THE UNIVERSITY OF CHICAGO

Computational and Applied Mathematics
&
Statistics Student Seminar

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Optimal Heteroskedasticity Testing in Random Design

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ABSTRACT

In the context of non-parametric and high-dimensional linear regression, the testing of heteroskedasticity is a classical statistical problem with significant practical implications, yet fundamental limits are not well understood. Taking a minimax perspective, we first examine the testing problem of an \(\alpha-\)H\"{o}lder mean function with an arbitrary variance function, considering a random design setting with \(p\)-dimensional covariates. We establish the sharp minimax separation rate \(n^{-\frac{8\alpha}{4\alpha+p}} + n^{-1}\). Next, we extend these ideas to the setting of high-dimensional linear regression and demonstrate their applicability in a kernel regression framework, establishing the rate \(n^{-1}\) for any dimension \(p\). For each of these settings, we employ a similar kernel-based statistic as suggested by previous work.

This work is a collaboration with Subhodh Kotekal.