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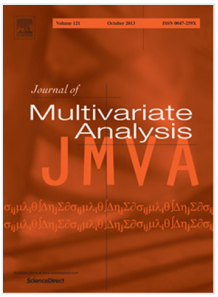

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Generalized Linear Latent Models for Multivariate Longitudinal Measurements Mixed with Hidden Markov Models☆

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Abstract

This article presents a generalized linear latent variable model for analyzing multivariate longitudinal data within the hidden Markov model framework. The relationships among multiple items are captured by several common latent factors. The linear coregionalization method is adopted to model the temporal processes of latent variables. The merit of this modeling strategy lies in the fact that the processes among latent variables are nonseparate and codependent from each other. To account for possible heterogeneity and interrelationship among the longitudinal data, a hidden Markov model is introduced to model the transition probabilities across different latent states over time. The Monte Carlo expectation conditional maximization (MCECM) algorithm is developed to estimate unknown parameters in the proposed model. The Wald- and score-type statistics are proposed to test the related dependence of processes. A simulation study is conducted to investigate the performance of the proposed methodology. An example from a longitudinal study of cocaine use is taken to illustrate the proposed methodology.

Keywords: Generalized linear latent variable model, hidden Markov model, linear coregionalization mold, MCECM algorithm

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