

A Gibbs Sampler for a Class of Random Convex Polytopes*

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We present a Gibbs sampler for the Dempster-Shafer (DS) approach to statistical inference for Categorical distributions. The DS framework extends the Bayesian approach, allows in particular the use of partial prior information, and yields three-valued uncertainty assessments representing probabilities “for”, “against”, and “don’t know” about formal assertions of interest. The proposed algorithm targets the distribution of a class of random convex polytopes which encapsulate the DS inference. The sampler relies on an equivalence between the iterative constraints of the vertex configuration and the non-negativity of cycles in a fully connected directed graph. Illustrations include the testing of independence in 2×2 contingency tables and parameter estimation of the linkage model. The paper [1] will appear with discussion in the Journal of the American Statistical Association.

References

- [1] Pierre E. Jacob, Ruobin Gong, Paul T. Edlefsen, and Arthur P. Dempster. A gibbs sampler for a class of random convex polytopes (with discussion). *Journal of the American Statistical Association*, 0(0):1–12, 2021. doi: 10.1080/01621459.2021.1881523. URL <https://doi.org/10.1080/01621459.2021.1881523>.

* The authors gratefully acknowledge support from the National Science Foundation (DMS-1712872, DMS-1844695, DMS-1916002), and the National Institute of Allergy and Infectious Disease at the National Institutes of Health [2 R37 AI054165-11 and 75N93019C00070]. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. The authors thank Rahul Mazumder for useful advice on linear programming.