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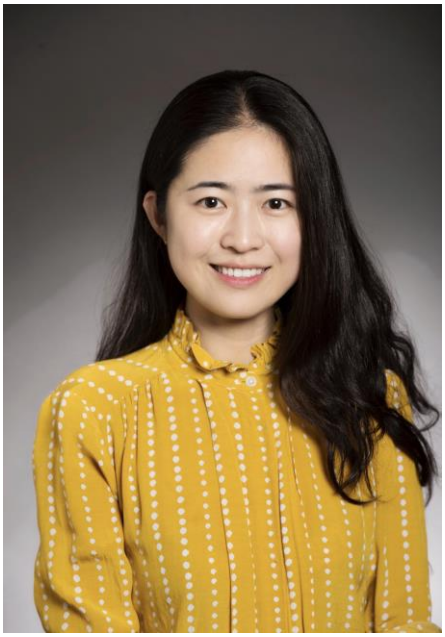

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Reliable Hypothesis Testing Paradigms in High Dimensions

Wednesday, December 9th, 2020
11:45 AM EST

Zoom Meeting ID: 981 1457 1041
Password: 883766

Virtual Coffee session before the seminar at 11:30AM

Abstract: Modern scientific discovery and decision making require the development of trustworthy and informative inferential procedures, which are particularly challenging when coping with high-dimensional data. This talk presents two vignettes on the theme of reliable high-dimensional inference. The first vignette considers performing inference based on the Lasso estimator when the number of covariates is of the same order or larger than the number of observations. Classical asymptotic statistics theory fails due to two fundamental reasons: (1) The regularized risk is non-smooth; (2) The discrepancy between the estimator and the true parameter vector cannot be neglected. We pin down the distribution of the Lasso, as well as its debiased version, under a broad class of Gaussian correlated designs with non-singular covariance structure. Our findings suggest that a careful degree-of-freedom correction is crucial for computing valid confidence intervals in this challenging regime.The second vignette investigates the Model-X knockoffs framework --- a general procedure that can leverage any feature importance measure to produce a variable selection algorithm. Model-X knockoffs rely on the construction of synthetic random variables and is, therefore, random. We propose a method for derandomizing --- and hence stabilizing --- model-X knockoffs. By aggregating the selection results across multiple runs of the knockoffs algorithm, our method provides stable decisions without compromising statistical power. Our approach, when applied to the multi-stage GWAS of prostate cancer, reports locations on the genome that have been replicated with other studies.
This is joint work with Michael Celentano, Andrea Montanari, Zhimei Ren and Emmanuel Candes.

Bio: Yuting Wei is currently an assistant professor in the Statistics and Data Science department at Carnegie Mellon University. Prior to that, she was a Stein Fellow at Stanford University, and she received her Ph.D. in statistics at University of California, Berkeley working with Martin Wainwright and Aditya Guntuboyina. She was the recipient of the 2018 Erich L. Lehmann Citation from the Berkeley statistics department for her Ph.D. dissertation in theoretical statistics. Her research interests include high-dimensional and non-parametric statistics, statistical machine learning, and reinforcement learning.