

$$\sum_{d=1}^N \log P(d) = \sum_{d=1}^N \sum_{t=1}^T X(t, d) \log \sum_{k=1}^K P(t | k) P(k | d)$$

which is to be maximised w.r.t. parameters  $P(t | k)$  and then also  $P(k | d)$ ,

subject to the constraints that  $\sum_{t=1}^T P(t | k) = 1$  and  $\sum_{k=1}^K P(k | d) = 1$ .