



INDIAN STATISTICAL INSTITUTE

Theoretical Statistics and Mathematics Unit, Kolkata

SEMINAR

Date: December 13, 2023

Time: 02:30 PM

VENUE:

L-infinity

(5th Floor, A.N. Kolmogorov Bhavan), ISI Kolkata

TITLE:

Global Testing Against Sparse Alternatives under Ising Models

SPEAKER:

Rajarshi Mukherjee

Department of Biostatistics, Harvard University

ABSTRACT:

In this talk, I will discuss the effect of dependence on detecting sparse signals in a concrete class of models. In particular, we will focus on mean-type signals in Ising models and establish how the interplay between the strength, structure, and sparsity of signals determine their detectability under various levels of dependence. The impact of dependence is best illustrated under Mean-Field type models where we observe the effect of a "thermodynamic" phase transition. In particular, critical states of these models exhibit a subtle "blessing of dependence" phenomenon in that one can detect much weaker signals at criticality than otherwise. We also argue that similar results are valid for non-Mean-Field models as well by explicitly analyzing Ising models on lattices in arbitrary but fixed dimensions. Moreover, we develop testing procedures that are broadly applicable to account for dependence and show their asymptotic minimax optimality. Finally, I will also discuss the behavior of sharp constants of detection boundaries for a class of structured signals and explore how one can pinpoint the precise benefits and perils of dependence on inference in Ising models.

This talk is based on past and ongoing projects with Sohom Bhattacharya, Nabarun Deb, Sumit Mukherjee, Gourab Ray, and Ming Yuan.

ALL ARE CORDIALLY INVITED