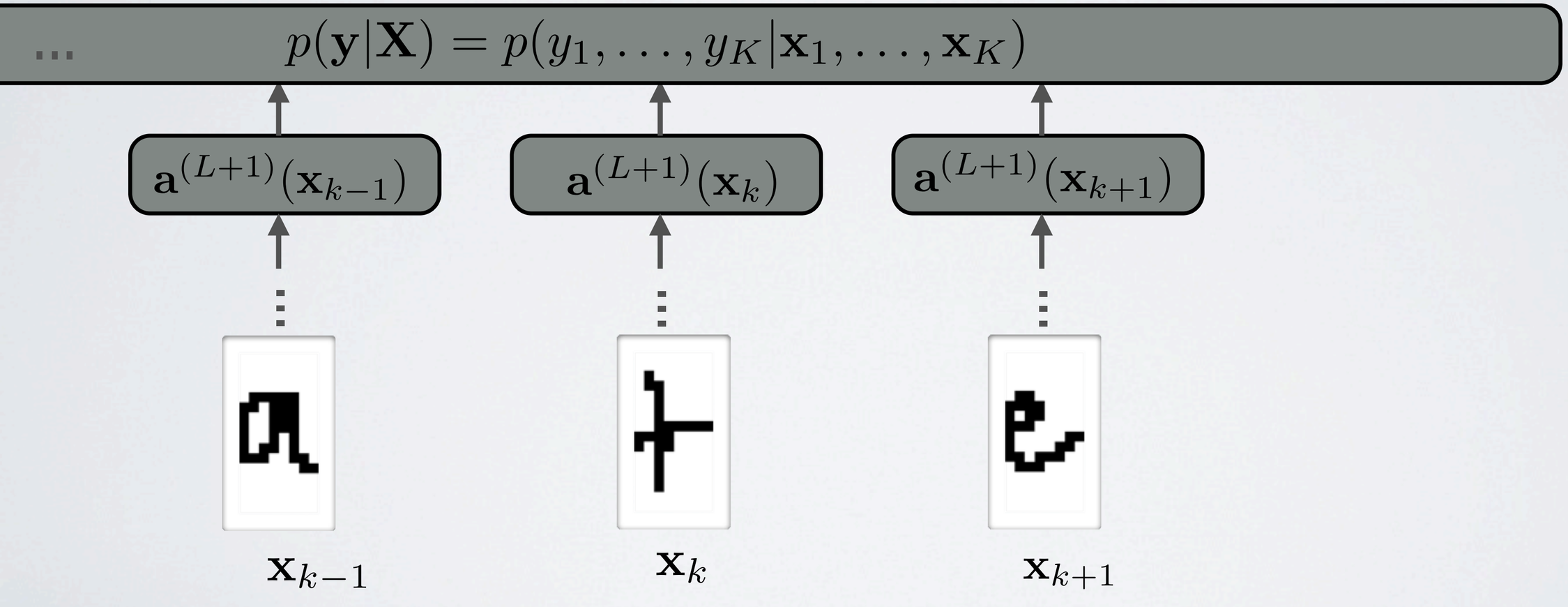
Neural networks

Conditional random fields - linear chain CRF

CONDITIONAL RANDOM FIELD

Topics: sequence classification

- For a given example $(\mathbf{X}, \mathbf{y})$:



LINEAR CHAIN CRF

Topics: lateral weights

- Regular classification:

$$
\begin{aligned}
p(\mathbf{y}|\mathbf{X}) &= \prod_k p(y_k|\mathbf{x}_k) = \prod_k \exp(a^{(L+1)}(\mathbf{x}_k)_{y_k})/Z(\mathbf{x}_k) \\
&= \exp\left(\sum_k a^{(L+1)}(\mathbf{x}_k)_{y_k}\right) / \left(\prod_k Z(\mathbf{x}_k)\right)
\end{aligned}
$$

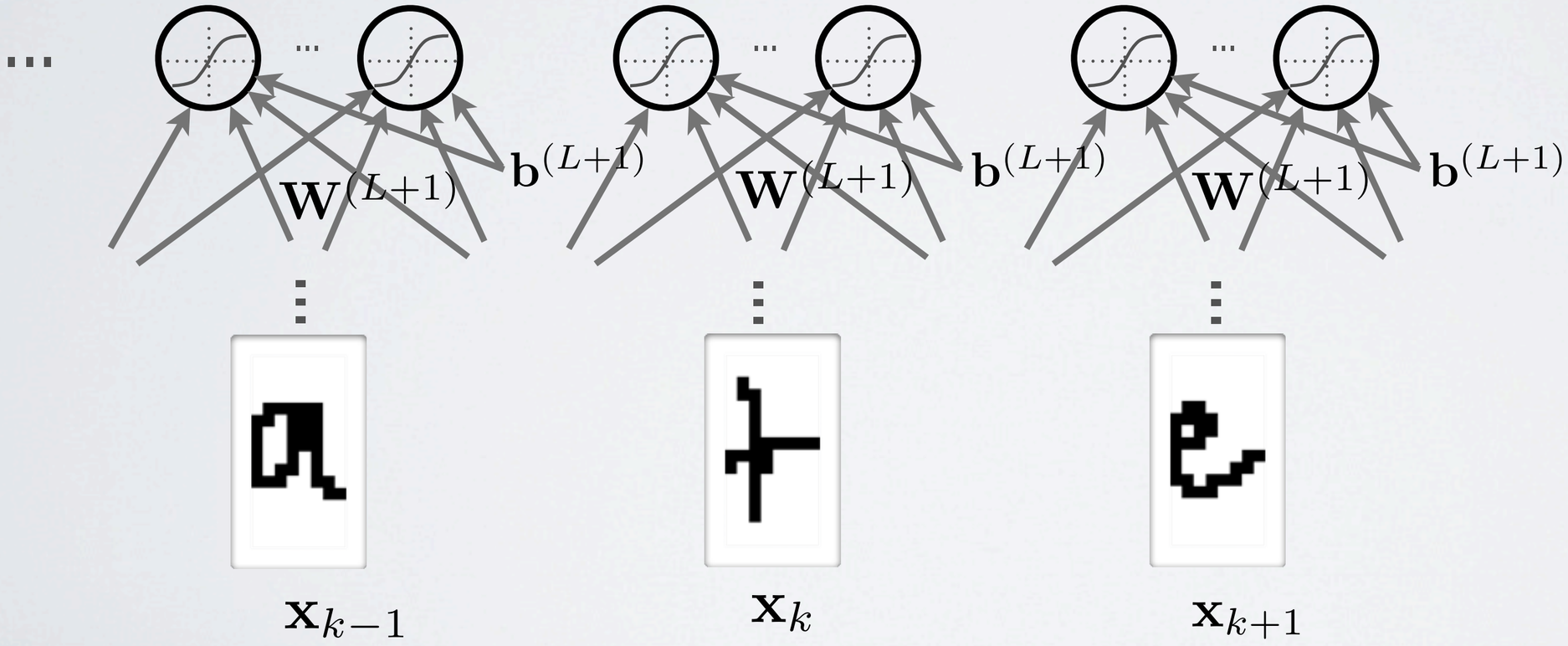
- Sequence classification with linear chain:

$$
p(\mathbf{y}|\mathbf{X}) = \exp\left(\underbrace{\sum_{k=1}^{K} a^{(L+1)}(\mathbf{x}_k)_{y_k}}_{\text{is } y_k \text{ likely given input ?}} + \underbrace{\sum_{k=1}^{K-1} V_{y_k,y_{k+1}}}_{\text{is } y_k \text{ followed by } y_{k+1} \text{ likely?}}\right) \underbrace{/Z(\mathbf{X})}_{\text{partition function}}
$$

LINEAR CHAIN CRF

Topics: lateral weights

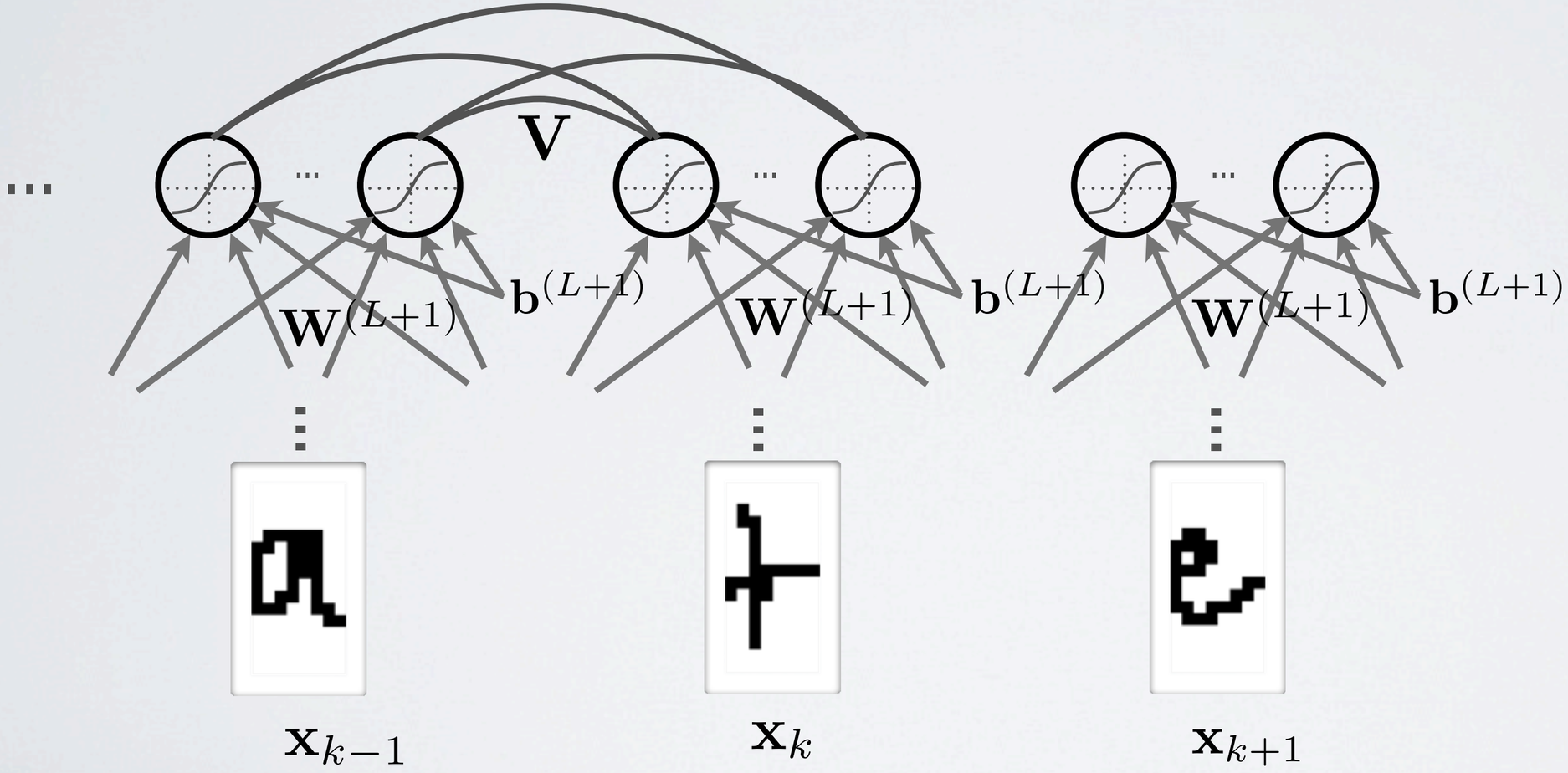
- Sequence classification with linear chain:



LINEAR CHAIN CRF

Topics: lateral weights

- Sequence classification with linear chain:



LINEAR CHAIN CRF

Topics: lateral weights

- Sequence classification with linear chain: