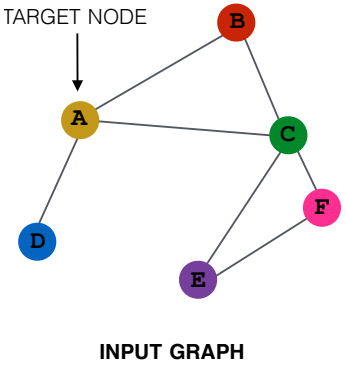
A General Perspective on Graph Neural Networks

A General GNN Framework (1)

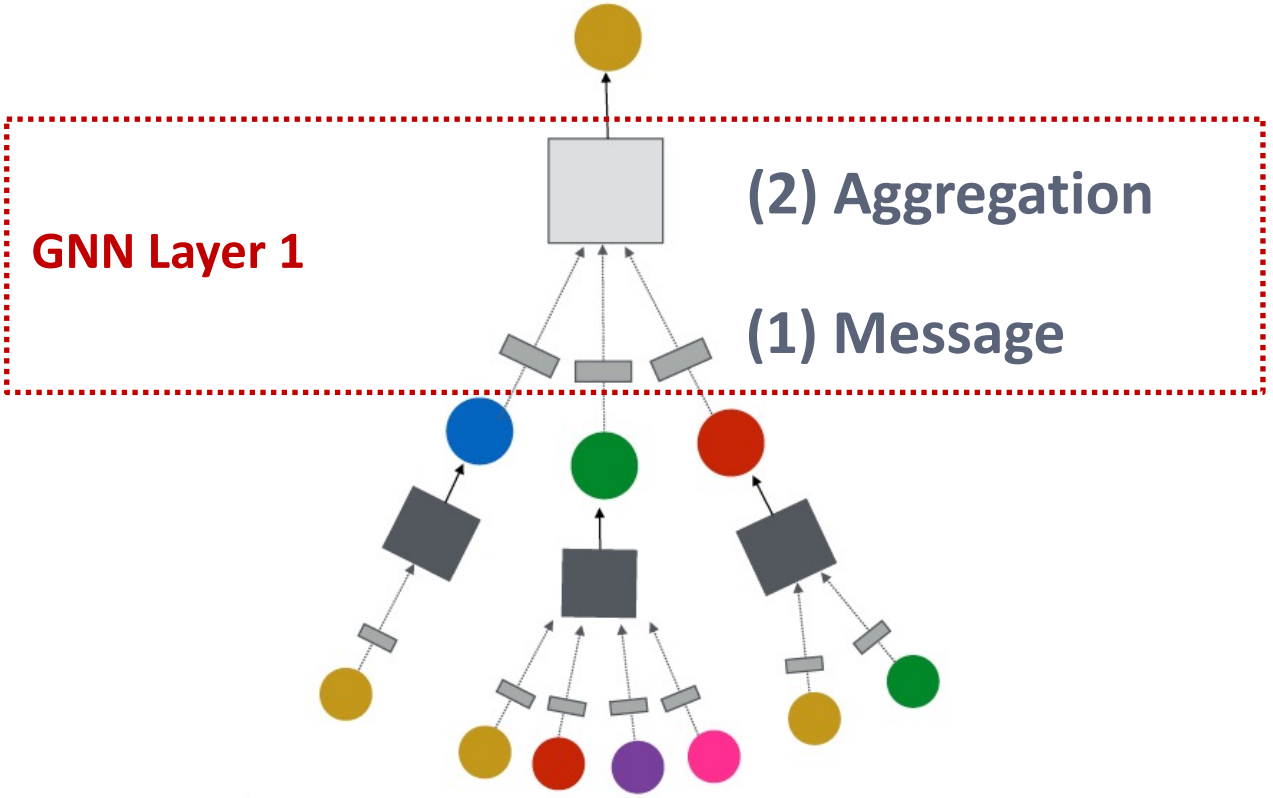
J. You, R. Ying, J. Leskovec. Design Space of Graph Neural Networks, NeurIPS 2020



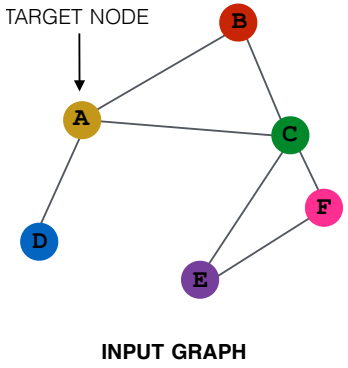
INPUT GRAPH

GNN Layer = Message + Aggregation

- Different instantiations under this perspective
- GCN, GraphSAGE, GAT, …



A General GNN Framework (2)

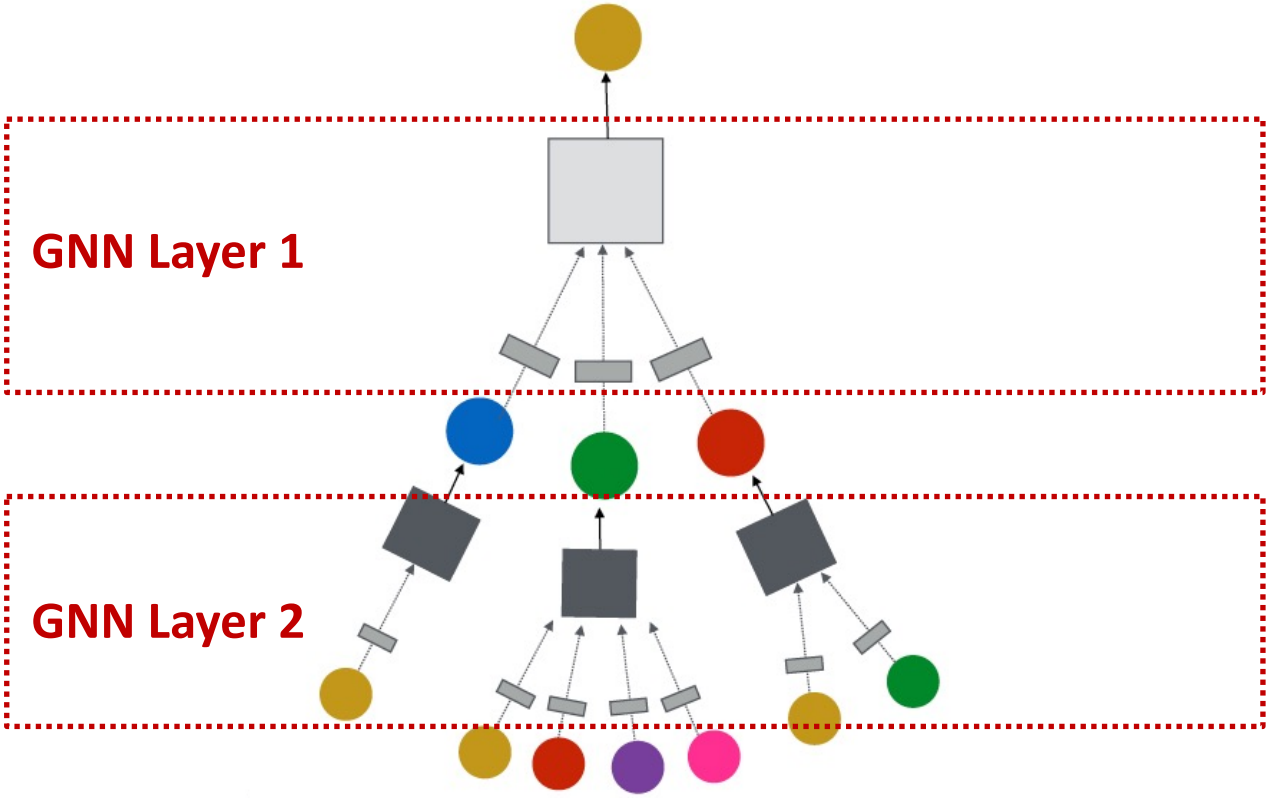


INPUT GRAPH

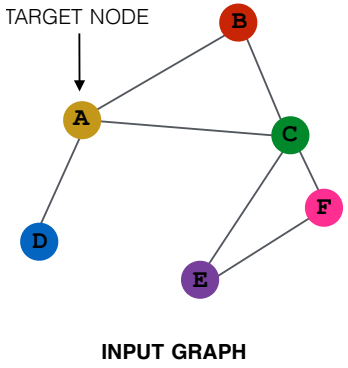
Connect GNN layers into a GNN

- Stack layers sequentially
- Ways of adding skip connections

(3) Layer connectivity



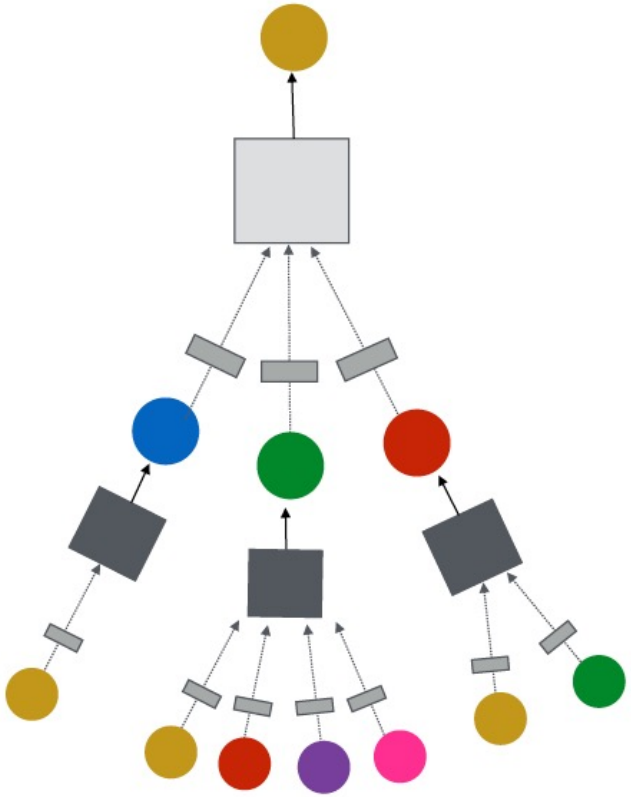
A General GNN Framework (3)



INPUT GRAPH

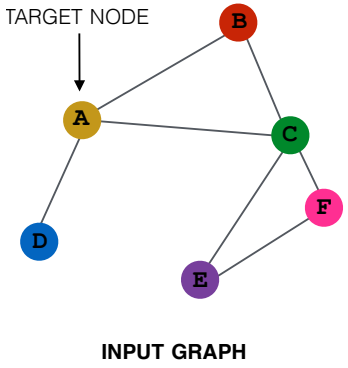
Idea: Raw input graph ≠ computational graph

- **Graph feature augmentation**
- **Graph structure augmentation**

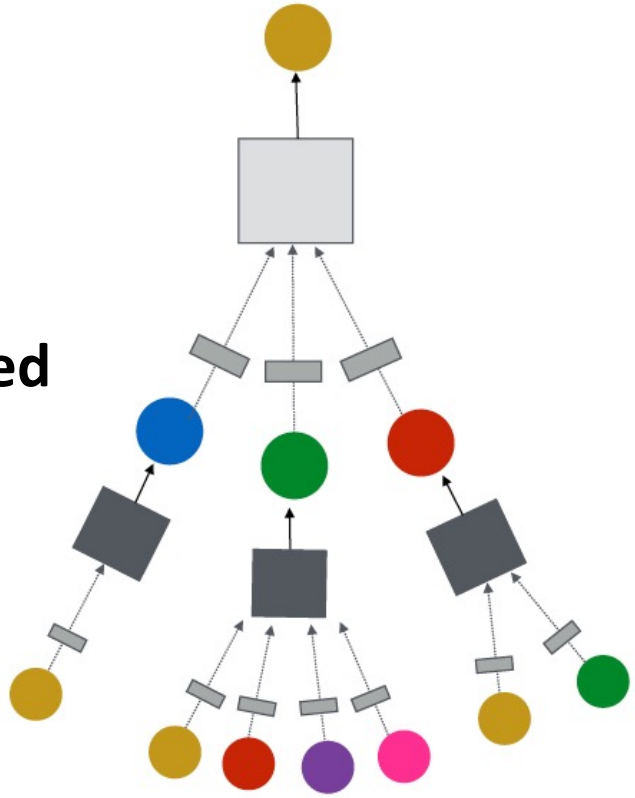


(4) Graph augmentation

A General GNN Framework (4)



(5) Learning objective

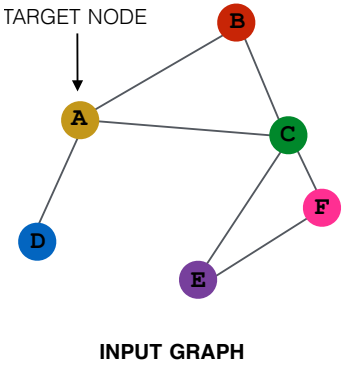


How do we train a GNN

- **Supervised/Unsupervised objectives**
- **Node/Edge/Graph level objectives**

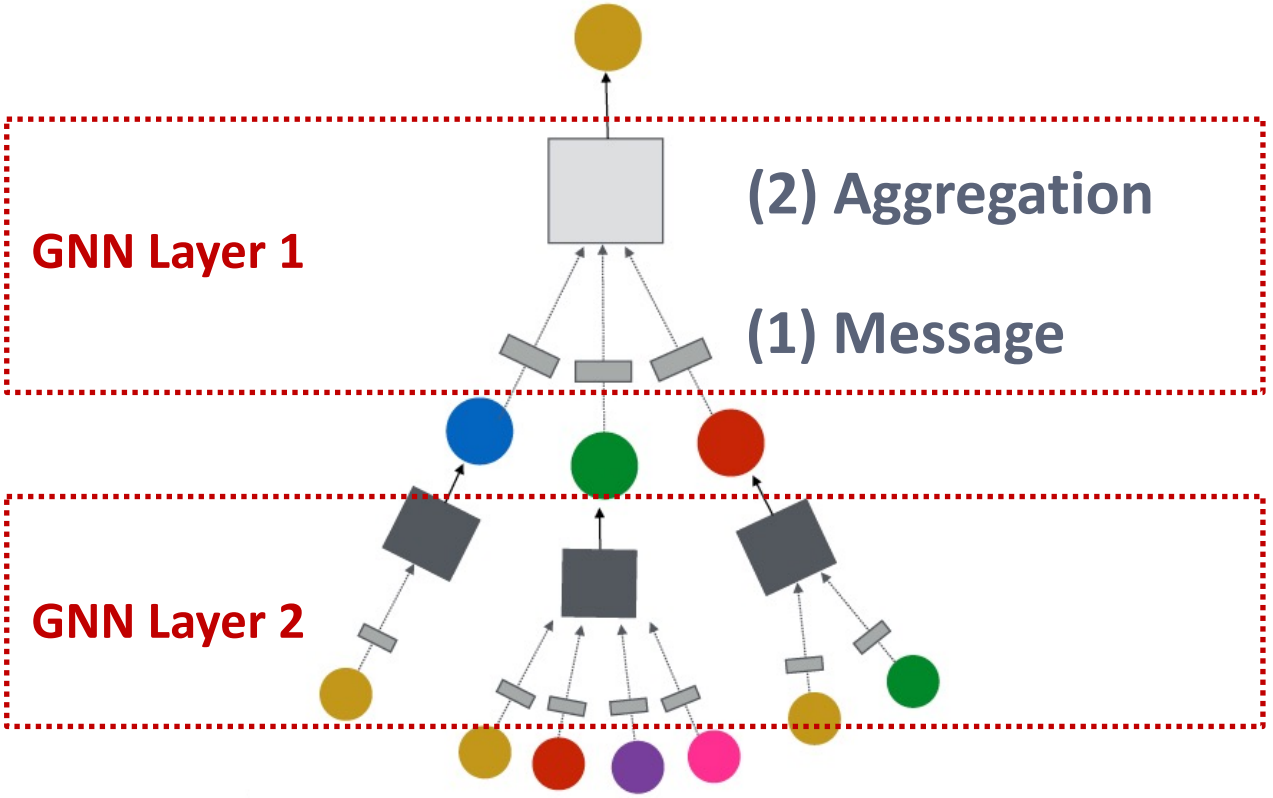
(We will discuss all of these later in class)

GNN Framework: Summary



INPUT GRAPH

(5) Learning objective



(3) Layer connectivity

(4) Graph augmentation