

038. Leverage the Partially Confirmatory Approach to Psychometric Modeling with Bayesian Regularization
Coordinated Paper Session
 3:00 to 4:30 pm
 Virtual: Room 1

A partially confirmatory approach to psychometric modeling with Bayesian regularization was introduced recently. In this session, four papers are presented to exploit the boundaries of the approach. The first paper investigates the regularized latent variable model framework with structural component, where one can regularize different parameter matrices separately or jointly. It can lead to various research designs depending on the combinations of regularizations. The second paper investigates the partially confirmatory cognitive diagnosis model framework with Bayesian Lasso, where the Q-matrix can be partially specified by the experts and inferred from the response data. Under the framework, the fully expert-defined and data-driven methods of Q-matrix construction can be perceived as two extremes of a continuum with different amount of partial knowledge. The third paper extends the approach to address various bifactor models. It covers both the standard- and extended-types of bifactor models under the exploratory or confirmatory senses, with a partially regularized loading matrix and inherited scalability of the approach. The last paper investigates if we can improve the recommender system with the approach. When incorporating partial knowledge of latent factors, the approach can provide interpretation to help reveal the black box of the learning process in the system.

Session Organizer:

Jinsong Chen, The University of Hong Kong

Participants:

Introducing the Regularized Latent Variable Modeling Framework with Bayesian Lasso

Jinsong Chen, The University of Hong Kong

This paper investigates the regularized latent variable model framework with structural component. RLVM extends the multiple-indicator multiple-cause model with Bayesian regularization and local dependence. One can regularize three different parameter matrices separately or jointly and fully or partially. It can lead to various research designs that can be used for different purposes, depending on the combinations of different regularizations.

Q-Matrix Inference in Partially Confirmatory Cognitive Diagnosis Modeling with Bayesian Lasso

Yi Jin; Jinsong Chen, The University of Hong Kong

This paper investigates the partially confirmatory cognitive diagnosis model with Bayesian Lasso, where the Q-matrix can be partially specified by the experts and inferred from the data. The fully expert-defined and data-driven approaches of Q-matrix construction can be perceived as two extremes of a continuum with different partial knowledge.

Accommodating Various Bifactor Models Within the Partially Confirmatory Factor Analysis Framework

Yifan Zhang; Jinsong Chen, The University of Hong Kong

This paper extends the partially confirmatory factor analysis to accommodate various bifactor models under the exploratory or confirmatory senses. For the standard-type bifactor models, the loading matrix can be partially regularized. For the extended-type bifactor models with multiple general factors, two loading matrices can be partially regularized, separately or simultaneously.

Improving Recommender System with the Partially Confirmatory Approach and Psychological Factors

Jinsong Chen, The University of Hong Kong; Yifan Zhang; Zhimin Zou, Wenzhou University

This paper investigates if we can improve recommender system with the partially confirmatory approach. The proposed approach comparable to conventional machine learning methods for recommendation. When incorporating partial knowledge, the approach can provide interpretation to the recommendation, thus help make the black box of the learning process transparent.

Discussant:

Lihua Yao, Northwestern University