

Local Polynomial and Penalized Trigonometric Series Regression

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Abstract

We investigate the connections between local polynomial regression, mixed models, and penalized trigonometric series regression. Expressing local polynomial regression in a projection framework, we derive equivalent kernels for both the interior and boundary points. For interior points, it is shown that the asymptotic bias decreases as the order of polynomial increases. Then we show that, under some conditions, the local polynomial projection approach admits an equivalent mixed model formulation where the fixed effects part includes the polynomial functions. The random effects part in the representation is shown to be the trigonometric series asymptotically. The connections are extended to partial linear models and additive models. These results suggest a new smoothing approach using a combination of unpenalized polynomials and penalized trigonometric functions. We illustrate the potential usefulness of the new approach with real data analysis.

Keywords: Additive model, ANOVA decomposition, Equivalent kernel, mixed model, Partial linear model, Projection, Varying coefficient model

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