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Nonparametric regression and generalized linear models: a roughness penalty approach.
(English) [Zbl 0832.62032](#)

[Monographs on Statistics and Applied Probability](#). 58. London: Chapman & Hall. xii, 182 p. (1994).

This monograph deals with the application of the roughness penalty method to problems in regression and related fields and it shows how this method provides a unifying approach to a wide range of smoothing problems. The authors start with the description of the basic ideas of the roughness penalty approach, they explain the role of cubic splines in interpolation and nonparametric regression and discuss such topics as the choice of the smoothing parameter, the equivalent kernel method, the philosophical basis of roughness penalties and nonparametric Bayesian calibration.

The main theme of this book is to show the applicability of the roughness penalty approach to semiparametric modelling, a simple application of this method to multiple regression is considered. Furthermore, the authors set out ways in which roughness penalty methods can be applied in the broader context of generalized linear models. It is explained how this method allows assumptions to be relaxed and how this leads to nonparametric GLMs.

The emphasis throughout is methodological rather than theoretical and concentrates on statistical and computational issues. Real data examples are used to illustrate the various methods. Some publicly available software is also discussed. The mathematical treatment is intended to be largely selfcontained, and depends mainly on simple algebra and calculus.

This monograph will be useful both as a reference work for research and applied statisticians and as a text for graduate students.

Reviewer: [H.Liero \(Potsdam\)](#)

MSC:

[62G07](#) Density estimation

[62J12](#) Generalized linear models (logistic models)

[62-02](#) Research exposition (monographs, survey articles) pertaining to statistics

Cited in **428** Documents

Keywords:

spline estimation; roughness penalty method; cubic splines; interpolation; nonparametric regression; smoothing; kernel method; nonparametric Bayesian calibration; semiparametric modelling; multiple regression; software