# Spatially-dependent Indian buffet processes

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**Abstract**

We develop a new stochastic process called spatially-dependent Indian buffet processes (sIBP) for binary feature matrices of unbounded columns with spatial correlations between subjects, and propose general spatial factor models for various multivariate response variables. We introduce spatial dependency through the stick-breaking representation of the original In- dian buffet process (IBP) (Griffiths and Ghahramani, 2005, 2011) and latent Gaussian process for the logit-transformed breaking proportion to capture underlying spatial correlation. We show that the marginal limiting properties of the number of non-zero entries under SIBP are the same as those in the original IBP, while the joint probability is affected by the spatial cor- relation. Using binomial expansion and Pólya-gamma data augmentation, we provide a novel Gibbs sampler for posterior computation. The usefulness of our SIBP is demonstrated through simulation studies and two applications for large-dimensional multinomial data of areal dialects and geographical distribution of multiple tree species.