Approximate upper confidence intervals on a ratio of sums of variances

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Abstract

Confidence intervals are very useful statistical inference tool, they are usually constructed from completely specified distribution, however, in some cases the exact distribution of the statistic of interest is unknown, then an approximate distribution is derived and used to form an approximate confidence interval for the parameter under consideration. Satterthwaite (1946) gave an approximation of the distribution of a linear combination of chi-squared variates as another chi-square with appropriate degrees of freedom. These degrees of freedom are generally functions of the unknown variance components and hence must be estimated. Satterthwaite (1946) and Birch (1990) approximations are popular methods to construct confidence intervals on $\lambda = (k_1\theta_1 + k_2\theta_2)/(k_3\theta_3 + k_4\theta_4)$ where θ_i represents a variance of normal population and $k_i > 0$ for i = 1, 2, 3, 4. This article proposes other methods for constructing approximate upper confidence intervals on $\lambda = (\theta_1 + \theta_2)/(\theta_3 + \theta_4)$ and comparing them with those constructed under Satterthwaite and Birch methods

References

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