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?