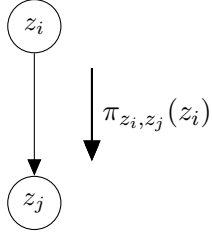# Pearl algorithm cheat-sheet
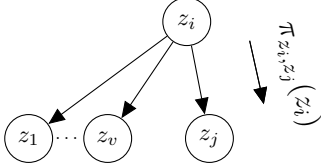
π messages - from parent to child

Simple version:

$$\pi_{z_i,z_j}(z_i) = \pi(z_i)$$
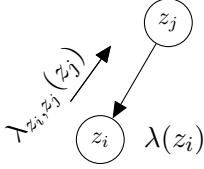
Complete version:

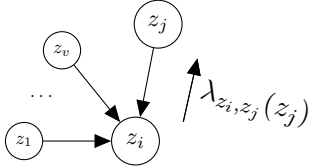$$\pi_{z_i,z_j}(z_i) = \pi(z_i) \prod_{v \neq j} \lambda_{z_v,z_i}(z_i)$$

λ messages - from child to parent

Simple version:

$$\lambda_{z_i,z_j}(z_j) = \sum_{z_i} \lambda(z_i) \, p(z_i|z_j)$$
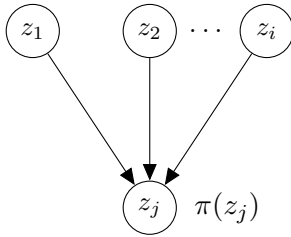
Complete version:

$$\lambda_{z_i,z_j}(z_j) = \sum_{z_i} \lambda(z_i) \sum_{z_v \in \mathbf{z} \setminus z_j} p(z_i|z_1, z_2, ...z_j) \prod_{v \neq j} \pi_{z_v,z_i}(z_v)$$
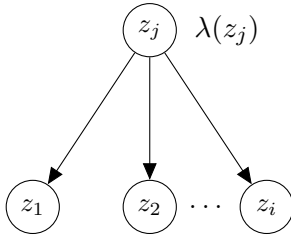
Belief components

Causal:

$$\pi(z_j) = \sum_{z_i \in \text{parent}(z_j)} p(z_j|z_1, z_2, ...) \prod_{z_i \in \text{parent}(z_j)} \pi_{z_i,z_j}(z_i)$$

Diagnostic:

$$\lambda(z_j) = \prod_{z_i \in \text{child}(z_j)} \lambda_{z_i,z_j}(z_j)$$