



Regularized nonlinear regression with dependent errors and its application to a biomechanical model

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Abstract

A biomechanical model often requires parameter estimation and selection in a known but complicated nonlinear function. Motivated by observing that the data from a head-neck position tracking system, one of biomechanical models, show multiplicative time-dependent errors, we develop a modified penalized weighted least squares estimator. The proposed method can be also applied to a model with possible non-zero mean time-dependent additive errors. Asymptotic properties of the proposed estimator are investigated under mild conditions on a weight matrix and the error process. A simulation study demonstrates that the proposed estimation works well in both parameter estimation and selection with time-dependent error. The analysis and comparison with an existing method for head-neck position tracking data show better performance of the proposed method in terms of the variance accounted for.

Keywords Nonlinear regression · Temporal dependence · Multiplicative error · Local consistency and oracle property

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