CS660 Project: Applying Mamba to GNNs

Jyotirmaya Shivottam | 23226001

Goals

- To investigate whether Structured Space Models (SSMs), specifically Mamba S6[#1], can be applied to state updates in Graph Neural Networks (GNNs)
- To implement such a graph-based model
- To benchmark against existing graph networks on a wide variety of tasks

Existing GNN Baselines

- 2015: Gated Graph Sequence Neural Networks (GGNN)

- 2016: Graph Convolutional Networks (GCN)

- 2017: Graph Attention Networks (GATN)

- 2018: Graph Isomorphism Networks (GIN)

- 2021: (Dynamic) Graph Echo State Networks (GESN)

Tasks

- Node property prediction, e.g., node classification.
- Edge property prediction, e.g., link existence.
- Graph representation learning (Global graph-level)

Datasets (Tentative)

- Open Graph Benchmark (OGB)
- Traffic forecasting datasets, like PeMSD8
- Academic citation network datasets, like Cora
- *More to be added later*

References

1. 2023: Mamba: Linear-Time Sequence Modeling with Selective State Spaces
2. 2020: HiPPO: Recurrent Memory with Optimal Polynomial Projections