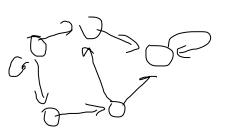
Лекция 1



$P = (\quad)$

$x_1 x_6 x_4 x_7 x_2 x_5$

$\Sigma = \{0,1,2,3,4,5,6\}$

$3102520160231 \rightarrow P$

$P(x_1 x_2 \dots x_4) = P(x_1 = x_1) P(x_2 | x_1) P(x_3 | x_2) \dots$

$= P(x_1) \prod_t p_{x_{t+1} x_t} = P(x_1) \prod_{i,j} p_{ij}^{n_{ij}}$

1

MLE $L_1(p) = p(x_1) \prod_i \prod_j p_{ij}^{n_{ij}}$

$\mathcal{L}(p) = \log L_1(p) = \log p(x_1) + \sum_{ij} n_{ij} \log p_{ij}$

$\frac{\partial \mathcal{L}}{\partial p_{ij}} = 0$

$\mathcal{L}' = \mathcal{L} - \sum_i \lambda_i \left(\sum_j p_{ij} - 1 \right)$

$\frac{\partial \mathcal{L}'}{\partial p_{ij}} = 0 = \frac{n_{ij}}{p_{ij}} - \lambda_i = 0$

$p_{ij} = \frac{n_{ij}}{\lambda_i} \quad \sum_j p_{ij} = 1 \Rightarrow$

$\sum_j \frac{n_{ij}}{\lambda_i} = 1, \quad \lambda = \frac{1}{\sum_j n_{ij}}$

$p_{ij} = \frac{n_{ij}}{\sum_j n_{ij}}$

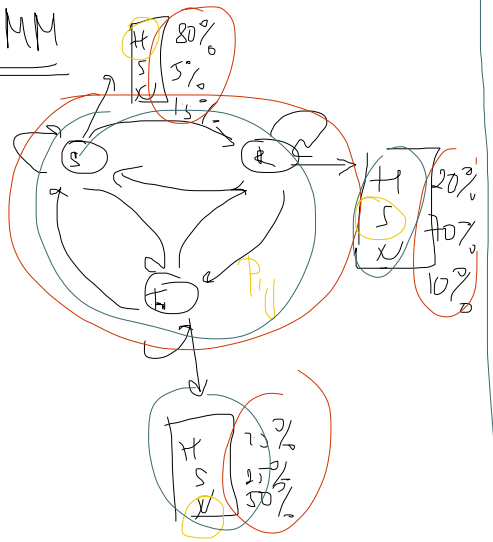
$P_{11} = 0$

$P_{34} = \frac{1}{2}$

$P_{31} = \frac{1}{2}$

3423103027145647

HMM



HHSNNSSSHHNNSHHH

$A = \begin{pmatrix} a_{ij} \end{pmatrix}$ ← скрытые

N

$B = \begin{pmatrix} | & | & | & | & | & | \\ | & | & | & | & | & | \end{pmatrix}$ M ← символы

N

π ← H, Y

$\lambda = (A, B, \pi)$ HMM

$O = O_1 O_2 O_3 O_4 \dots$