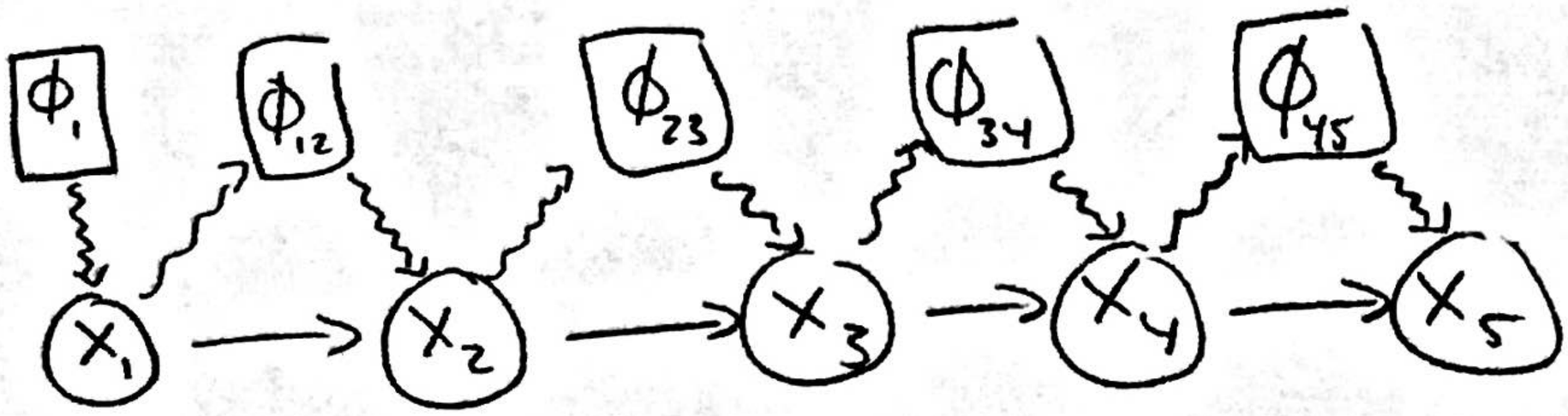

$$P(\vec{X}) = P(X_1) \cdot P(X_2|X_1) \cdot P(X_3|X_2) \cdot P(X_4|X_3) \cdot P(X_5|X_4)$$

$$P(X_i) = \frac{1}{Z_i} \exp(-a x_i^2)$$

$$P(X_j|X_i) = \frac{1}{Z_{ij}} \exp(-b_{ij}(x_i - x_j)^2)$$

$$\theta = \{ a \; ; \; b_{12} \; ; \; b_{23} \; ; \; b_{34} \; ; \; b_{45} \}$$

$$L(\theta : D) = \prod_{i=1}^{|D|} P(\vec{x}[i] : \theta)$$

$$\log\left[L(\theta : D)\right] = \sum_{i=1}^{|D|} \log\left[P(\vec{x}[i] : \theta)\right]$$

$$\log\left[L(\theta : D)\right] = \sum_{i=1}^{|D|} \left[\left(\log[P(x_1[i] : a)] \right) + \left(\log[P(x_2[i]|x_1[i] : b_{12}) + \cdots \right] \right]$$

$$\log\left[L(\theta : D)\right] = \underbrace{\sum_{i=1}^{|D|} \left(\log[P(x_1[i] : a)] \right)}_{\text{Depends only on } a} + \underbrace{\sum_{i=1}^{|D|} \left(\log[P(x_2[i]|x_1[i] : b_{12})] \right)}_{\text{Depends only on } b_{12}} + \cdots$$

"Likelihood Decomposability"

This treatment allows us to optimize each component of θ independently!