Random-Effect DIF Analysis via Hierarchical Generalized Linear Modeling

Akihito Kamata
Florida State University, 307 Stone Building, Tallahassee, FL 32306-4453, U.S.A.,
e-mail: kamata@coe.fsu.edu

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Abstract

When differential item functioning (DIF) is present, there is a possibility that the magnitude of the DIF varies across groups, such as schools and communities. If this is the case, one will be interested in knowing the magnitude of the DIF variation and why such a variation exists. A variation in DIF magnitude could be explained by the variation of group characteristics. For example, the magnitude of the DIF for a specific test item might be different between urban and suburban schools. This type of information will suggest what may be causing DIF, in addition to pointing out the existence of DIF. This study suggests a model that allows one to estimate the variation of DIF, while DIF parameter is treated as a random effect in the framework of hierarchical generalized linear model (HGLM) (Raudenbush, 1995; Raudenbush & Bryk, 2002). Some studies have successfully modeled DIF in the framework of the HGLM (e.g., Luppescu, 2002; Chu, 2002). This study extends their models by further allowing one to estimate the variance of DIF across group units and examine group characteristic variables that may explain such variations. This model also allows one to estimate DIF for each group unit by empirical Bayes estimator.

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