
GPN: A JOINT STRUCTURAL LEARNING FRAMEWORK FOR GRAPH NEURAL NETWORKS

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This paper [1] proposed a bilevel GNN-based joint learning framework called generative predictive network (GPN) that simultaneously learns the graph structure and the downstream task. The upper optimization (generator) and the lower optimization (predictor) are both instantiated with GNNs. The overall pipeline of GPN is as follows.

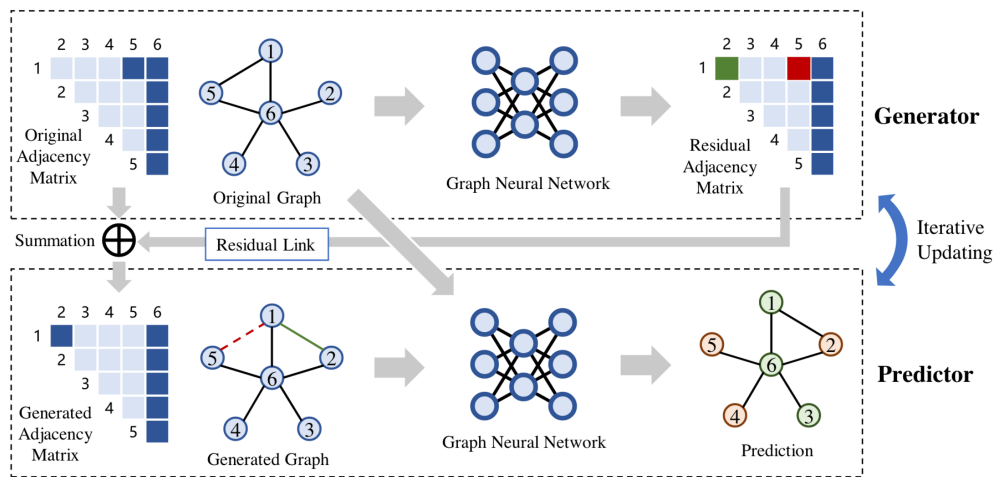


Figure 1: Overall pipeline of GPN

The generator is a GNN that computes node representations, which are then used to compute the node similarities via some similarity functions, e.g., Euclidean distance, cosine similarity, dot product, etc. The output of the generator is the residual adjacency matrix, which is to be added to the adjacency matrix before it is used in predictor (which is also a general GNN). Some approximation for the upper level optimization is introduced.

In the training stage, the predictor is alternatively trained on the generated graph and the original graph, while in the testing stage, only the generated graph is used. The multi-head scheme can also be used (it seems this also adopts the alternatively training scheme over different heads).

References

- [1] Qianggang Ding, Deheng Ye, Tingyang Xu, and Peilin Zhao. Gpn: A joint structural learning framework for graph neural networks. *arXiv preprint arXiv:2205.05964*, 2022.