A Moving Average Cholesky Factor Model in Covariance Modeling for Longitudinal Data

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We propose new regression models for parameterising covariance structures in longitudinal data analysis. Using a novel Cholesky factor, the entries in this decomposition have a moving average and log innovation interpretation and are modeled as linear functions of covariates. We propose efficient maximum likelihood estimates for joint mean-covariance analysis based on this decomposition and derive the asymptotic distributions of the coefficient estimates. Furthermore, we study a local search algorithm, computationally more efficient than traditional all subset selection, based on BIC for model selection, and show its model selection consistency. Thus, a key conjecture made by Pan and MacKenzie (2003) is verified. We demonstrate the finite-sample performance of the proposed method via analysis of the data on CD4 trajectories and through simulations.