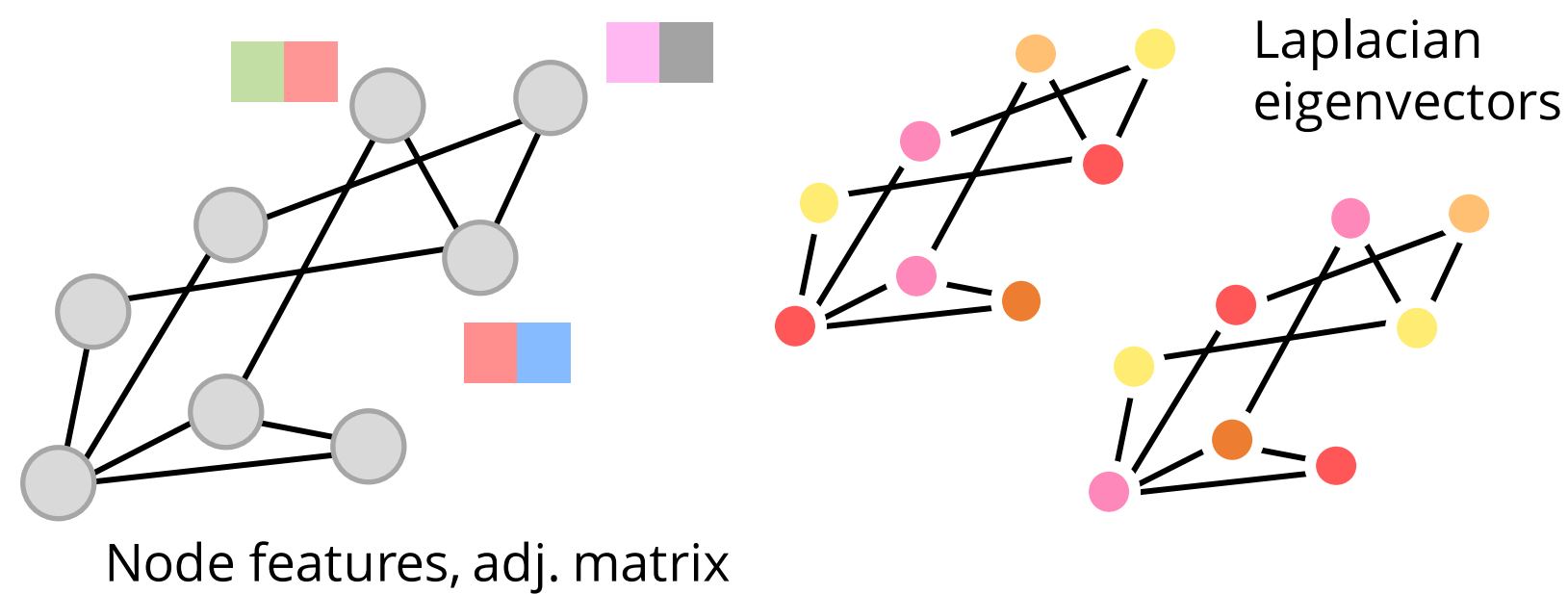


Architecture Diagram

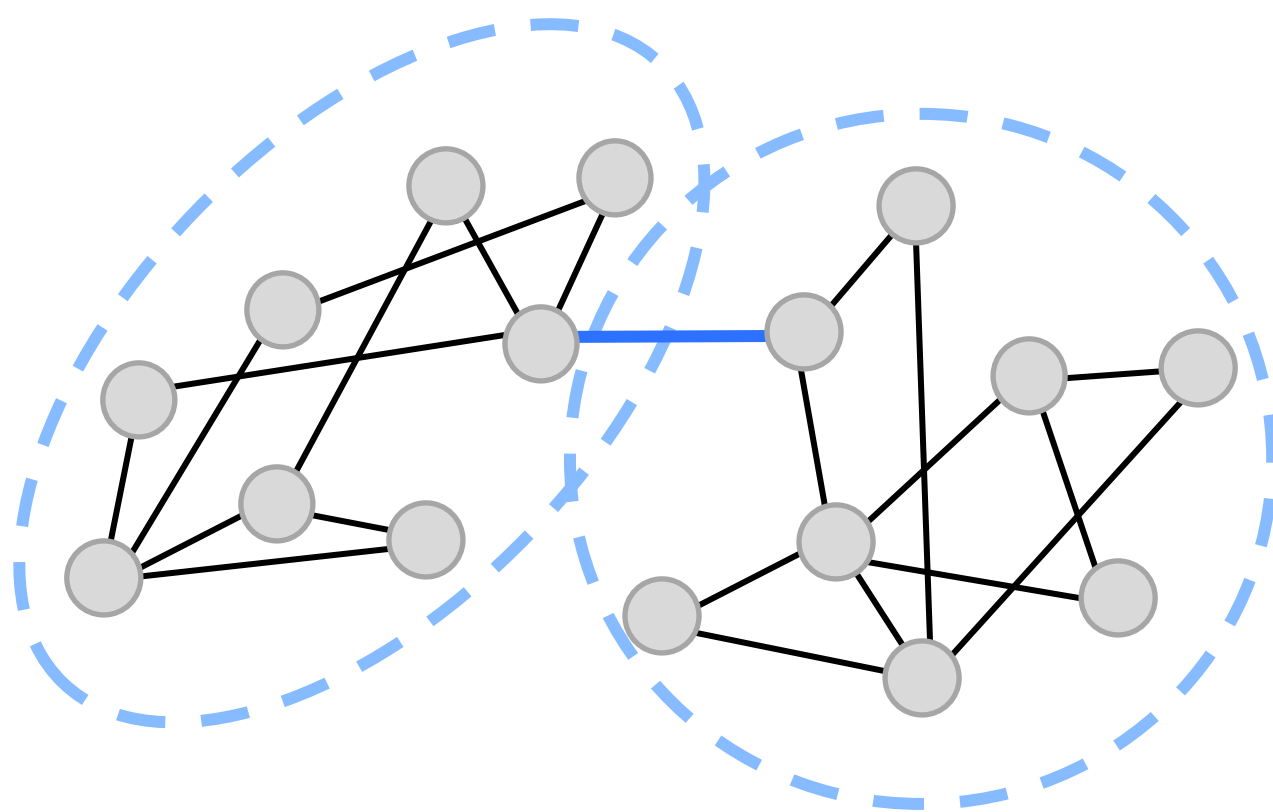
SignNet positional encoding using DeepSets

$$f(v_1, \dots, v_k) = \rho \left([\phi(v_i) + \phi(-v_i)]_{i=1}^k \right)$$

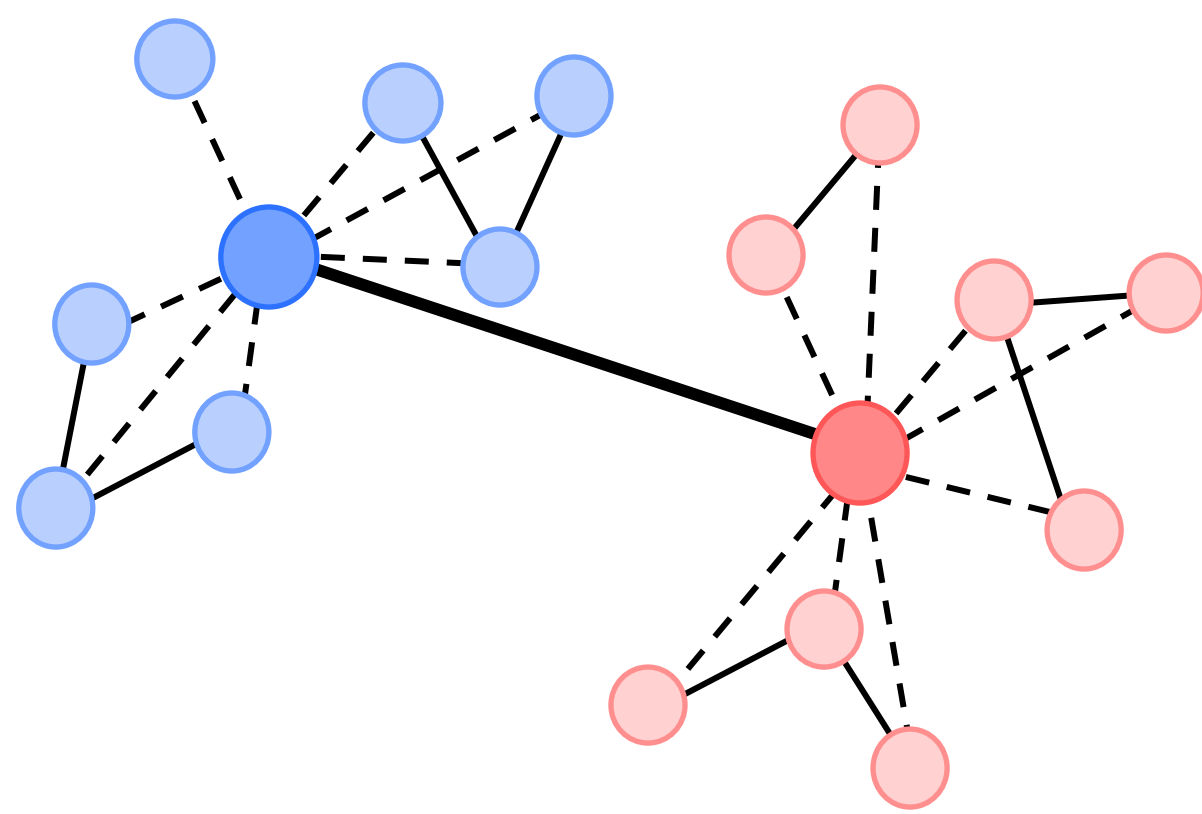


Jointly optimize MP-GNN and MLP to minimize:

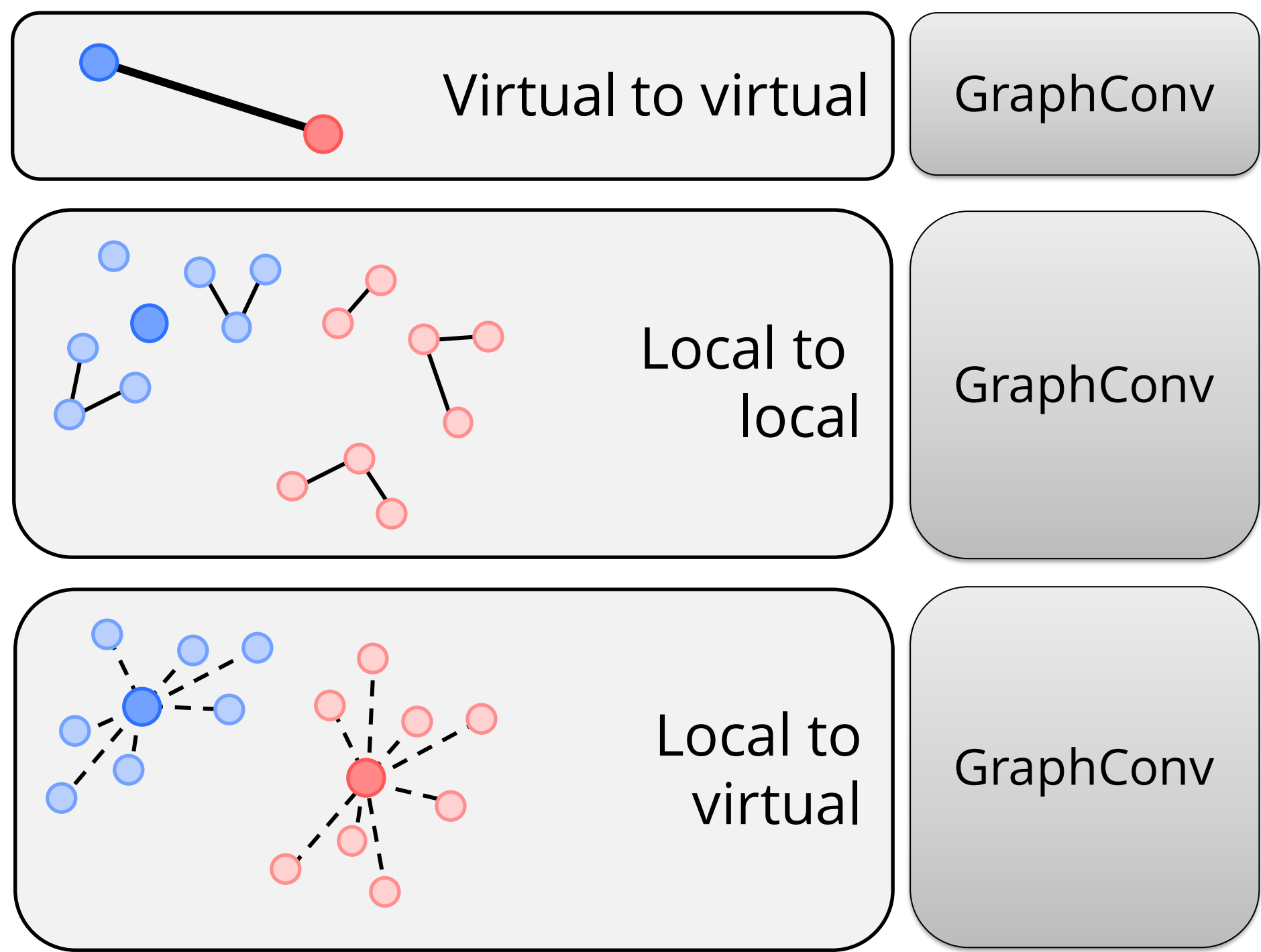
$$\mathcal{L}_u = \mathcal{L}_c + \mathcal{L}_o = \underbrace{-\frac{\text{Tr}(\mathbf{S}^T \tilde{\mathbf{A}} \mathbf{S})}{\text{Tr}(\mathbf{S}^T \tilde{\mathbf{D}} \mathbf{S})}}_{\mathcal{L}_c} + \underbrace{\left\| \frac{\mathbf{S}^T \mathbf{S}}{\|\mathbf{S}^T \mathbf{S}\|_F} - \frac{\mathbf{I}_K}{\sqrt{K}} \right\|_F}_{\mathcal{L}_o},$$



Clustered graph to coarsen representation (dashed lines represent connection to virtual node.)



Heterogenize, pass into Hetero conv. net:



Optional MLP

Graph- or node-level predictions