

Research Proposal

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Summary of the Proposal

I aim to focus my PhD research on these three main areas:

- Convert knowledge distillation from a graph neural network into a decision tree.
- Non-IID in Federated GNN.
- Generalizable model in network field.

Background

Convert knowledge distillation from a graph neural network into a decision tree

Network is full of different graph topology, thus GNN(Graph Neural Network) is always used in LLP and CLP of the network. However, current programmable switches have the disadvantage of having limited memory space and single mathematical operations. Distill the GNN model to BDT is a way to solve this problem.

Non-IID in Federated GNN

In the zone of federated GNN, Non-IID data lead to severe performance reduction of the federated model in the local. Using Global-Personal framework for federate learning has proven effective. I aim to transfer this framework to federated GNN.

Generalizable model in network field

Minor to moderate discrepancies of topology in network senario happens frequently. However, retraining whenever a minor change happens is time-consuming and not computation-efficient. I aim to design a GNN framework that can generalize to any frequent and minor topology dynamics. In details, I use WGAN-GP and GAT to generate network traffic data when some links added or removed from the network. By aggregating the generated data and the original data, the trained GNN model can generalize to minor to moderate topology dynamics.