LEARNING DISCRETE STRUCTURES FOR GRAPH NEURAL NETWORKS

A NOTE

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This paper [1] proposes to jointly learn the graph structure and the parameters of GCNs, which allows one to apply GCNs when the given graph is either completely missing, incomplete, or noisy. The problem is framed as a bilevel programming problem where the outer objective aims to find an optimal discrete structure to minimize validation error and the inner objective is to learn the optimal parameters of GCNs to minimize training error. The outer variables are relaxed to be continuous to represent Bernoulli random variables, which are updated using projected gradient descent (see Section 2.3 for how to compute the gradient). The loss in the inner problem is computed as the average loss on a finite number of graph samples sampled from the Bernoulli distribution determined by the outer variables.

References

[1] Luca Franceschi, Mathias Niepert, Massimiliano Pontil, and Xiao He. Learning discrete structures for graph neural networks. In *International conference on machine learning*, pages 1972–1982. PMLR, 2019.