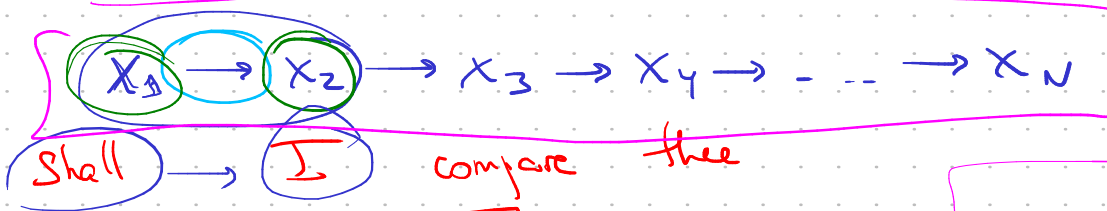


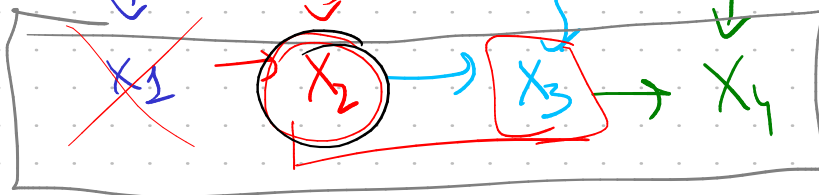
Markov chain



$$p(x_t | x_{t-1})$$

$$p(w | w')$$

$$p(x_1)$$

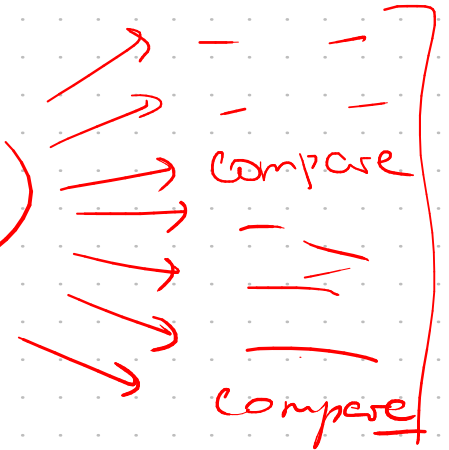


- unigram LM

$$p(x_t | x_{t-1}, x_{t-2})$$

$$p(x_1, x_2)$$

$$(Shell, I)$$



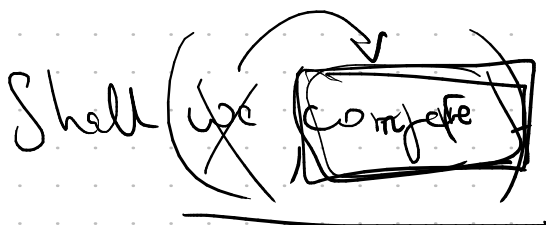
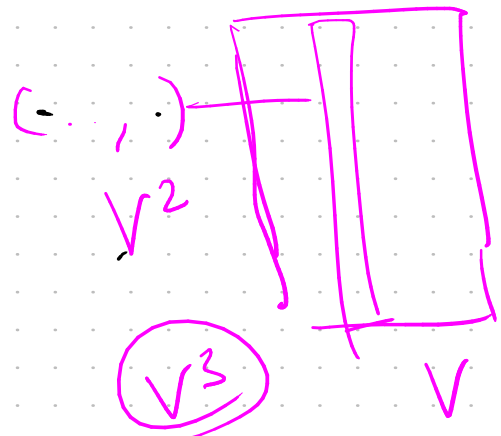
bigram LM

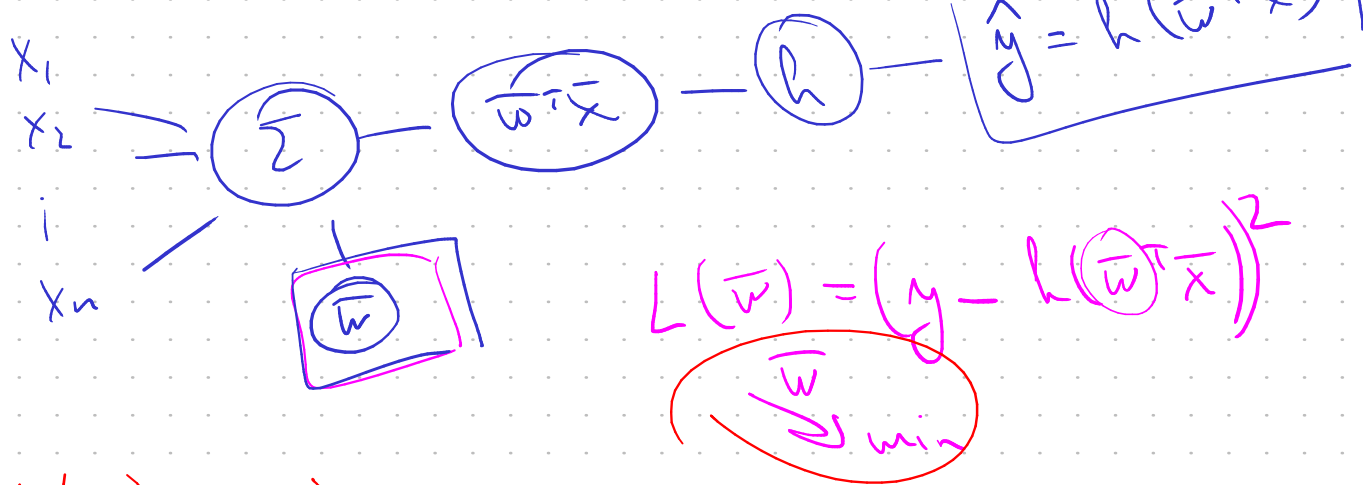
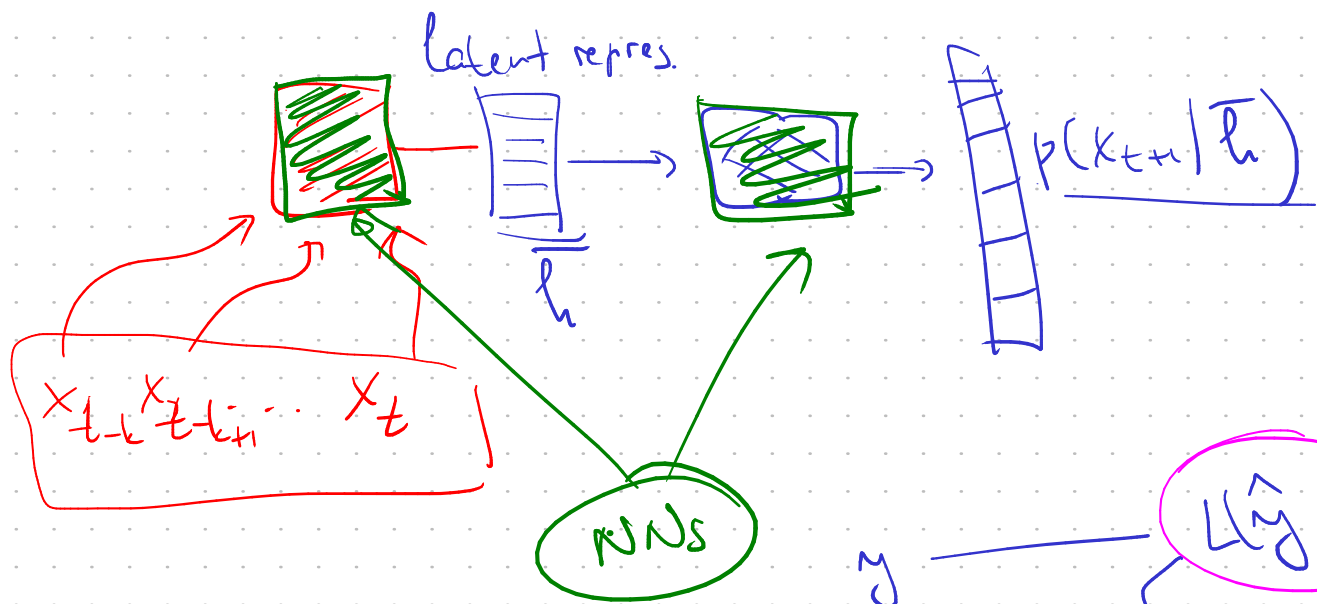
$$V^{n+1}$$

n-gram LM

$$(x_1, x_2) \rightarrow (x_2, x_3) \rightarrow (x_3, x_4) \rightarrow (x_4, x_5) \rightarrow \dots$$

$$p(x_t, x_{t+1} | (x_{t-1}, x_t))$$





$L(\bar{w}) \rightarrow \min$

$\bar{w} := \bar{w} - \eta \cdot \frac{\partial L(\bar{w})}{\partial \bar{w}}$

$\left(\frac{\partial L}{\partial w_1}, \dots, \frac{\partial L}{\partial w_n} \right)$

