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Purely sequential bounded-risk point estimation of the negative binomial mean under various loss functions: one-sample problem

Nitis Mukhopadhyay[1] · **Sudeep R. Bapat**[1,2]

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Abstract A negative binomial (NB) distribution is useful to model over-dispersed count data arising from agriculture, health, and pest control. We design purely sequential bounded-risk methodologies to estimate an unknown NB mean $\mu(>0)$ under different forms of loss functions including customary and modified Linex loss as well as squared error loss. We handle situations when the thatch parameter $\tau(>0)$ may be assumed known or unknown. Our proposed methodologies are shown to satisfy properties including first-order asymptotic efficiency and first-order asymptotic risk efficiency. Summaries are provided from extensive sets of simulations showing encouraging performances of the proposed methodologies for small and moderate sample sizes. We follow with illustrations obtained by implementing estimation strategies using real data from statistical ecology: (1) weed count data of different species from a field in Netherlands and (2) count data of migrating woodlarks at the Hanko bird sanctuary in Finland.

Keywords Linex loss · CV approach · First-order asymptotic efficiency · First-order asymptotic risk efficiency · Migrating woodlarks data · Over-dispersed count data · Squared error loss · Statistical ecology · Weed count data · Bird sanctuary data

✉ Nitis Mukhopadhyay
nitis.mukhopadhyay@uconn.edu

Sudeep R. Bapat
sudeep.bapat@uconn.edu

[1] Department of Statistics, University of Connecticut, AUST Building, U-4120, 215 Glenbrook Road, Storrs, CT 06269-4120, USA

[2] Department of Statistics and Applied Probability, University of California, Santa Barbara, CA 93106-3110, USA