Preface

The aim of this book is two-pronged. It addresses two different groups of readers. The one is more theoretically oriented, interested in the mathematics of smoothing techniques. The other comprises statisticians leaning more towards applied aspects of a new methodology. Since with this book I want to address both sides, this duality is also in the title: Smoothing techniques are presented both in theory and in a modern computing environment on a workstation, namely the new S. I hope to satisfy both groups of interests by an almost parallel development of theory and practice in S.

It is my belief that this monograph can be read at different levels. In particular it can be used in undergraduate teaching since most of it is at the introductory level. I wanted to offer a text that provides a nontechnical introduction to the area of nonparametric density and regression function estimation. However, a statistician more trained in parametric statistics will find many bridges between the two apparently different worlds presented here. Students interested in application of the methods may employ the included S code for the estimators and techniques shown. In particular, I have put emphasis on the computational aspects of the algorithms.

Smoothing in high dimensions confronts the problem of data sparseness. A principal feature of smoothing, the averaging of data points in a prescribed neighborhood, is not really practicable in dimensions greater than three if we just have 100 data points. Additive models guide a way out of this dilemma but require for their interactiveness and recursiveness highly effective algorithms. For this purpose, the method of WARPing is described in great detail. WARPing does not mean that the data are warped. Rather, it is an abbreviation of Weighted Averaging using Rounded Points. This technique is based on discretizing the data first into a finite grid of bins and then smoothing the binned data. The computational effectiveness lies in the fact that now the smoothing (weighted averaging) is performed on a much smaller number of (rounded) data points.

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Louvain-La-Neuve, January 1990 Wolfgang Härdle