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PhD Project:

Methodical and practical issues of Cognitive Diagnosis Models

In educational tests, in the recent years, there has been an increasing international interest in fine-grained diagnostic inferences on multiple skills, i.e. latent cognitive criteria, such as reading comprehension, mathematical or non-verbal abilities. Diagnostic Models, such as Cognitive Diagnosis Models (CDMs; e.g. Rupp et al., 2010), provide detailed information at a fine-grained level that can be used for developing targeted learning aids.

Concerning CDMs, in my dissertation project the following methodological questions and topics are involved:

- Building the R-Package (R Development Core Team, 2011) "CDM" for estimation and simulation of CDMs.
- To what extent are CDMs and skill-based Knowledge Space Theory (KST; e.g. Doignon and Falmagne, 1999) models comparable? What are the methodological advantages and disadvantages of both approaches?
- Are good (unbiased) estimations in CDMs connected with special structures of the Q-Matrix?
- In how far are the generalized DINA (G-DINA; de la Torre, 2011) and the DINA model connected? This work should mainly examine the misclassification rate in both models.
- What are the respective capabilities of CDMs and multivariate Item Response Models (IRM, e.g. Baker & Kim, 2004) concerning research goals and specific applications?

Some practical questions are the following:

- In the PIRLS-Study, which reading skills are possessed with which probabilities? Does the analysis of the study with CDMs give some basic information about the acquisition of reading skills?
- Is it possible to model the Austrian educational standards test in mathematics within the CDM G-DINA framework? Which mathematical skills do Austrian pupils possess??

Curriculum Vitae:

8/1991 - 6/1995	Primary School Grundschule Witten Rüdighausen
8/1995 - 6/2004	Secondary School Albert-Martmöller Gymnasium, Witten
10/2004 – 10/2010	Technical University of Dortmund Studies in Statistics with minor in Psychology Diploma Thesis: <i>"Diagnostic knowledge structure and cognitive diagnosis models: A review and comparison"</i> 10/2006 - 3/2010 Research and Teaching Assistant at the Chair for Statistics in Biosciences, Department of Statistics, TU Dortmund 10/2009 - 9/2010 Research and Teaching Assistant at the Chair for Statistics in Social Sciences, Department of Statistics, TU Dortmund
Since 10/2010	Research School Education and Capabilities

Publications and Presentations:

Publications:

- George, A.C. and Ünlü, A. (2011). Parameter estimation in skills-based Knowledge Space Theory and Cognitive Diagnosis Models: A Comparison. In D. Conesa, A. Forte, A. López-Quílez and F. Muñoz (eds.), Proceedings of the 26th International Workshop on Statistical Modeling. ISBN 978-84-694-5129-8.
- George, A.C. (2010). Diagnostic Knowledge Structure and Cognitive Diagnosis Models: A Review and Comparison. Diploma Thesis, TU Dortmund University.
- Fried, R., and George, A.C. (2009). Median Filter. In Miodrag Lovric (ed.), International Encyclopedia of Statistical Science. New York: Springer.
- Fried, R., and George, A.C. (2009). Exponential Smoothing. In Miodrag Lovric (ed.), International Encyclopedia of Statistical Science. New York: Springer.

Presentations:

- George, A.C., Robitzsch, A., & Groß, J. (2011, September). Analysis of individual classification rates in the G-DINA model. Talk at the 10. Meeting of the department methods and evaluation of the DGPs, Bamberg, Germany.
- Nahberger, G., Dohe, C., & George, A.C. (2011, September). First results in IGLU-Transfer. Talk at the 75. Tagung der Arbeitsgruppe für empirische pädagogische Forschung (AEPF 2011), Klagenfurt, Austria.
- George, A.C. and Ünlü, A. (2011, July). Parameter estimation in skills-based Knowledge Space Theory and Cognitive Diagnosis Models: A Comparison. Poster at the 26th International Workshop on Statistical Modeling (IWSM, 2011), València, Spain.
- George, A.C., Kiefer, T., Ünlü, A., & Robitzsch, A. (2011, March). The R package CDM: Introduction to and implementation and application of cognitive diagnosis models. Talk at the Meeting of the Working Group for Empirical Educational Research (AEPF 2011), Bamberg, Germany.
- George, A. C. and Ünlü, A. (2010, September). Diagnostic knowledge structure models: An application to the PIRLS Reader 2001 for German elementary school pupils. Poster at the 74. Tagung der Arbeitsgruppe für Empirische Pädagogische Forschung (AEPF 2010), Jena, Germany.
- George, A. C. and Ünlü, A. (2010, March). Diagnostic knowledge structure models: A review and comparison. Talk at the 2nd Joint Statistical Meeting of the German Working Group on Statistics (DAGStat2010), Dortmund, Germany.