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Confidence Intervals for the Ratio of Means of Lognormal Distribution with Restricted Parameter Space

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Abstract

This paper presents new confidence intervals for the ratio of means of lognormal distribution with restricted parameter. We derived analytic expressions to find the coverage probability and expected length of each confidence interval.

Mathematics Subject Classification: 62F25

Keywords: Lognormal distribution, the mean, restricted parameter space

1 Introduction

Let $X_i = (X_{1i}, X_{2i}, \dots, X_{n_i})$, ($i = 1, 2$) be a random variable having a lognormal distribution, and μ_i and σ_i^2 , respectively, are denoted by the mean and the variance of Y_i where $Y_i = \ln(X_i) \sim N(\mu_i, \sigma_i^2)$. The probability density function of the lognormal distribution, $LN(\mu_i, \sigma_i^2)$, is

$$f(x_i, \mu_i, \sigma_i^2) = \begin{cases} \frac{1}{x_i \sigma_i \sqrt{2\pi}} \exp\left(-\frac{(\ln(x_i) - \mu_i)^2}{2\sigma_i^2}\right) & ; \text{ for } x_i > 0 \\ 0 & ; \text{ for } x_i \leq 0. \end{cases} \quad (1)$$