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Improved estimator of the entropy and goodness of fit tests in ranked set sampling

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(Submitted on 9 Jun 2011)

The entropy is one of the most applicable uncertainty measures in many statistical and en- gineering problems. In statistical literature, the entropy is used in calculation of the Kullback- Leibler (KL) information which is a powerful mean for performing goodness of fit tests. Ranked Set Sampling (RSS) seems to provide improved estimators of many parameters of the population in the huge studied problems in the literature. It is developed for situations where the variable of interest is difficult or expensive to measure, but where ranking in small sub-samples is easy. In This paper, we introduced two estimators for the entropy and compare them with each other and the estimator of the entropy in Simple Random Sampling (SRS) in the sense of bias and Root of Mean Square Errors (RMSE). It is observed that the RSS scheme would improve this estimator. The best estimator of the entropy is used along with the estimator of the mean and two biased and unbiased estimators of variance based on RSS scheme, to esti- mate the KL information and perform goodness of fit tests for exponentiality and normality. The desired critical values and powers are calculated. It is also observed that RSS estimators would increase powers.

Submission history

From: Morteza Amini [view email]
[v1] Thu, 9 Jun 2011 08:05:05 GMT (184kb)

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