

# Maximum a Posteriori (MAP) Estimate

$$\Lambda^* = \arg \max_{\Lambda} p(\Lambda) p(\text{Data} | \Lambda)$$

- We may use  $p(\Lambda)$  to encode all kinds of preferences and constraints, e.g.,
  - $p(\Lambda) > 0$  if and only if one topic is precisely “background”:  $p(w | \theta_B)$
  - $p(\Lambda) > 0$  if and only if for a particular doc  $d$ ,  $\pi_{d,3} = 0$  and  $\pi_{d,1} = 1/2$
  - $p(\Lambda)$  favors a  $\Lambda$  with topics that assign high probabilities to some particular words
- The MAP estimate (with conjugate prior) can be computed using a similar EM algorithm to the ML estimate with smoothing to reflect prior preferences