

1112-68-574

Qingming Tang (tqm2004@gmail.com), 6045 S. Kenwood Ave., Chicago, IL 60637-2803, and
Jinbo Xu* (jinboxu@gmail.com), 6045 S. Kendwood Ave, Chicago, IL 60637. *New machine learning methods for network inference.*

Learning network structure underlying data is an important problem in machine learning. This paper presents a novel degree prior to study the inference of scale-free and hub networks, which are widely used to model social and biological networks. In particular, this paper formulates scale-free and hub network inference using Gaussian Graphical model (GGM) regularized by a node degree prior. Our degree prior not only promotes a desirable global degree distribution, but also exploits the estimated degree of an individual node and the relative strength of all the edges of a single node. To fulfill this, this paper proposes a ranking-based method to dynamically estimate the degree of a node, which makes the resultant optimization problem challenging to solve. To deal with this, this paper presents a novel ADMM (alternating direction method of multipliers) procedure. Our experimental results on both synthetic and real data show that our prior not only yields a scale-free or hub network, but also produces many more correctly predicted edges than existing scale-free-inducing priors, hub-inducing prior and the l_1 norm. (Received August 11, 2015)