EM Computation in Action

E-step
$$p^{(n)}(z = 0 \mid w) = \frac{p(\theta_d)p^{(n)}(w \mid \theta_d)}{p(\theta_d)p^{(n)}(w \mid \theta_d) + p(\theta_B)p(w \mid \theta_B)}$$

M-step
$$p^{(n+1)}(w \mid \theta_d) = \frac{c(w,d)p^{(n)}(z = 0 \mid w)}{\sum_{w' \in V} c(w',d)p^{(n)}(z = 0 \mid w')}$$

Assume
$p(\theta_d) = p(\theta_B) = 0.5$
and $p(w \mid \theta_B)$ is known

Word	#	$p(w \mid \theta_B)$	Iteration 1		Iteration 2		Iteration 3	
			$P(w \mid \theta)$	$p(z=0 \mid w)$	$P(w \mid \theta)$	$P(z=0 \mid w)$	$P(w \mid \theta)$	$P(z=0 \mid w)$
The	4	0.5	**0.25**	0.33	**0.20**	0.29	**0.18**	0.26
Paper	2	0.3	**0.25**	0.45	**0.14**	0.32	**0.10**	0.25
Text	4	0.1	**0.25**	0.71	**0.44**	0.81	**0.50**	0.93
Mining	2	0.1	**0.25**	0.71	**0.22**	0.69	**0.22**	0.69
Log-Likelihood			-16.96		-16.13		-16.02	

Likelihood increasing →

"By products": Are they also useful?