Division of Statistics

Master's Thesis Defense

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Ag Science 62

Robust Confidence Interval Estimation on the Lognormal Mean

ABSTRACT

Land's exact method for estimating confidence intervals on the lognormal mean is unstable for small sample size when skewness is large and sensitive to deviations from lognormality. Approximate methods assuming lognormality have been proposed, but existing literature that evaluates the performance of these methods ignores robustness to non-lognormality. For simulated mixture distributions for which there was low power to correctly reject lognormality, all methods assuming lognormality were found to be biased and imprecise. For these departures from lognormality and sample sizes 12 and 25, all methods assuming lognormality were biased and required wider intervals to achieve the same coverage probabilities as the best non-parametric methods considered. For sample sizes 50 and 100, interval length improved, but bias remained, and, consequently, coverage error was large. Non-parametric methods outperformed methods assuming lognormality for some departures from lognormality. When the true distribution was lognormal, several approximate methods assuming lognormality were found to be more stable than Land's method. Several real data applications are included.