

$$L = \prod_{i=1}^m P(x_i, y_i | \theta) = \prod_{i=1}^m P(x_i | y_i, \theta) P(y_i | \theta)$$

$$\log L = \log \prod_{i=1}^m P(x_i, y_i | \theta) = \sum_{i=1}^m \log P(x_i | y_i, \theta) P(y_i | \theta)$$