Theoretical Statistics and Mathematics Unit

Indian Statistical Institute

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SEMINAR

Date: December 14, 2026
Time: 04:15 PM

VENUE:

L-Infinity, 5th Floor, A.N. Kolmogorov Bhavan, ISI Kolkata

SPEAKER:

Sagnik Nandy

Ohio State University, USA

TITLE:

How does limma-trend work? An empirical partially Bayes perspective

ABSTRACT:

Large-scale testing in genomics and proteomics often involves thousands of linear models, each fitted using very few observations. A common feature of these data is a mean–variance trend: variability changes systematically with average expression. Limma-trend incorporates this relationship through a parametric model for variance heterogeneity around an estimated trend. This raises a statistical question: when does learning this structure from the same data lead to valid inference?

In this talk, I will study limma-trend from an empirical partially Bayes perspective, placing an estimated prior on nuisance parameters while treating the parameters of interest as fixed. This framework interprets limma-trend as approximating p-values conditional on the sample variance and average expression and clarifies when this interpretation is valid. It also motivates two extensions based on nonparametric maximum likelihood: one learns residual variance heterogeneity around a fitted trend, while the other learns the joint distribution of mean and variance. We establish asymptotic false discovery rate control under a dense-signal condition and show that the first procedure retains this guarantee even when the estimated trend converges to an incorrect limit. I will conclude with applications to genomics and proteomics.

This talk is based on joint work with Wanyi Ling, and Nikolaos Ignatiadis.

ALL ARE CORDIALLY INVITED

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