

Encoding Expert Opinion on Skewed Non-Negative Distributions

Samantha Low Choy

School of Mathematical Sciences, Queensland University of Technology, Brisbane, Australia.
Email: s.lowchoy@qut.edu.au

Kerrie Mengersen

School of Mathematical Sciences, Queensland University of Technology, Brisbane, Australia.
Email: k.mengersen@qut.edu.au

Judith Rousseau

CEREMADE, Université Paris Dauphine, France. Email: rousseau@ceremade.dauphine.fr

Abstract

Often only limited information can be elicited from experts about a distribution, such as quantiles or other summary statistics. Skewed non-negative distributions often arise in practice, and present a particular challenge for elicitation due to their asymmetry. This paper provides a range of simple approaches to encoding these types of distributions. We consider the popular two-parameter gamma and lognormal distributions, as well as the three-parameter location-shifted lognormal and quantile-specified Davies distribution. Equations are provided for moment-matching approaches, each depending on a different though minimal set of summary statistics that have been elicited from experts. When additional information has been elicited, regression can be applied to these moment-matching equations. A simulation study and case study illustrate the varying accuracy that can be achieved, depending on the encoding method (which summary statistics are used), the distributional choice and the expert. More broadly this research emphasizes the need to question distributional choice when distributions, such as priors, are encoded using few summary statistics.

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