

Use of Pseudo-Likelihood Approach in Longitudinal Educational Surveys

Zhi-Hui Fu*

Shenyang Normal University, Shenyang, China fuzhihui2001@163.com

Multidimensional item response theory (MIRT) models can be applied to longitudinal educational surveys where a group of individuals are administered different tests over time. However, computational problems typically arise as the dimension of the latent variables increases. This is especially true when the latent variable distribution cannot be integrated out analytically, as with MIRT models for the data collected from the mixed-type tests, which composed of both dichotomous and polytomous items. Based on the pseudo-likelihood theory, this presentation will describe a pairwise modeling strategy to estimate item and population parameters in longitudinal studies. The pairwise method effectively reduces the dimensionality of the problem and hence is applicable to longitudinal IRT data with high-dimensional latent variables, which are challenging for classical methods. At last, we proposed the Pairwise EM (PEM) algorithm, and proved this algorithm has the ascent property similar to the EM algorithm in that the pairwise likelihood is nondecreasing.

Key Words: Expectation-maximization algorithm, mixed-type test, multidimensional item response theory, pairwise modeling