

$$P1(t,k) \propto P1(t,k) \sum_{d=1}^N \frac{X(t,d)}{\sum_{k=1}^K P1(t,k)P2(k,d)} P2(k,d); \quad P1(t,k) \propto \frac{P1(t,k)}{\sum_{t=1}^T P1(t,k)}$$

$$P2(k,d) \propto P2(k,d) \sum_{t=1}^T \frac{x(t,d)}{\sum_{k=1}^K P1(t,k)P2(k,d)} P1(t,k); \quad P2(k,d) \propto \frac{P2(k,d)}{\sum_{k=1}^K P2(k,d)}$$