Samejima's Continuous Response Model for Item Response Time

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Item Response Model, Continuous Response Model, Item Response Time

Abstract

For years, the absence of practical method of data collection has hindered the full use of response time in ability testing. However, the advent of computer-based testing has provided an efficient way of collecting the actual responses to the items along with response times. With the availability of this type of data, a model that addresses both the power and speededness aspects of test is in order.

The primary objective of this research is to propose an item response model that incorporates both the binary response and the response time. The model is made up of two parts, one that pertains to the correctness or accuracy of the response and another, the response time. For this paper, the two-parameter logistic model is used to model correctness of the response. The model for continuous response proposed by Samejima (1973) is used in modeling the time it takes examinees to respond correctly to items. However, instead of the normal ogive, the logistic function is used in its placed. Also, in this model, only response times to items answered correctly will be used is estimating time-related parameters. Although this would result in fewer observations, this approach will make the interpretation of processing speed more straightforward instead of being confounded by other strategies such as rapid-guessing particularly for items located near the end of the test. Parameters will be estimated using EM algorithm.

References

Samejima, F. (1973). Homogeneous case of the continuous response model. *Psychometrika*, 38, 203-219.