<u>Bootstrap-based Standard Error for DETECT</u>

EunYoung Lim
Department of Educational Psychology
University of Illinois at Urbana-Champaign

Louis Roussos
Measured Progress

Bootstrap-based Standard Error for DETECT

The purpose of this research is to develop and evaluate a method to estimate standard errors for statistics provided by the DETECT nonparametric dimensionality estimation procedure. The current version of DETECT does not provide standard errors for the DETECT estimator, IDN index, or Ratio *r*, which limits the usefulness of these statistics, especially for applications with small to moderate sample sizes. In this study, a bootstrap re-sampling approach is applied, and a simulation study is carried out to evaluate the standard error estimator. The estimated standard error is compared to the standard deviation of the DETECT statistics over multiple independent simulated trials, for both unidimensional and multidimensional simulation models.

A simulation study was conducted to evaluate the proposed standard error estimator. The simulation models (of item parameters, ability distributions, and dimensionality structures) will be based on those used by Roussos and Ozbek (2006), who calculated the DETECT population parameter and compared it to the empirically determined (through very large sample sizes) DETECT estimator for a variety of unidimensional and multidimensional models. Using this particular choice of models (including a variety of test lengths, correlations, dimensionality structures, and items per dimension), we can also see from the results of Roussos and Ozbek the value of the true DETECT population parameter, which we can compare with the mean of the DETECT estimator over the multiple simulation trials, adding another dimension (pardon the pun) to our study.