

Title: Degrees of Freedom Tests for Smoothing Splines

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Abstract:

When using smoothing splines to estimate a function, the user faces the problem of choosing the smoothing parameter. Several techniques are available to select this parameter according to certain optimality criteria. This involves solving an optimization problem. Here, we choose a different point view and we propose a technique to choose between two alternatives (e.g. allowing for two different levels of degrees of freedom). The problem is addressed in the framework of a mixed-effects model, a likelihood-ratio-type test statistic is proposed, and its distribution is derived. A test of linearity follows directly. We then extend this idea to additive models where it provides a more attractive alternative than multiparameter optimization. Examples on real data and a simulation study complete the article.