

## **STATISTICAL METHODS FOR THE DETECTION OF ITEM PREKNOWLEDGE IN EDUCATIONAL TESTING**

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**Abstract:** In standardized educational testing, items are repeatedly used. It is possible that some items get leaked after their exposure in a few test administrations, and some test takers obtain access to the leaked items and gain advantage in future tests. In this talk, we propose statistical models and methods for the detection of item preknowledge in educational tests. We consider two different settings: (1) The detection of leaked items and test takers with preknowledge based on item responses and response times from a single test, and (2) the online detection of leaked items based on sequentially corrected data. We view the first problem as a two-way outlier detection problem for multivariate data and proposed a latent variable model to detect the two-way outliers. We view the second problem as a multi-stream change detection problem and proposed a compound decision theory for the quick sequential detection of changed streams. The proposed methods showed superior performance under real and simulated settings.