SEMINAR
DEPARTMENT OF STATISTICS
THE CHINESE UNIVERSITY OF HONG KONG

Tree-Regularized Bayesian Latent Class Analysis: Improving Weakly Separated Dietary Pattern Subtyping in Small-Sized Subpopulation

INVITED SPEAKER

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TIME

July 26, 2023 (Wed) · 2:30 pm - 3:30 pm

VENUE

LT2 · Lady Shaw Building · CUHK

ABSTRACT

Dietary patterns synthesize multiple related diet components, which can be used by nutrition researchers to examine diet-disease relationships. Latent class models (LCMs) have been used to derive dietary patterns from dietary intake assessment, where each class profile represents the probabilities of exposure to a set of diet components. However, LCM-derived dietary patterns can exhibit strong similarities, or weak separation, resulting in numerical and inferential instabilities that challenge scientific interpretation. This issue is exacerbated in small-sized subpopulations. To address these issues, we provide a simple solution that empowers LCMs to improve dietary pattern estimation. We develop a tree-regularized Bayesian LCM that shares statistical strength between dietary patterns to make better estimates using limited data. This is achieved via a Dirichlet diffusion tree process that specifies a prior distribution for the unknown tree over classes. Dietary patterns that share proximity to one another in the tree are shrunk towards ancestral dietary patterns a priori, with the degree of shrinkage varying across pre-specified food groups. Using dietary intake data from the Hispanic Community Health Study/Study of Latinos, we apply the proposed approach to a sample of 496 US adults of South American ethnic background to identify and compare dietary patterns. This is joint work with PhD student Mengbing Li (UMich Biostat) and Professor Briana Stephenson (Harvard Biostat).