Discrete Variational Autoencoders and Stochastic Block Models

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Abstract

A recent advance in link prediction has been brought by using generative latent variable models, particularly variational graph autoencoders. However such models provide little or no interpretability of the node representations. In contrast Many latent variable models like variational graph autoencoders have been proposed recently for link prediction in graphs, however they provide little or no interpretability of the node representations. In contrast, variants of the Stochastic Block Models (SBMs) such as the mixed-membership model and non-parametric latent feature relational models have been successful in providing interpretable latent features along with adroitly discovering community structure. In an attempt to unify these two strands of research, this work presents an enhanced variational autoencoder model for graphs, with each node modelled as a binary latent vectors with an expressive restricted Boltzmann machine (RBM) prior. To handle the intractable inference, we leverage the Gumbolt reparametrization, along with continuous latent representations to retain the interpretability while still retaining excellent predictive power of these representations. We will also present a brief survey of some of the state of the art models for using binary latent variables in the variational inference literature, followed by some experimental results on the behaviour of these models.