Linear Models for Optimal Test Design

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August 28, 2004

Abstract

The topic of optimal test design, introduced by Birnbaum in his contributions to Lord and Novick (1968), has been a prolific topic of research, particularly since successful attempts to formulate optimal test design problems as problems of mixed integer programming (MIP) in the mid 1980s. Problems that can be solved routinely using MIP are IRT-based test assembly with targets for the test information function, classical test assembly with optimization of test reliability or validity, assembly of tests to meet an observed-score for a previous test (=observed-score preequating), item matching, simultaneous assembly of multiple tests, such as sets of parallel tests, pretest-posttests, and for a multistage testing system, as well as multidimensional tests. The same methodology can be used to assemble tests from pools of items organized as sets around common stimuli, select adaptive tests to elaborate systems of content specifications, and design and manage item pools.

In this presentation, I will introduce the basic ideas of optimal test design and review a selection of its current applications to testing problems taken from a new book with the same title as this presentation to be published by Springer-Verlag later this year.