desire to perpetuate the myth of the .05 significance level, but what is so special about having many degrees of freedom?

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Statistical Challenges in Modern Astronomy, edited by Eric D. FEIGELSON and G. Jogesh BABU, New York: Springer-Verlag, 1992, xxi + 527 pp., $59.

To promote collaborations between astronomers and statisticians, the conference "Statistical Challenges in Modern Astronomy" was held on the campus of Penn State University during the summer of 1991. The proceedings of this conference will be of most value to statisticians and astronomers interested in astrophysical research.

The main themes of the conference were galactic clustering, truncation and censoring, Bayesian and image analysis, time series, and multivariate analysis. Because each theme is so broad, only a selected number of topics are included in the book. Each theme is treated in a separate section. To overcome language barriers, the authors include a glossary of astrophysical and statistical terms. Useful information about relevant journals, meetings, and funding strategies is provided.

The best and longest section is on galaxy clustering and cosmology. The statistical focus is on spatial statistics, stochastic geometry, clustering, and pattern recognition. The truncation and censoring section concerns estimation of luminosity functions, galactic distributions, survival analysis, and detection at the noise limit. Some problems in the survival-analysis approach are identified in the discussion section. In the section on Bayesian and image analysis, there is an interesting paper on image restoration. Unfortunately, restored images are not presented in this section. The section on time series includes papers on spectral analysis and a more speculative paper on chaotic processes in astronomy. The last section, on multivariate analysis, has an interesting paper on cluster analysis and classification.

In most sections, astronomers present review papers on the basic science and current statistical methods. Statisticians then critique the review papers and sometimes offer advice on new directions for statistical work. Although the review articles often skip details, many references are given. Open scientific and statistical questions are often posed. Because both fields are represented by some of its brightest stars, the dialogue between statisticians and astronomers is lively and constructive. In more than one paper, however, conflicting opinions are not resolved. A few papers are based on incorrect statistical assumptions. Most are very good or excellent and provide a foundation for further research and study.

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Handbook of Statistics 9: Computational Statistics, edited by C. R. RAO, Amsterdam: Elsevier, 1993, xix + 1045 pp., $190.

This is the ninth volume in the *Handbook of Statistics* series begun in 1980, originally edited by P. R. Krishnaiah and now edited by C. R. Rao. This volume contains 28 review articles on statistical computing. The articles are divided into seven areas, including general articles on computing apart from statistics, mathematical programming, least squares estimation, general estimation, artificial intelligence, simulation and resampling, and statistical graphics. The articles vary in length from about 10 to 80 pages.

Unlike the earlier volumes in this series, the area of coverage for this book is ill defined. This difficulty is clearly reflected in the topics of the articles. Some, such as "Mathematical Programming—A Computational Perspective," by W. W. Hager, R. Horst, and P. M. Pardalos, and "Algorithms," by B. Kalyanasundaram, put the clear emphasis on the computing end of statistical computing. At the other extreme, articles like "Graphical Methods for Linear Models," by A. S. Hadi, and "Bootstrap Methodology," by G. J. Babu and C. R. Rao, belong in a book on computational statistics only because they give statistical methods that are fairly computationally intensive.

If we take as a definition of statistical computing the collection of computational methods that are used in statistics and the collection of statistical methods that are computationally intensive, then statistical computing becomes such a large area that it is no surprise that this book necessarily falls short of the goal of providing a summary of the entire area. It is not hard to find important areas in statistics that are not represented at all, such as multivariate analysis and time series (although an article on "Graphics for Time Series," by H. J. Newton, is included). The value of a book like this one is therefore in providing high-quality review articles. Given the general availability of the *Current Index to Statistics*, the need for a single comprehensive source of review articles is probably less important that it once was.

I have found the majority of the articles in this book to be of high quality. For example, "Numerical Aspects of Solving Linear Least Squares Problems," by J. L. Barlow, provides a very good overview of this well-studied problem, including references both from the computer science and statistics literatures. When combined with the article "Computing Using the QR Decomposition," by C. R. Goodall, a comprehensive review of the linear least squares problem is available. Other articles are less successful. "The Total Least Squares Problem," by S. Van Huffel and H. Zha, deals with an estimation method that is much more popular among computer scientists than among statisticians. This article fails to make the connections of this methodology to statistics. The authors did not even translate their work into notation that is more familiar to statisticians. The article on "The EM Algorithm" is too brief and does not explore the full power of this important computational method or give adequate references for the reader to move on to other sources.

Another strong point of the book is the inclusion of articles on relatively new topics, such as "Gibbs Sampling," by S. F. Arnold, and "Analysis of Ordered Categorical Data Through Appropriate Sampling," by C. R. Rao and P. M. Caligiuri. In the latter article, I was a bit disappointed by the skimpy references because this would have been a good place to introduce the reader to correspondence analysis and the work exemplified by Gifi (1990).

In summary, I think this book should be included in large lending libraries of statistics because it provides several very good review articles, but the high price of the book should discourage individual purchases. As a general introduction to statistical computing, I would prefer, and recommend, a textbook devoted to this topic that presents a unified notation and approach that is necessarily lacking in a multiauthored book; those of Kennedy and Gentle (1980) and Thisted (1988) come to mind as good choices.

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REFERENCES

Gifi, A. (1990), *Nonlinear Multivariate Analysis*, New York: John Wiley.