DEPARTMENT OF STATISTICS

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Global Testing Against Sparse Alternatives under Ising Models
Wednesday, February 17, 2021
11:45 AM EST

Zoom Meeting: Meeting ID: 995 3703 2528
Password: 796085
https://rutgers.zoom.us/j/99537032528?pwd=ZXZGQnljVUJJaVVVVHhzd2dPRzBrUT09
Virtual Coffee session before the seminar at 11:30AM EST

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 be 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.

Bio: I am an Assistant Professor in the Department of Biostatistics at Harvard T.H. Chan School of Public Health. Previously, I was an Assistant Professor in the Division of Biostatistics at UC Berkeley following my time as a Stein Fellow in the Department of Statistics at Stanford University. I obtained my PhD in Biostatistics from Harvard University advised by Prof. Xihong Lin. I am generally interested in structured signal detection and estimation in high dimensional problems, as well nonparametric functional estimation theory in the context of causal inference for observational studies.