

Joint mean-covariance modelling and its R package: jmcm

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Abstract

Longitudinal studies are commonly arising in various fields such as psychology, social science, economics and medical research, etc. It is of great importance to understand the dynamics in the mean function, covariance and/or correlation matrices of repeated measurements. However, the high-dimensionality (HD) and positive-definiteness (PD) constraints are two major stumbling blocks in modelling of covariance and correlation matrices. It is evident that Cholesky-type decomposition based methods are effective in dealing with HD and PD problems, but those methods were not implemented in statistical software yet, causing a difficulty for practitioners to use. In this talk, three Cholesky decomposition based methods for joint modelling of mean and covariance structures, namely Modified Cholesky decomposition (MCD), Alternative Cholesky decomposition (ACD) and Hyperpherical parameterization of Cholesky factor (HPC), will be introduced first. The newly developed R package jmcm which includes the MCD, ACD and HPC methods will then be introduced. Demonstration will be made by running the package jmcm and comparison of those methods will be made through analyzing two real data sets.

Keywords

Cholesky decomposition based methods, Covariance matrix, covariance models, R package.