

Generative Link Prediction for Incomplete Networks with Node Features

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Abstract: Link prediction is one of the fundamental problems in network analysis. Most existing methods require at least partial observation of connections for every node. In real-world networks, however, there often exist nodes that do not have any link information, and it is imperative to make link predictions for such nodes based on their node features. In this talk, we consider a general framework in which a network consists of three types of nodes: nodes having features only, nodes having link information only, and nodes having both. Our goal is to predict links between nodes having features only and all other nodes. Under this setting, we have proposed a family of generative models for incomplete networks and node features, and we have developed a variational auto-encoder algorithm for model estimation and link prediction and investigated different encoder structures. We have also designed a cross-validation scheme under the problem setting. The proposed method has been evaluated on an online social network and two citation networks and achieved superior performance comparing with existing methods. This talk is based on joint work with Boang Liu, Binghui Liu and Elizaveta Levina.