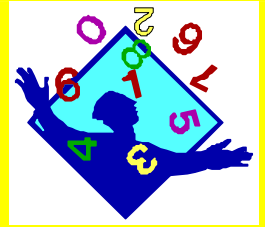


STATISTICS SEMINAR



MASTER REPORT

A Class of Robust Tests for the Center of a Symmetric Distribution

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DATE: June 9, 2005

TIME: 4:00 pm

PLACE: Dickens 106

REFRESHMENTS: 3:30 – Dickens 108

The purpose of this report is to study the performance of Lord's (1947) statistic, T_L , and Horn's (1983) statistic, T_H , to test a hypothesis about the location parameter of a symmetric, continuous distribution, and compare their performance to the traditional t-test whose p-values assume sampling from a normal distribution. Both T_L and T_H are based on order statistics and were proposed as robust procedures whose distributions are location-scale invariant and therefore can, in principle, provide exact tests for a known location-scale family. Here, we employ a bootstrap to approximate p-values for all three tests. Thus, there are two versions of the t-test. The second t-test uses a bootstrap p-value in place of a normal theory p-value. Simulation will be used to estimate the size and power of the four tests under a variety of conditions.

Simulations carried out here show that bootstrap p-values often yield type I error rates far in excess of their nominal values, making power comparisons invalid. Instead this report evaluates all tests on the basis of the sum of their type I and type II error rates. Based on this criterion, the t-test carried out under the usual assumption of normality performs best. In addition to inflated type I error rates, this surprising result may be due to the fact that except for heavy tails, the distributions used are very similar to the normal in their middle range. Nested bootstrapping might work better at estimating p-values for large sample sizes.