The Craft of Generalized Linear Smoothing using P-Splines

Brian D. Marx
Department of Experimental Statistics
Louisiana State University

Abstract

In this student-oriented instructional seminar, I describe in detail the basics and implementation of P-splines for practical applications within the generalized linear model. More specifically, P-splines are a combination of regression on a B-spline basis and difference penalties (on the B-spline coefficients), and – in short – P-splines can be extended to non-normal data, like counts or a binomial response. The penalized regression framework makes it straightforward to transplant most ideas from generalized linear models to P-spline smoothing. A variety of applications are presented, including Poisson, binomial, and density estimation.