nadaraya–Waston regression estimator (NWRE), a fundamental kernel-based nonparametric estimator. Regularization in the form of cross-validation and asymptotically optimal regularization parameter sequences plays a pivotal role in linking these two estimators. Chapter 2 briefly discusses how the MS consistency results of Chapter 1 can be used to prove the Bayes risk consistency of the approximate Bayes decision rules formed from regularized strict interpolation RBFN posterior probability estimators. Chapter 3 extends the results of MS consistency of regularized strict interpolation RBFNs to nonlinear autogressive time-series prediction, along with corresponding experimental results on speech prediction. Chapters 4 and 5 continue the theme on nonlinear time series, where regularized strict interpolation FBFNs are applied to the problems of nonlinear state estimation and dynamic reconstruction of chaotic processes. Chapter 6 reviews the results on the relationship between regularized strict interpolation RBFN and NWRE, and discusses positive and negative aspects of the MS approach along with alternative designs of RBFN using deterministic annealing, semi parametric machine learning, and continuous learning in a regularized manner.

The book is well written and states the main idea very clearly throughout. It gives a guided tour of the book at the end of the Introduction, which serves as a basic knowledge needed for the book. At the end of each chapter, a summary and discussion are given. I fully agree with the authors' statement that "in the end, one could say that this book bears two messages: To the ANN [artificial neural network] community, the KRE/NWRE (kernel regression estimator/Nadaraya and Watson regression estimator) theory has much to offer as a guide for justifiable RBFN design under a wide variety of conditions; to the kernel regression community, the extension provided by the presence of the regularization parameter is nontrivial, computationally feasible, and well supported in theory and practice from the PLS (penalized least-squares)/spline smoothing field."

The target audience for this book is researchers, practitioners, and graduate students in engineering and the sciences who are interested in nonparametric estimation and ANNs. Given the book's objectives certain mathematical tools are unavoidable necessities for the book's development. Thus, readers are assumed to have had some exposure to elementary measure, integration, and probability theory.

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Computer Intrusion Detection and Network Monitoring, by David J. Marchette, New York: Springer-Verlag, 2001, ISBN 0-387-95281-0, xvii + 332 pp., $64.95.

The author begins by stating that "Computer networks are a rich source of interesting problems and data for statisticians." My physical sciences background initially left me somewhat skeptical of that claim. To be sure, there are classic problems of traffic intensity, and I have used pattern recognition to identify certain user behaviors. But what else? After reading this book, I now have an answer to that question, and echo the author's claim. I believe that many readers would benefit from the skillful joint development of problem context and statistical application. As a bridge between the computer science and mathematical communities, this book is a fine addition to both the computer science and statistics literature and will likely stimulate valuable research by awakening mathematicians and statisticians to the potential of problems in this area.

The content was developed in response to a request for a course on intrusion detection to be taught through the mathematical sciences department at Johns Hopkins University. The author draws on his extensive experience with this topic through the SHADOW (an intrusion detection system) project at the Naval Surface Warfare Center and builds a comprehensive overview of problems related to network monitoring and intrusion, along with approaches for addressing them. Because the book is intended to be an overview, ample space is given to developing the context of the data so that statisticians with very modest computer science backgrounds will be able to fully appreciate the data structure to which statistical techniques—many of them very recent—are applied.

The book is organized as follows:

Part I, Introduction
1. TCP/IP Networking
2. Network Statistics
3. Evaluation

Part II, Intrusion Detection
4. Network Monitoring
5. Host Monitoring

Part III, Viruses and Other Creatures
6. Computer Viruses and Worms
7. Trojan Programs and Covert Channels

Part I begins with a primer on internet protocols, how information is transferred over a network, and how it may be interpreted as data. It explains how network conversations begin, proceed, and end, essential background to understanding how these conversations can be perturbed for malicious intent, as well as how user data is encapsulated for travel over the network. The role of utilities for gathering data is discussed, including traceroute for mapping packet paths over the network and tcpdump for collecting packets of information for later study. Also addressed are problems related to modeling and graphically depicting network activity. Other topics range from the familiar application of Poisson models to an interesting use of the more recent color histograms to establish clusters of activity. Finally, Part I covers the use of pattern recognition and classification of activity, specifically as an intrusion or not, and discusses some of the difficulties in training classifiers and the relatively poor performance of classifiers to date.

Part II introduces specific types of attacks on networks and hosts (e.g., denial of service in the case of the former and buffer overflow in the case of the latter), along with a discussion of behaviors that often precede attacks, such as network mapping and operating system fingerprinting. These examples are described in some detail to illustrate the importance of signatures to current intrusion detection. Moving beyond signatures, Part II shows the applicability of statistical approaches such as k means clustering, kernel density estimation, and statistical graphics in establishing profiles of normal behaviors over a network or host against which anomalous behaviors will be evident.

Part III finishes with a discussion of viruses and their relatives, including how they can be detected and how they can be defeated. Specifics are given for a few well-known viruses and worms, an approach for modeling propagation, and steganography. Statistical and mathematical opportunities seem a little less direct in this section but are still present.

The reader will appreciate the Further Reading section at the end of each chapter and the appendixes. Sections for further reading include a brief discussion of approximately 15 additional recent papers and texts, on average, for those seeking more details. Appendixes list common port numbers for network services and trojans, country codes, and security-related web sites, as well as an extensive bibliography with more than 275 entries.

This book would be appropriate for an upper-level undergraduate or graduate course in computer science and statistics. It would also be a useful introductory reference for the mathematics and statistics researcher who would like to pursue problems in this area. It is both informative and accessible.

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Statistical Analysis of Extreme Values (2nd ed.), by R.-D. REISS and M. THOMAS, Basel, Switzerland: Birkhäuser-Verlag, 2001, ISBN 3-7643-6487-4, xviii + 443 pp. + CD, $64.95.

This book covers an enormous amount of information on the applications of extreme value theory. It not only addresses standard estimation methods (e.g., maximum likelihood, method of moments) and alternatives of considerable use in extreme value theory (e.g., L-moments, Bayesian estimators), but also takes up questions dealing with outliers, censored data, autocorrelated data, and other very practical problems. It includes an academic version (limited sample sizes) of the authors' software Xtremes, which emphasizes exploratory data analysis using tools such as Q-Q and P-P plots and kernel density estimates with sample distribution, excess, and hazard functions. The final third of the book consists of chapters with other coauthors detailing the application of extreme value theory to flood frequency analysis (with J. R. M. Hosking), actuarial analysis (with M. Radtke), asset pricing (with C. G. de Vries and S. Caserta), and corrosion analysis. New in this second edition are some case studies dealing with topical environmental applications, such as global warming and ozone pollution, as well as additional material on bivariate and multivariate extreme value models, sum-stable distributions, and Bayesian methodologies.

Chapter 1 introduces the types of problems and data that are dealt with by applied extreme value theory as well as the principal statistical models for extreme values and exceedances. The presentation is very well motivated from an applied point of view, but not at all from a mathematical perspective. This is perhaps a refreshing change from the more usual introductions to extreme value theory. However, readers who are unfamiliar with basic results such as those that Resnick (1987) put in his chapter 0—in particular, with uniqueness theorems such as the "convergence to types" theorem (theorem 0.2 in Resnick)—may find this introduction unintuitive, unconvincing, or both. References to more adequate treatments are at best sketchy, consisting largely of references to the original, pre-1950 papers (admirable but not perhaps the place to start).

Chapter 2 introduces the reader to the basic visualization tools and exploratory data analysis methods preferred by the authors and efficiently implemented in Xtremes. Demonstrations using real data are postponed until much later chapters, however. The software disk includes almost 70 datasets, some of which could surely provide more interesting tutorials at this point. The chapter concludes with some material on time series and autocorrelation that should have been postponed until Chapter 6.

Chapter 3 is likewise something of a digression, consisting of a review of statistical estimation methods in the context of familiar models such as the exponential, Gaussian, and Poisson distributions. Thus it is not until Chapter 4 that the authors return to extreme value and associated distributions and to the problems of statistical inference specific to these models and the associated data types. These central chapters (4–7) are reasonably comprehensive and form the core of the book. Chapters 8–10 survey multivariate models, providing little detail. Chapters 11–14 discuss in more detail the applications mentioned earlier.

The computational and applied aspects of the subject are clearly the authors' primary interest, and their software will be useful and intuitive to those already comfortable with menu-driven interfaces. This type of interface is also quite appropriate for their visually based approach to estimation. (The website for the software offers some pointers to alternatives for those who prefer more control over their computational environment). However, potential readers and purchasers of this book should be aware of its limitations, some of which may be the consequence of writing a book around a software program. First, the flip side of the book's wide scope is that the material in many parts is poorly digested. Notation is not always careful, as in the briefly stated version of the Fisher–Tippet theorem on page 18, which includes undefined symbols μ_n and σ_n. The ordering of the material is sometimes bewildering, with new and apparently unrelated topics briefly introduced and as quickly abandoned. Nonidiomatic English and incorrect

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