Preface

When the first edition was published a decade ago, I wrote in the Preface:

> Remaining on my wish list are (i) polished, user-friendly software tools for density estimation and hazard estimation, (ii) fast computation via approximate solutions of penalized likelihood problems, and (iii) handling of parametric random effects such as those appearing in longitudinal models and hazard models with frailty.

I am happy to report that the wishes have been fulfilled, plus some more, and it is time to present an updated treatise on smoothing methods with roughness penalties.

The developments of software tools embodied in an R package `gss` have gone a long way in the past decade, with the user-interface polished, functionality expanded, and/or numerical efficiency improved from release to release. The primary objective of this new edition is to introduce extensive software illustrations to complement the theoretical and methodological discussions, so the reader not only can read about the methods but also can use them in everyday data analysis.

Newly developed theoretical, methodological, and computational techniques are integrated in a few new chapters and new sections, along with some previously omitted entries; due modifications are made in related chapters and sections to maintain coherence. Empirical studies are expanded, reorganized, and mostly rerun using the latest software.

Two appendices are also added. One appendix outlines the overall design of the R package `gss`. The other presents some conceptual critiques on a few issues concerning smoothing methods at large, which are potentially controversial.

Much of the new materials that went into this edition were taken from or inspired by collaborations or communications with Pang Du, Anouschka Foltz, Chun Han, Young-Ju Kim, Yi Lin, Ping Ma, Christophe Pouzat, Jingyuan Wang, and Tonglin Zhang, to whom I owe thanks. I can not thank enough the R Core Team, for creating and maintaining a most enjoyable platform for statistical computing.

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August 2011