Bayesian estimation of a power sum functional for entropy assuming alternative Dirichlet priors

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Shannon entropy is a popular and widely studied measurement of information contained within a system and several variants of Shannon entropy has been developed which may act as valuable generalisations for entropy in data-driven applications. These expressions are defined as functionals of a probability structure, and the practical problem of estimating entropy from samples (sometimes small) in many applied settings remains a challenging and relevant problem. In this talk, previously unconsidered Dirichlet models are introduced as potential priors for an underlying multinomial model. Resultant estimators for the power sum functional, which represent the kernel for key entropy variants under consideration (including Tsallis and Mathai, for example) assuming the considered priors and squared error loss are derived and studied. Particular cases of these proposed priors are of interest and their effect on the estimation of the generalised entropy subject to different parameter scenarios is investigated. Numerical experiments emphasize the results of this study.