



Faculty of **Education**
The University of Hong Kong

EDUCATIONAL AND PSYCHOLOGICAL MEASUREMENT COLLOQUIUM SERIES

Learning Attribute Hierarchies from Data: Two Exploratory Approaches

Chun Wang, PhD

College of Education & Center for Statistics and the Social Sciences
University of Washington

November 13, 2019 (Wednesday)

10:00am - 11:30am

Room 108, Runme Shaw Building HKU

Abstract

In cognitive diagnostic assessment, multiple fine-grained attributes are measured simultaneously. Attribute hierarchies are considered important structural features of cognitive diagnostic models (CDM) that provide useful information about the nature of attributes. The hierarchical diagnostic classification model (HDCM) is a CDM that directly takes into account attribute hierarchies; hence HDCM is nested within more general CDMs. An empirically driven hypothesis test to statistically test one hypothesized link (between two attributes) at a time has been proposed. However, this likelihood ratio test statistic does not have a known reference distribution so it is cumbersome to perform hypothesis testing at scale. In this paper, we studied two exploratory approaches that could learn the attribute hierarchies directly from data, namely, the latent variable selection (LVS) approach and the regularized latent class modeling approach (RLCM). An identification constraint was proposed for the LVS approach. Simulation results revealed that both approaches could successfully identify different types of attribute hierarchies, when the underlying CDM is either the DINA model or the saturated logliner CDM model. The LVS approach outperformed the RLCM approach, especially when the total number of attributes increases. An illustrative example using data from the Examination for the Certificate of Proficiency in English is provided in the end. This work is in collaboration with Jing Lu.

About the Speaker

Dr Chun Wang is assistant professor of measurement and statistics in the College of Education at the University of Washington (UW). She is also an affiliated faculty of the Center for Statistics and the Social Sciences at UW. Prior to joining the UW, she was an associate professor of quantitative psychology at the University of Minnesota. Her research interests include multidimensional and multilevel item response theory models and their applications, cognitive diagnostic modeling, and computerized adaptive testing. She is associate editor of *Applied Psychological Measurement*, the *British Journal of Mathematical and Statistical Psychology*, and the *Journal of Educational and Behavioral Statistics*.

Everyone is welcome to attend!

If interested, please confirm your attendance by sending an email to xlqiu@hku.hk