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Robust Inference for Generalized Multivariate Analysis of Variance (GMANOVA) Models

Existing methods for estimating the parameters of the Growth Curve Model (GCM), which is a special case of Generalized Multivariate Analysis of Variance (GMANOVA) models, assume that the underlying distribution for the error terms is multivariate normal. In practical situations, however, we often come across skewed longitudinal data. Simulation studies show that existing normal-based estimators are sensitive to the presence of skewness in the data, where estimators are associated with increased bias and mean square error (MSE), when the normality assumption is violated. In this presentation, we will consider the GCM under multivariate skew normal (MSN) distribution, where the estimators are derived using the expectation maximization (EM) algorithm. We will also present an extension, where the extended growth curve model (EGCM) is used for clustered longitudinal data. We will discuss an extension of the Newton Raphson algorithm, which was used in developing the Restricted Expectation Maximization (REM) algorithm to derive estimators for the EGCM under MSN distribution. We will provide results from a simulation study and illustrate an application using real data sets.