

## Estimators for the binomial distribution that dominate the MLE in terms of Kullback–Leibler risk

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**Abstract** Estimators based on the mode are introduced and shown empirically to have smaller Kullback–Leibler risk than the maximum likelihood estimator. For one of these, the midpoint modal estimator (MME), we prove the Kullback–Leibler risk is below  $\frac{1}{2}$  while for the MLE the risk is above  $\frac{1}{2}$  for a wide range of success probabilities that approaches the unit interval as the sample size grows to infinity. The MME is related to the mean of Fisher’s Fiducial estimator and to the rule of succession for Jefferey’s noninformative prior.

**Keywords** Kullback–Leibler risk · Modal estimators · MLE