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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Multi-task Learning for Gaussian Graphical Regressions with High Dimensional Covariates

By

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Abstract

Gaussian graphical regression is a powerful approach for regressing the precision matrix of a Gaussian graphical model on covariates, which permits the response variables and covariates to outnumber the sample size. However, traditional approaches of fitting the model via separate node-wise lasso regressions overlook the network-induced structure among these regressions, leading to high error rates, particularly when the number of nodes is large. To address this issue, we propose a multi-task learning estimator for fitting Gaussian graphical regression models, which incorporates a cross-task group sparsity penalty and a within-task element-wise sparsity penalty to govern the sparsity of active covariates and their effects on the graph, respectively. We also develop an efficient augmented Lagrangian algorithm for computation, which solves subproblems with a semi-smooth Newton method. We further prove that our multi-task learning estimator has considerably lower error rates than the separate node-wise regression estimates, as the cross-task penalty enables borrowing information across tasks. We examine the utility of our method through simulations and an application to a gene co-expression network study with brain cancer patients.

Date : 09 December 2024 (Monday)
Time : 3:00p.m.-4:00p.m.
Venue : Room 1409 (Lift 25/26)

All are Welcome!