On partial least squares estimation in functional regression models

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Abstract

Scalar-on-function regression, where the response is scalar-valued and predictor consists of random functions, is one of the most important tools for exploring the relationship between the response and predictor. For estimating the regression coefficient function, the functional partial least squares method produces improved estimation accuracy compared to other existing methods, such as least squares, maximum likelihood, and maximum penalized likelihood. The functional partial least squares method is often based on either SIMPLS or NIPALS algorithm. These algorithms can be computationally slow for analyzing a large dataset. By re-orthogonalizing score and loading vectors, we introduce a modified functional partial least squares method to estimate the regression coefficient function under the scalar-on-function framework efficiently. The finite-sample performance and computational speed are evaluated using a series of Monte Carlo simulation studies and a chemometric dataset.

Keywords

Basis expansion; Orthogonalization; Scalar-on-function regression.

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