A New Bias Correction Method for the DIMTEST Procedure

by

Amy G. Froelich
Iowa State University

and

William F. Stout
University of Illinois, Urbana

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ABSTRACT

Developed by Stout (1987), DIMTEST is a nonparametric procedure that provides a hypothesis test of unidimensionality for a test data set. A new bias correction method for the DIMTEST procedure based on the nonparametric IRT parametric bootstrap method is presented. Using a specified examinee ability distribution and nonparametric item response function estimates for each test item, a second test data set is generated under the assumption of unidimensionality. The DIMTEST statistic calculated from this generated data set serves to correct for the bias present in the DIMTEST statistic calculated using the original data set. Using results from both Stout (1987) and Douglas (1997), the new DIMTEST procedure is shown to have an asymptotically standard normal distribution under fairly general regularity conditions and assumptions as both the number of items and the number of examinees tends to infinity. A Monte-Carlo simulation study shows this new version of the DIMTEST procedure has an average Type I error rate slightly below the nominal rate of $\alpha = 0.05$ and very high power to detect multidimensionality in a variety of realistic multidimensional models.