A Generalized Multi-Detectors Combination Approach for Differential Item Functioning Detection

Shan HUANG1 and Hidetoki Ishii2

1Affiliation not available
2Department of Psychology and Human Developmental Sciences Graduate School of Education and Human Development Nagoya University

August 29, 2023

Abstract
To achieve more accurate and robust Differential Item Functioning (DIF) detection, this study introduces a novel approach called Multi-Detectors Combination (MDC). The main innovation of the MDC approach lies in effectively integrating multiple existing single DIF detection methods under observable examination conditions. Four specific supervised learning methods (LR, NB, TAN, and SVM) in MDC are evaluated using simulated data (360 testing conditions). The results indicate that MDC methods outperform single DIF detection in accuracy (AUC: 81.2% to 82.3%), surpassing the AUC values of other methods, which ranged only from 59.4% to 77.4%. Among MDC methods, TAN performed the best, under all observable test conditions. Moreover, MDC methods demonstrate enhanced precision (RMSE: 0.528 to 0.531) in ability estimation. Analysis of actual data further validates the MDC approach’s superior stability in ability estimation, achieved by excluding flagged DIF items.

Hosted file