THE UNIVERSITY OF CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

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Beyond Gaussian Approximation: Bootstrap in Large Scale Simultaneous Inference

MONDAY, March 6, 2017, at 4:00 PM

Eckhart 133, 5734 S. University Avenue

Refreshments before the seminar at 3:30 PM in Jones 111

ABSTRACT

The Bonferroni adjustment, or the union bound, is commonly used to study rate optimality properties of statistical methods in high-dimensional problems. However, in practice, the Bonferroni adjustment is overly conservative. The extreme value theory has been proven to provide more accurate multiplicity adjustments in a number of settings, but only on ad hoc bases. Recently, Gaussian approximation was used to justify bootstrap adjustments in large scale simultaneous inference in some general settings when $n \gg (\log p)^7$, where p is the multiplicity of the inference problem and n is the sample size. The thrust of this theory is the validity of the Gaussian approximation for maxima of sums of independent random vectors in high-dimension. In this paper, we reduce the sample size requirement to $n \gg (\log p)^5$ for the consistency of the empirical bootstrap and the multiplier/wild bootstrap in the Kolmogorov-Smirnov distance. New comparison and anti-concentration theorems, which are of considerable interest in and of themselves, are developed as existing ones interweaved with Gaussian approximation are no longer applicable.