The influence of hyper-parameters in the infinite relational model

The influence of hyper-parameters in the infinite relational model

The infinite relational model (IRM) is a Bayesian nonparametric stochastic block model; a generative model for random networks parameterized for uni-partite undirected networks by a partition of the node set and symmetric matrix of inter-partition link probabilities. The prior for the node clusters is the Chinese restaurant process, and the link probabilities are, in the most simple setting, modeled as iid. with a common symmetric Beta prior. More advanced priors such as separate asymmetric Beta priors for links within and between clusters have also been proposed. In this paper we investigate the importance of these priors for discovering latent clusters and for predicting links. We compare fixed symmetric priors and fixed asymmetric priors based on the empirical distribution of links with a Bayesian hierarchical approach where the parameters of the priors are inferred from data. On synthetic data, we show that the hierarchical Bayesian approach can infer the prior distributions used to generate the data. On real network data we demonstrate that using asymmetric priors significantly improves predictive performance and heavily influences the number of extracted partitions.

General information

State: Published
Organisations: Department of Applied Mathematics and Computer Science, Cognitive Systems
Contributors: Albers, K. J., Mørup, M., Schmidt, M. N.
Number of pages: 6
Publication date: 2016

Host publication information

Title of host publication: Proceedings of the IEEE International Workshop on Machine Learning for Signal Processing (MLSP 2016)
Publisher: IEEE
ISBN (Print): 978-1-5090-0746-2
Keywords: Infinite relational model, Hyperparameter inference, Link-prediction, Bayesian nonparametrics
DOIs: 10.1109/MLSP.2016.7738908
Source: PublicationPreSubmission
Source-ID: 127116970
Research output: Research - peer-review › Article in proceedings – Annual report year: 2016