PLSA ➜ LDA

W

$p(w|\theta_1)$ Topic θ_1

government 0.3
response 0.2
...

$p(w|\theta_2)$ Topic θ_2

city 0.2
new 0.1
orleans 0.05
...

$p(w|\theta_k)$ Topic θ_k

donate 0.1
relief 0.05
help 0.02
...

$p(\theta_1)=\pi_{d,1}$

$p(\theta_2)=\pi_{d,2}$

$p(\theta_k)=\pi_{d,k}$

Both word distributions and topic choices are free in PLSA

$$\vec{\pi}_d = (\pi_{d,1},...,\pi_{d,k})$$

$$p(\vec{\pi}_d) = \mathrm{Dirichlet}(\vec{\alpha})$$

$$\vec{\alpha} = (\alpha_1,...,\alpha_k), \alpha_i > 0$$

LDA imposes a prior on both

$$\vec{\theta}_i = (p(w_1|\theta_i),...,p(w_M|\theta_i))$$

$$p(\vec{\theta}_i) = \mathrm{Dirichlet}(\vec{\beta})$$

$$\vec{\beta} = (\beta_1,...,\beta_M), \beta_i > 0$$