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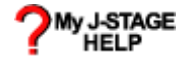
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Estimation of Bounded Location and Scale Parameters

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Abstract: This paper addresses the issue of deriving estimators improving on the best location equivariant (or Pitman) estimator under the squared error loss when a location parameter is restricted to a bounded interval. A class of improved estimators is constructed, and it is verified that the Bayes estimator for the uniform prior over the bounded interval and the truncated estimator belong to the class. This paper also obtains the sufficient conditions for the density under which the class includes the Bayes estimators with respect to the two-point boundary symmetric prior and general continuous prior distributions when a symmetric density is considered for the location family. It is demonstrated that the conditions on the symmetric density can be applied to logistic, double exponential and t-distributions as well as to a normal distribution. These conditions can be also applied to scale mixtures of normal distributions. Finally, some similar results are developed in the scale family.

Key words: Bayes estimator, bounded mean, decision theory, improved estimator, location family, minimaxity, monotone likelihood ratio, Pitman estimator, restricted parameter, scale family, symmetric density, uniform prior

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