

# STATISTICS SEMINAR

Gyuhyeong Goh

University of Connecticut

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Dickens Hall, Room 207, 4:00-5:00 pm

Refreshments: Dickens 108, 3:30-4:00 pm



## Bayesian Sparse Reduced Rank Multivariate Regression

Many modern statistical problems can be cast in the framework of multivariate regression, where the main task is the estimation of a possibly high-dimensional coefficient matrix. The low-rank structure in the coefficient matrix is of intrinsic multivariate nature, which, when further combined with sparsity, can further lift dimension reduction, conduct variable selection, and facilitate model interpretation. Using a Bayesian approach, we develop a unified sparse and low-rank multivariate regression method, to both estimate the coefficient matrix and obtain its credible region for making inference. The newly developed sparsity-inducing prior for the coefficient matrix enables simultaneous rank reduction, predictor selection, as well as response selection. We utilize the marginal likelihood to determine the regularization hyperparameter, so it maximizes its posterior probability given the data. Theoretically, the posterior consistency is established under a high-dimensional asymptotic regime. As a real application, we apply our method to integrative analysis of gene expression data and Chromatin Immunoprecipitation (ChIP) data in order to reveal the transcriptional regulatory mechanisms.

Keywords: Bayesian; Low rank; Penalized least squares; Posterior consistency; Sparsity; Rank reduction