is misspelled), Taguchi, and Shainin. The inclusion of Shainin requires a rather broad definition of DOE. Occasionally, the author's enthusiasm for a given technique results in its being oversold. For instance, the disadvantages of Pre-control as a substitute for a control chart are not spelled out. Those interested in this subject should consult Ledolter and Swersey (1997).

On pages 434–439, Shainin's Lot Plot Plan is described and highly recommended. However, no one should use this plan without first reading Craig (1953), in which the weaknesses and faults of Shainin's plan are shown in quantitative detail. Craig discussed the ease of misinterpretation and the plan's frequent failure to produce the desired results.

In a footnote on page 211, the reference to Shewhart's book lists Van Nostrand-Reinhold as the publisher. Presently, this book is available only through ASQ. A compact disk accompanies this book and will be found very useful in carrying out the various statistical calculations.

References

CRAIG, C. C. (1953). "Some remarks concerning the Lot Plot Plan". *Industrial Quality Control* 10, pp. 42–48.

LEDOLTER, J. AND SWERSEY, A. (1997). "An Evaluation of Pre-Control". *Journal of Quality Technology* 29, pp. 163–197.

Semiparametric Regression by David Ruppert, Matt Wand, and Ray Carroll. Cambridge University Press, Cambridge, UK CB2 2RU. 2003. xvi+386 pp. $100 hardback, $45 paperback.

Reviewer: *Thomas P. Ryan,* Acworth, GA 30101.

This book is aimed at various audiences, including students, scientists with only a moderate background in regression, and statistically oriented scientists who are well-versed in linear models. The authors also believe that smoothing experts will find enough new material to captivate their interest. For the most part the book should be quite readable by the intended audiences, although there are some places where theoretical results will have to be taken on faith since they are not derived and the reader is only referred to appropriate references for more information.

Overall, this is a superb book that is a nice mixture of applications, theoretical results, and computer code, with discussion of computing issues where appropriate. (Appendix B is devoted to computational issues and contains a moderate amount of code.) Any state-of-the-art book should contain a large number of references, and I counted 363. The level of the book is mixed, with the early material being at a somewhat low level, but the text picks up speed considerably after Chapter 3. As the title of the book implies, the book features regression models that are partly parametric and partly nonparametric, with the authors using the term "flexible nonlinear regression" in place of nonparametric regression.

The book contains 19 chapters plus two appendix chapters. The first chapter ("Introduction") is essentially a presentation of a few datasets and illustrations of how nonlinearities are present in the datasets, and thus must be appropriately modeled. Chapter 2 is a review of parametric regression. Although this is standard material, it is presented very well and even has a new wrinkle or two. Chapter 3 is an introduction to scatterplot smoothing, with an emphasis on penalized splines. Chapter 4 is on mixed models, which allow the incorporation of random effects. The authors make a statement on page 95 of that chapter that bears repeating: "Prediction is a fundamental problem in statistics, although its treatment in textbooks is overshadowed by estimation." Chapter 5 is on automatic smoothing, which is performed by letting the data guide the smooth, an alternative to the user making the decisions that lead to the smooth. This is presented using various criteria, including cross-validation, generalized cross-validation, and Mallows' C_p criterion. Chapter 6 is on inference, which is necessarily based on approximations, unlike parametric inference.

Although scatterplot smoothing is the easiest to relate to, there is generally more than one predictor involved in a typical application, so to be particularly useful semiparametric modeling must extend beyond two dimensions. The extension begins in Chapter 7, Simple Semiparametric Models, with models in that chapter having one predictor in a nonparametric form and the other predictors in a parametric form. The authors indicate their preferences throughout the book, and give their reasons for doing so. For extending scatterplot smoothing, they state that their preference is penalized spline scatterplot smoothing with a mixed model representation.

Chapter 8 is on additive models, and Chapter 9 is a 7-page chapter on semiparametric mixed models. Chapter 10 is on generalized parametric regression,

which is regression models with non-Gaussian response variables. The chapter is in two parts, with the first being a brief overview of generalized linear models and the second part devoted to generalized linear mixed models. Chapter 11 is a 9-page chapter on generalized additive models (GAMs). The user of GAMs must contend with difficulties with inference, such as hypothesis tests, because exact tests are not available and the authors recommend that users rely on simulation. Chapter 12, Interaction Models, is on the identification of the need for and fitting of interactions in various types of models.

Chapter 13, Bivariate Smoothing, is concerned with modeling interactions between two continuous variables. Chapter 14, Variance Function Estimation, is a 7-page chapter that consists of a brief introduction to heteroscedasticity in smoothing problems and guidance in understanding and adjusting for heteroscedasticity. Chapter 15 is a 7-page chapter on measurement error and Chapter 16 is on Bayesian Semiparametric Regression. Chapter 17 is on spatially adaptive smoothing, and in Chapter 18, Analyses, the authors apply the methods given in the book to a few datasets. In Chapter 19, Epilogue, the authors briefly discuss topics that were not covered in the book due to space considerations. This chapter is followed by two appendix chapters, the first of which is devoted to the essentials of linear algebra that are needed to understand the book, and the other is devoted to computational issues and includes a moderate amount of code.

All books have errors, including printing errors in their initial printing, and I will point out some of the problems that I noticed. One printing snafu was in regard to certain figures, as parts of certain figures are missing in the first printing. For example, the data are missing from Figure 10.1, so all that is shown are the axes. Another error, as indicated at the Errata site for the book, http://stat.tamu.edu/ftp/pub/rjcarroll/rwebook_directory/errata.pdf, is that the matrix $\mathbf{X}$ used in Section 11.4 should actually be $\mathbf{C}$.

There is a terminology matter that almost seems to be part of a trend, but I wish the trend would be reversed. Specifically, many if not most authors seem to use the terms "estimate" and "estimator" interchangeably. For example, in the middle of page 33 there is a reference to an estimate being unbiased. If we restrict the use of the term "estimate" to the numerical value of an estimator, which at least a minority of us would prefer, then we wouldn't speak of an estimate as being unbiased. Another common occurrence in books, including regression books, is to state, as on page 184, that there are 2^k possible subsets of regression models, considering only linear terms, when there are k candidate predictors. We don't have a regression model without at least one predictor, however, so it should be $2^k - 1$.

Minor errors might cause a reader to wonder if there are more substantive errors, such as errors in logic and reasoning, but that is not the case here, at least not as far as I can tell. The authors have long been known for their substantial and very important contributions to regression methodology and such contributions will undoubtedly continue. Readers will simply have to make their own corrections, aided by the Errata website, since a second printing apparently will not be before the end of this year.

The publisher states that "the book is suitable as a textbook...," but there are no chapter exercises. The authors state that "the primary aim of this book is to guide researchers...," and for that purpose I strongly recommend it.

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