



Statistics > Methodology

Beta processes, stick-breaking, and power laws

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The beta-Bernoulli process provides a Bayesian nonparametric prior for models involving collections of binary-valued features. A draw from the beta process yields an infinite collection of probabilities in the unit interval, and a draw from the Bernoulli process turns these into binary-valued features. Recent work has provided stick-breaking representations for the beta process analogous to the well-known stick-breaking representation for the Dirichlet process. We derive one such stick-breaking representation directly from the characterization of the beta process as a completely random measure. This approach motivates a three-parameter generalization of the beta process, and we study the power laws that can be obtained from this generalized beta process. We present a posterior inference algorithm for the beta-Bernoulli process that exploits the stick-breaking representation, and we present experimental results for a discrete factor-analysis model.

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