

## Smooth backfitting in additive inverse regression

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**Abstract** We consider the problem of estimating an additive regression function in an inverse regression model with a convolution type operator. A smooth backfitting procedure is developed and asymptotic normality of the resulting estimator is established. Compared to other methods for the estimation in additive models the new approach neither requires observations on a regular grid nor the estimation of the joint density of the predictor. It is also demonstrated by means of a simulation study that the backfitting estimator outperforms the marginal integration method at least by a factor of two with respect to the integrated mean squared error criterion. The methodology is illustrated by a problem of live cell imaging in fluorescence microscopy.

**Keywords** Inverse regression · Additive models · Curse of dimensionality · Smooth backfitting

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