A Mixed Effects Transformation Model with Application to Horse Racing Prediction

by
Ming Gao Gu
Department of Statistics
The Chinese University of Hong Kong
Hong Kong
minggao@cuhk.edu.hk

Abstract

Mixed effects models provide a flexible and powerful tool for the analysis of grouped or clustered data in that they have good parsimony property in describing the within-group correlations and between-group heterogeneity. Therefore, they have been widely used in biostatistics, population pharmacokinetics and pharmacodynamics, and financial areas such as portfolio credit risk (McNeil and Wendin 2007), Actuarial statistics (Antonio and Beirlant 2007), among others. We formulate the mixed effects general transformation models, i.e. general transformation models incorporating both fixed and random effects. Rank-based marginal likelihood estimation is proposed. The estimation procedure is baseline-free, a good property enjoyed by the Cox partial likelihood. A three-stage Monte Carlo stochastic approximation algorithm is developed to find the maximum marginal likelihood estimation (MMLE). The asymptotic normality is obtained via a discretization method. Monte Carlo simulation shows that the MMLE also has a good small to moderate-sample behaviour. We illustrate the proposed method in an anaylsis of Hong Kong horse racing data.

This is joint work with Zhongxin Ni.