

基于样条变换的PLS回归的非线性结构分析

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收稿日期 2004-5-31 修回日期 2006-5-12 网络版发布日期 2008-3-27 接受日期

摘要 基于样条变换的PLS非线性回归模型既吸取了样条函数分段拟合以适应任意曲线连续变化的优点,又借鉴了偏最小二乘回归方法能够有效解决自变量集合高度相关的技术.针对多元加法模型,从理论和仿真试验的角度分别验证了,对于多个独立自变量对单因变量为非线性关系的数据系统,基于样条变换的PLS回归方法不仅能够有效实现自变量对因变量的整体预测,而且能够提取各维自变量对因变量的单独非线性作用特征,从而确定数据系统内部的复杂非线性结构关系,增强了模型的可解释性.

关键词 [样条函数](#),[偏最小二乘回归](#),[非线性](#),[特征提取](#),[结构分析](#).

分类号 [62-07](#), [62J02](#)

Nonlinear Structure Analysis with Partial Least-Squares Regression Based on Spline Transformation

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Abstract Nonlinear Partial Least-Squares Regression Model based on Spline Transformation not only takes advantages of the characters of spline functions which can locally fit continuous curves properly, but also brings in Partial Least-Squares Regression Method which can effectively solve the problem of high correlations in the set of independent variables. In this paper, according to additive modeling methods both in theory and simulation, it is proven that Nonlinear Partial Least-Squares Regression Method based on Spline Transformation can not only get the exact whole forecasting model, but also successfully extract nonlinear features of each independent variable's effect on the dependent variable when dealing with nonlinear data systems with multi-absolute independent variables for one dependent variable. In this way, acquire the complex nonlinear structures of the data system and an explainable model can be acquired.

Key words [Spline functions](#), [partial least-squares regression](#), [nonlinear](#), [feature extraction](#), [structure analysis](#).

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