

## Perpendicular latent space models for multiview network data

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The latent space model for networks (see Hoff, Raftery and Handcock (2002), for example) assumes that the actors in a network form ties independently given their (latent) position in some unobservable ‘social space.’ A multidimensional geometric space then parsimoniously represents the complicated dependence structure in the network. In real-world social networks, individuals interact in many different ways (two people may be colleagues and friends, for example). We propose a latent space framework that captures dependence between multiple types of relationships, known as views. Our method uses the multivariate Bernoulli distribution (Dai, Ding & Wahba, 2012) to introduce perpendicular structure on a series of latent spaces. We show that our approach flexibly represents dependence between views while preserving interpretability of marginal social network structure in each relationship. We demonstrate our method using data on over a dozen different relationship types between households.

Keywords: Bayesian modeling, multi-relation modeling, Multivariate Bernoulli model, social network