PhD scholarship in Methodology and Statistics

Detecting multidimensionality in polytomous items: Nonparametric IRT or nonlinear component analysis?

Project

At the Department Statistics and Data Analysis (Faculty of Behavioral and Social Sciences, University of Groningen) there is a scholarships available in the area of psychometrics and statistics for a PhD project entitled 'Detecting multidimensionality in polytomous items: Nonparametric IRT or nonlinear component analysis?'

Requirements

Applicants are invited for a PhD scholarship in methodology and statistics at the Department Statistics and Data Analysis. As a PhD you will do a literature search, examine and develop psychometric models, and apply the methods to empirical data. The PhD will present papers at conferences and write papers for international journals to be included in a PhD dissertation. The scholarships will be awarded for four years. We are looking for a non-Dutch candidate with a thorough knowledge of statistics, statistical modelling and programming; and a demonstrable interest in research methods, psychometrics, and/or econometrics. The candidate has a master degree in a relevant subject, is ambitious, is able to work independently, and is willing to cooperate closely with fellow researchers. Also, the candidate has to speak and write in English at a level that is sufficient for conducting and reporting on scientific research. Knowledge of Dutch is an advantage but not a prerequisite.

Project description

Tests and questionnaires are popular instruments to measure individuals with respect to their abilities, traits or attitudes. Such measurements can be highly relevant in many settings like in job applicant selection, school selection, and diagnosing for medical or psychological treatment. To warrant their use, it is essential to have measurements of good quality. In building a test or questionnaire, nonparametric item response theory (NIRT) based modeling is an important tool to assess the properties of the items that make up the test or questionnaire. Abilities, traits, or attitudes are features that are not directly observable, and are generally denoted by the term latent trait. Conceptually, measurements are easiest to interpret when they convey a single latent trait. Therefore, in evaluating a test or questionnaire, it is important to assess whether the items under study measure a single latent trait, or multiple latent traits. To this end, two main NIRT approaches can be used, namely Mokken Scale analysis for polytomous items, and procedures based on conditional covariances, like HCA/CCPROX. For the special case of dichotomous items, the effectiveness of those methods has been compared using simulation studies. It is less known that nonlinear principal component analysis (nonlinear PCA; e.g., Gifi, 1990) can be used as an alternative to assess the dimensionality of test scores. Especially in the case of polytomous items, this approach is a promising alternative to a NIRT approach. The central question in this project is how successful the various NIRT approaches and nonlinear PCA approaches are in detecting the dimensionality of polytomous test scores. To this end, the various approaches will be compared theoretically and on the basis of simulation studies and empirical data analyses. Depending on the results, existing approaches may be improved by combining attractive features of various approaches. The ultimate goal is to provide insight into the best approaches in empirical research practice.

For further information please contact
Dr. Marieke Timmerman (m.e.timmerman@rugnl; tel. 0031 50 3636255) or

Prof. dr. Rob Meijer (r.r.meijer@rug.nl; tel. 0031 50 3636339)

The closing date for applications is August 1, 2008.

Your application, including a curriculum vitae should be submitted to

Prof. dr. Rob Meijer
r.r.meijer@rug.nl or
Heymans Heymans Institute for Psychology, DPMG
Grote Kruisstraat 2/1, 9712TS Groningen
The Netherlands