



THE UNIVERSITY OF
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Department of Statistics

MASTER'S THESIS PRESENTATION

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Thresholding Tests by Half-Sample Method for High-Dimensional Means

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ABSTRACT

We investigate tests alternative to the maximal L2 and L1-thresholding tests of Zhong, Chen and Xu [Ann. Statist. 41 (2013) 2820-2851] for high-dimensional means under sparsity of nonzero means for sub-Gaussian data and column-wise dependence by applying the half-sample method. Although the maximal test statistics of Zhong et al. are asymptotically convergent to standard Gumbel distribution, the speed of asymptotic convergence is low in practice. We construct new test statistics to increase the convergence speed, by first substituting the sample means in the original test statistics with half-sample techniques, then thresholding L1 and L2 statistics, respectively, followed by maximizing a range of thresholding levels adaptive to signal strength and sparsity. While the asymptotic distribution of our proposed test statistics is not discussed, we provide simulation studies in finite samples and a real data example to demonstrate that for any level of sparsity and faintness, the half-sample maximal L2-thresholding test is at least as powerful as the half-sample maximal L1-thresholding test, and both tests are at least as powerful as the half-sample Higher Criticism test.

Key words and phrases: Half-sample method, high-dimensional mean, sparsity, thresholding, weak dependence.

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