Mean Field Networks

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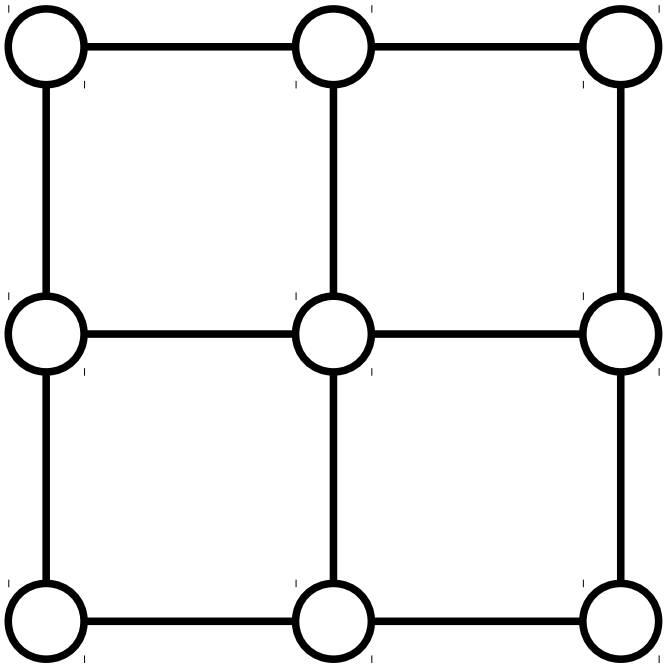
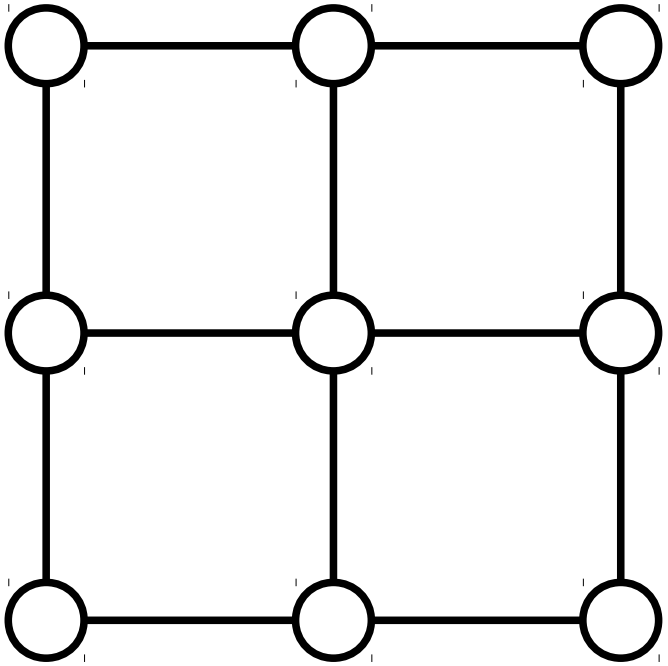
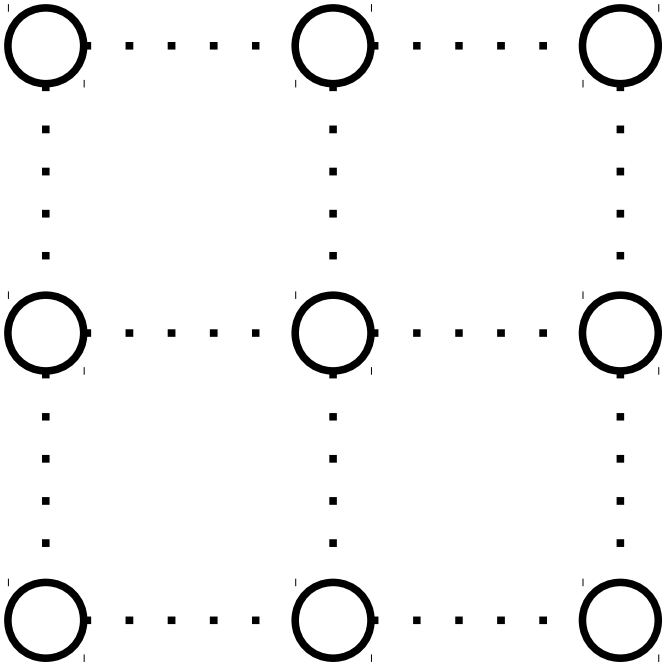


$$p(\mathbf{x};\theta) = \frac{1}{Z}\exp\left(\sum_{s\in\mathcal{V}} f_s(x_s;\theta) + \sum_{(s,t)\in\mathcal{E}} f_{st}(x_s,x_t;\theta)\right)$$





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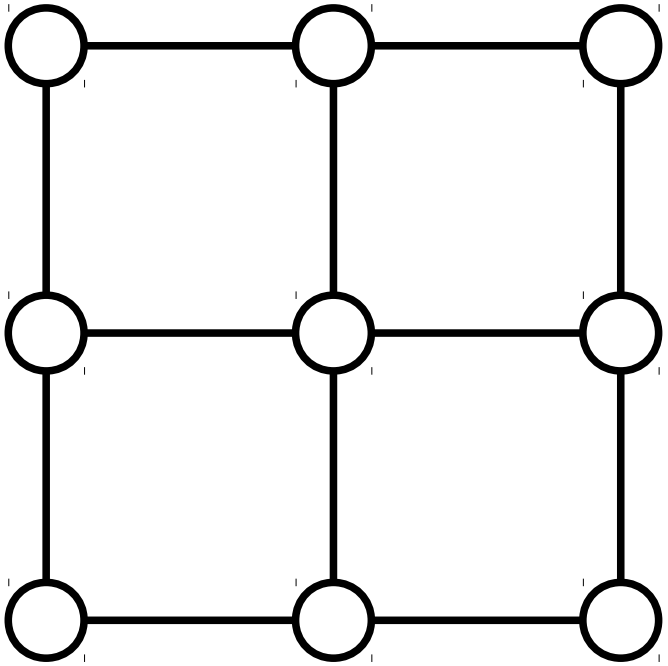
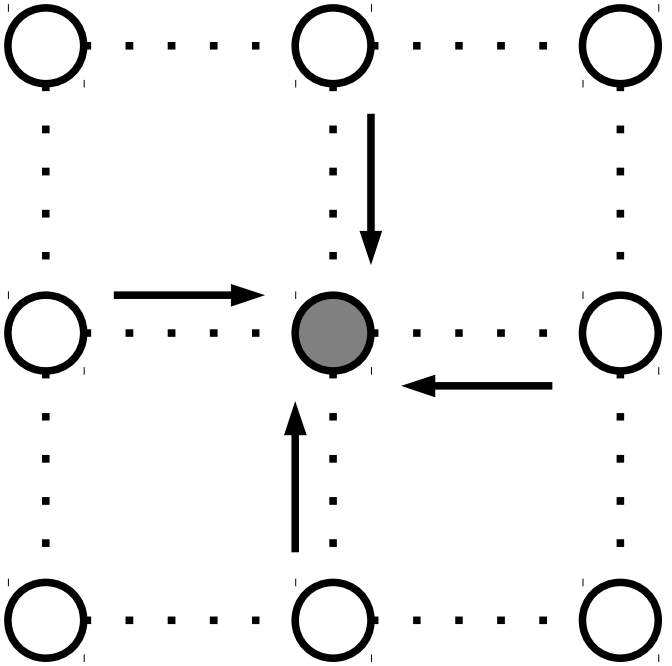
$$q(\mathbf{x}) = \prod_{s\in\mathcal{V}} q_s(x_s)$$

$$\min_q \mathrm{KL}(q||p)$$





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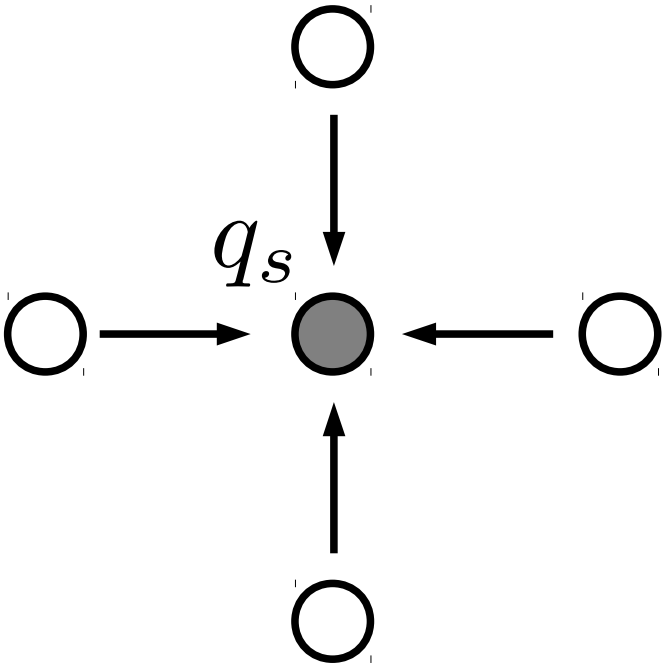
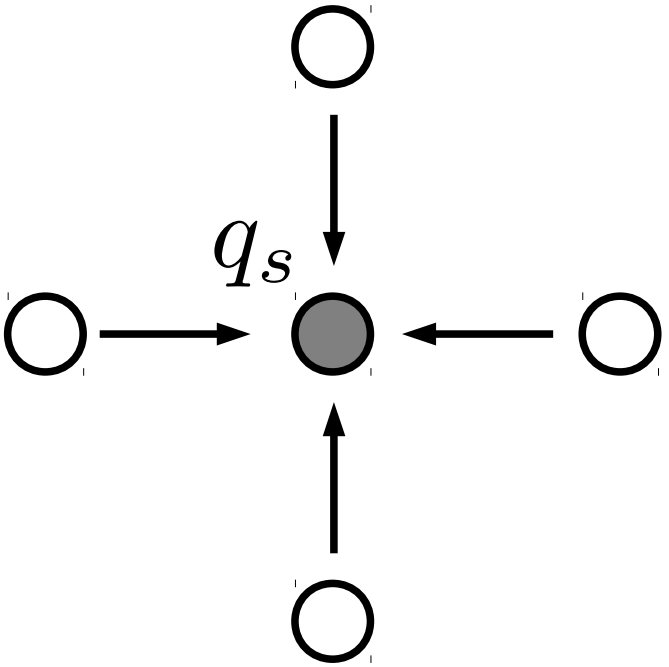
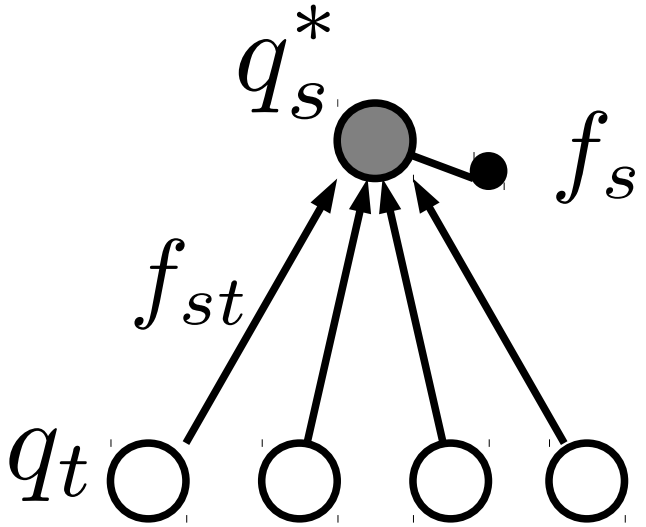


$$q_s^*(x_s) = \frac{1}{Z_s} \exp\left(f_s(x_s;\theta) + \sum_{t \in \mathcal{N}(s)} \sum_{x_t} q_t(x_t) f_{st}(x_s, x_t;\theta) \right)$$





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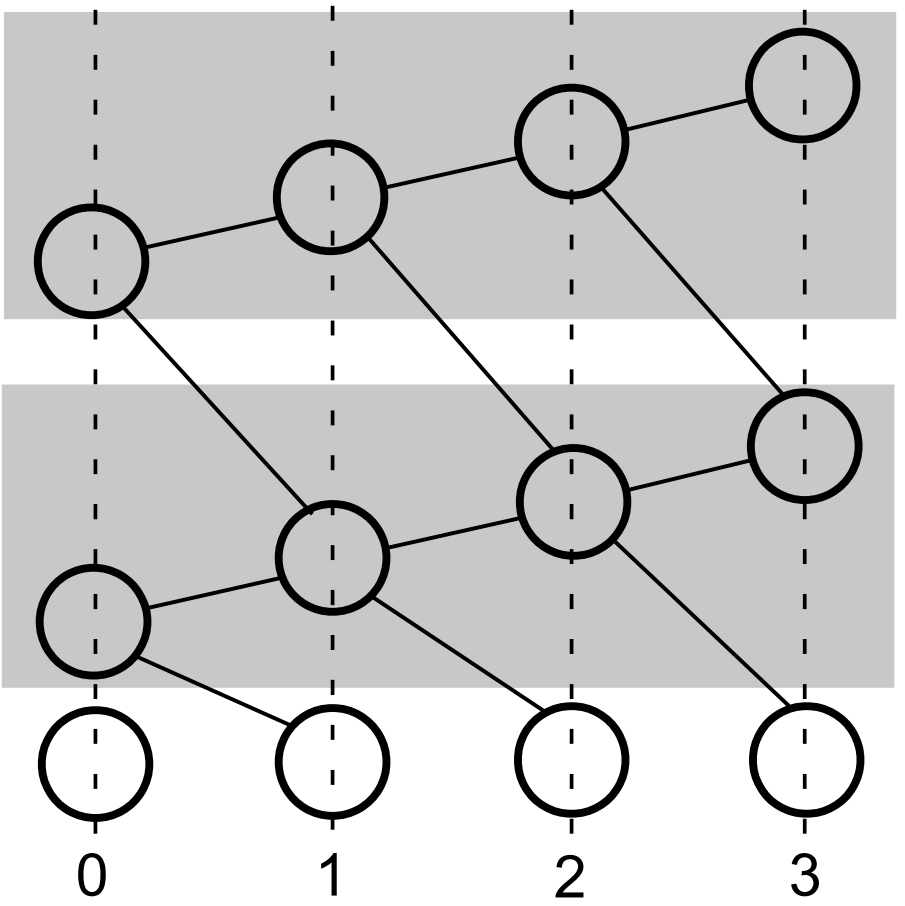
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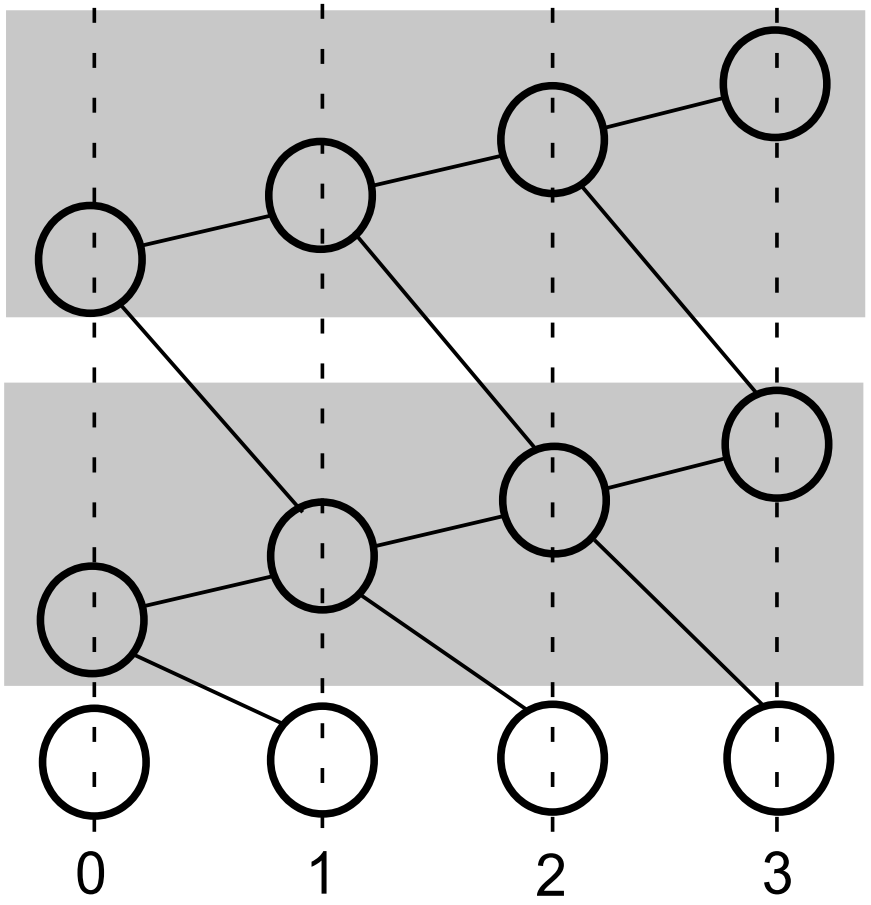

- Parameters in network tied with the graphical model
- Parameters in network tied on all layers
- Structure of the network tied with the graphical model, and tied on all layers.