Weisberg (1985). Also, very little recent literature (after 1984) is covered (with the exception of Sec. 7.3, which covers radial basis functions). Following Cook and Weisberg (1999, p. 432), the most important idea from the recent literature is that MLR is the study of the conditional distribution of the response variable given the predictors, and this distribution can be visualized with a plot of the fitted values versus the response variable. Texts that do not discuss this plot may be obsolete.

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REFERENCES

Cook, R. D., and Weisberg, S. (1999), *Applied Regression Including Computing and Graphics*, New York: Wiley.
Draper, N. R., and Smith, H. (1998), *Applied Regression Analysis* (3rd ed.), New York: Wiley.
Fox, J. (1997), *Applied Regression Analysis, Linear Models, and Related Methods*, Thousand Oaks, CA: Sage Publications.
Hamilton, L. C. (1992), *Regression With Graphics: A Second Course in Applied Statistics*, Belmont, CA: Wadsworth.
Montgomery, D. C., Peck, E. A., and Vining, G. (2001), *Introduction to Linear Regression Analysis* (3rd ed.), Hoboken, NJ: Wiley.
Neter, J., Kutner, M. H., Nachtsheim, C. J., and Wasserman, W. (1996), *Applied Linear Statistical Models* (4th ed.), Boston: McGraw-Hill.
Weisberg, S. (1985), *Applied Linear Regression* (2nd ed.), New York: Wiley.

Semiparametric Regression, David RUPPERT, M. P. WAND, and R. J. CARROLL, Cambridge, U.K.: Cambridge University Press, 2003, ISBN 0-851-78050-0, xvi + 386 pp., $100.00.

This book is an excellent addition to the growing literature on smoothing. Smoothing or nonparametric regression is a powerful and intuitive tool that has found many areas of application (e.g., Walker and Wright 2002).

Most of the material in the book is based on a novel method for fitting smooth curves. One of the most important points of the book is that this method can be carried out using a mixed model representation. Consequently, the fit and analysis can be done using existing statistical software. The method consists of shrinking the estimators obtained using the truncated basis, which is a simple and intuitive way to fit piecewise linear models. The two main advantages of this method are that (1) it is very intuitive and (2) it can be easily implemented using widely available software. The truncated basis adds one term (column to the X matrix) for each inflection point or knot where a change occurs to the regression regime. The selection of the number of knots and their position determines the smoothness (flexibility) of the curve. The problem is that the regression becomes ill-conditioned even for moderate number of knots. The method discussed in the book uses a ridge regression-type of technique to shrink the estimators associated with the knots and ameliorate the effects of ill-conditioning. The authors show that this procedure is analogous to fitting a mixed model with certain structure. A good part of the book is devoted to the discussion of the mixed-model approach.

The book's chapters and appendices are as follows:

1, Introduction. Motivation of smoothing through several real examples used to illustrate the techniques discussed in the book.
2, Parametric Regression. Basic ideas and techniques of linear and nonlinear regression analysis.
3, Scatterplot Smoothing. Methods to fit smooth curves; smoothers as penalized regression estimators.
4, Mixed Models. Introduction to the fundamental ideas of mixed models; mixed model representation of the smoother obtained with the truncated basis.
5, Automatic Scatterplot Smoothing. Selection of the number and position of knots; how to use restricted maximum likelihood (REML) in the mixed model representation to automatically determine the level of smoothing.
6, Inference. Confidence and prediction bands; discussion of several tests, including testing the adequacy of a parametric model.
7, Simple Semiparametric Models. The issues of additivity and interaction as they apply to smoothers, limited to the smoothing of one continuous predictor.
8, Additive Models. Ideas and issues in fitting additive models that involve the smoothing of multiple regressor; inference and model selection.
9, Semiparametric Mixed Models. Analysis of longitudinal data in which the errors are autocorrelated.
10, Generalized Parametric Regression. Case when the response in not normally distributed; ideas of generalized linear and generalized linear mixed models.
11, Generalized Additive Models. Extension of ideas in the previous chapter to the case of additive terms involving smoothing of regressors.
12, Interaction Models. Fitting additive models when there are interactions among the regressors; focused on interactions between categorical and continuous regressors.
13, Bivariate Smoothing. Smoothing in two dimensions; including tensor product basis, kriging, and radial smoothers.
14, Variance Function Estimation. Methods to deal with heteroscedasticity.
15, Measurement Error. Measurement error in the context of smoothing; procedure based on the EM algorithm.
16, Bayesian Semiparametric Regression. Introduction to Markov chain Monte Carlo methods and how they can be applied to smoothing.
17, Spatially Adaptive Smoothing. Smoothers that allow for varying amounts of smoothing; useful when the variability of the regression regime is not uniform.
18, Analyses. Detailed analyses of some of the examples presented in Chapter 1.
19, Epilogue. Summary and list of omitted topics.
Appendix A, Technical Complements. Basic ideas of matrix algebra and other statistical ideas used in the book.
Appendix B, Computational Issues. Formulas and programs to implement of some of the basic methods in S–PLUS and MATLAB; using S–PLUS and SAS mixed models software and WinBugs for Bayesian estimation.

The authors are authorities in this area and have written a clear and concise text that covers a wide range of topics. The notation is consistent, and the layout of the formulas is clear. The book has a distinct applied focus, with examples illustrating the techniques presented. The graphs are informative, and the list of references is fairly complete and updated. Algorithms for implementing most of the methods are delineated. The website *http://stat.tamu.edu/~carroll/semiregbook/* contains important information related to the book, including the datasets, errata, MATLAB, S–PLUS, SAS, and WinBugs code.

Semiparametric Regression is a valuable reference for anyone interested in the area of smoothing. Some of the chapters are not developed completely and can be used as starting points for research projects. As a text, this book is suitable for masters or doctoral students in statistics or graduate students in any subject area with a strong background in linear models. Students taking a course based on this book will learn very useful techniques and will be able to implement them to solve problems.

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REFERENCE

Walker, E., and Wright, S. P. (2002), "Comparing Curves Using Additive Models," *Journal of Quality Technology*, 34, 118–129.

Nonparametric and Semiparametric Models, Wolfgang HÄRDLE, Marlene MÜLLER, Stefan SPERLICH, and Axel WERWATZ, Berlin: Springer-Verlag, 2004, ISBN 3-540-20722-8, xxvii + 299 pp., $89.95.

This book, part of the Springer Series in Statistics, is a detailed, mathematical presentation of smoothing techniques that statisticians can apply when using a nonparametric approach to estimating a probability density and when using