THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

PHD DISSERTATION PROPOSAL PRESENTATION

SUBHODH KOTEKAL

Department of Statistics
The University of Chicago

Null Estimation in Large Scale Inference

WEDNESDAY, April 12, 2023, at 2:00PM
Jones 304, 5747 S. Ellis Avenue

ABSTRACT

The advent of large scale inference has spurred reexamination of conventional statistical thinking. In a series of highly original articles, Efron showed in some examples that the ensemble of the null distributed test statistics grossly deviated from the theoretical null distribution. This misspecification can cause substantial differences in downstream inferences, and Efron persuasively illus- trated the danger of the ingrained instinct to blindly believe the theoretical null. Though intimidating in other contexts, the large scale setting is to the statistician's benefit. There is now potential to estimate, rather than assume, the null distribution.

In a model for n many z-scores with at most k nonnulls, we adopt Efron's suggestion and consider estimation of location and scale parameters for a Gaussian null distribution. Placing no assumptions on the nonnull effects, we propose estimators based on the empirical characteristic function and the classical kernel mode estimator. We consider the entire regime $k < n$ 2 , that is, precisely the regime in which the null parameters are identifiable, and we establish rates of convergence. In the practically relevant regime $k \asymp n$, our results improve upon the existing literature and show that consistent estimation is indeed possible. Our location estimator also admits a direct generalization to non-Gaussian noise distributions. Notably, faster rates are achievable if the tail of the noise's characteristic function decays slower, revealing the presence of a phenomenon which is well-known in the deconvolution literature