

BIostatISTICS SEMINAR



Peter X.K. Song
PhD, Professor of
Biostatistics at
Dept. of Biostatistics,
School of Public Health
University of Michigan

HASS: Hybrid Algorithm for Subgroup Search via ADMM and EM Algorithms

Identification of subgroups in a biomedical study with subjects sampled from a heterogeneous population has attracted considerable attention in recent years. Technically, subgroup group analysis may be formulated as a type of supervised clustering analysis with group labels being latent. The method of finite mixture model is the most widely used approach in biomedical studies due to its interpretability and reproducibility, in which the Expectation-Maximization (EM) algorithm plays a central role in handling related optimization. A well-known issue with the EM algorithm is its strong reliance on initial values and possible poor convergence, especially when the underlying subgroups are not very separable. We propose a fusion learning approach to overcoming this drawback by generating initial values of high quality, where a pairwise fusion penalty is utilized to automatically detect and identify homogeneous subgroups as initial features. This fusion approach is implemented by an Alternating Direction Method of Multipliers (ADMM) algorithm, which, however, only provides subgroup centroids with no ability to reconstruct the underlying individual effect sizes. Our proposed method provides an estimated “posterior” density of individual effect size for each subject. We develop a Hybrid Algorithm for Subgroup Search (HASS) for implementation that allows blend computational speed and numerical stability in supervised subgroup analysis. It is illustrated by extensive simulation studies and analysis of a real example of a randomized comparative clinical trial for pioglitazone and gliclazide on reducing HbA1C among patients with type II diabetes. This is a joint work with Ling Zhou, Shiquan Sun and Haoda Fu.

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3:30 pm - 4:30 pm

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