



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

High dimensional asymptotics of likelihood ratio tests in the Gaussian sequence model under convex constraints

By

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Abstract

In the Gaussian sequence model $Y = \mu + \xi$, we study the likelihood ratio test (LRT) for testing $H_0 : \mu = \mu_0$ versus $H_1 : \mu \in K$, where $\mu_0 \in K$, and K is a closed convex set in R^n . In particular, we show that under the null hypothesis, normal approximation holds for the log-likelihood ratio statistic for a general pair (μ_0, K) , in the high dimensional regime where the estimation error of the associated least squares estimator diverges in an appropriate sense. The normal approximation further leads to a precise characterization of the power behavior of the LRT in the high dimensional regime. These characterizations show that the power behavior of the LRT is in general non-uniform with respect to the Euclidean metric, and illustrate the conservative nature of existing minimax optimality and sub-optimality results for the LRT. A variety of examples, including testing in the orthant/circular cone, isotonic regression, Lasso, and testing parametric assumptions versus shape-constrained alternatives, are worked out to demonstrate the versatility of the developed theory.

This talk is based on joint work with Yandi Shen(UW, Chicago) and Bodhisattva Sen(Columbia).

Date : 17 September 2021 (Friday)

Time : 10:00am

Zoom Meeting : <https://hkust.zoom.us/j/94328358340>

(Passcode: 690595)

All are Welcome!