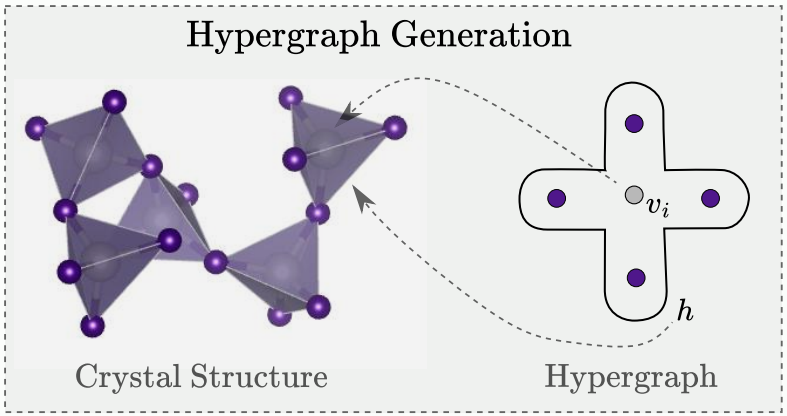


Message Passing

$$U_t(v_i^t, m^{t+1}) = v_i^{t+1}$$

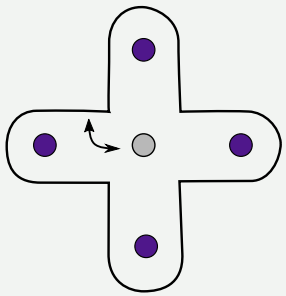
$\vdots$ $T\times$ Layers

$$R(\{v_i^T\}) = \hat{y}$$

$$m^{t+1} =$$

# of Messages:

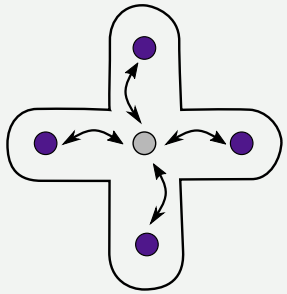
Relatives Dual Graph



$$\mathrm{M}_{t+1}(v \oplus h)$$

$$\mathcal{O}(n)$$

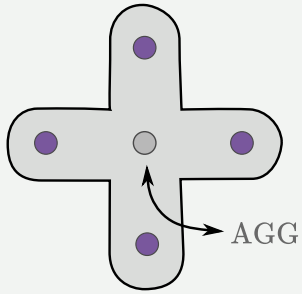
Total Exchange



$$\sum_{v_j \in h} \mathrm{M}_{t+1}(v \oplus h \oplus v_j)$$

$$\mathcal{O}(n^2)$$

Neighborhood Aggregation



$$\mathrm{M}_{t+1}(v \oplus h \oplus \mathrm{AGG}(\{v_j \in h\}))$$

$$\mathcal{O}(n)$$

m : Message

M : Message function for layer

U : Node update function

R : Readout function

v : Node feature

h : Hyperedge feature

n : Number of nodes in hyperedge

$\hat{y}$: Model output