COLLOQUIUM

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Bayesian Analysis of Dynamic Item Response Models

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Abstract

Item response theory models, also called latent trait models, are widely used in measurement testing to model the latent ability/trait of individuals. When there are repeated observations available for individuals through time, a dynamic structure for the latent ability/trait needs to be incorporated into the model to accommodate changes in ability. Other complications that often arise in such settings include a violation of the common assumption that test results are conditionally independent, given ability/trait and item difficulty, and that test item difficulties may be partially specified, but subject to uncertainty. Focusing on time series dichotomous response data, a new class of state space models, called Dynamic Item Response models is proposed. The models can be applied either retrospectively to the full data or on-line, in cases where real-time prediction is needed. The models are studied through simulated examples and applied to a large collection of reading test data obtained from MetaMetrics, Inc.

This is based on joint work with James O. Berger and Donald S. Burdick.

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