

Conditional Scores of DETECT

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Abstract

DETECT (Zhang & Stout, 1999a, 1999b) is a nonparametric procedure that determines the latent dimensional structure of a test of dichotomous items, based on conditional covariances between the items. In estimating the DETECT index, the conditional score to compute conditional covariances plays a critical role and it directly affects the precision of what the procedure yields. Currently two methods are available to compute conditional covariances with bias corrections: (a) Kim (1994) proposed computing covariances conditional upon the total score of the remaining items and centered with respect to the average covariance of all item pairs; (b) Zhang and Stout (1999b) proposed taking the average of conditional covariances based on the total score of the test and the total score of remaining items on the test.

There are clearly other ways of choosing the conditional score in computing conditional covariances. The present study investigates the effectiveness of six different conditional scores on the performance of DETECT. Namely, three different conditional scores are considered: the total score of the test, the total score of the remaining items, and the average of the two. Each of these scores will be centered and uncentered, thus producing six ways of computing the DETECT index. These six indices will be compared based on simulated one- and two-dimensional data with respect to the value of multidimensionality index, and the correct classification of items into clusters.

References

Kim, H. R. (1994). *New techniques for the dimensionality assessment of standardized test data*. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.

Zhang, J., & Stout, W. F.(1999a). Conditional Covariance structure of generalized compensatory multidimensional items. *Psychometrika*, 64, 129-152.

Zhang, J., & Stout, W. F.(1999b). The theoretical DETECT index of dimensionality and its application to approximate simple structure. *Psychometrika*, 64, 213-249.