Latent Dirichlet Allocation

Dirichlet priors for $\phi_t = (\phi_{wt})_{w \in W}$ and $\theta_d = (\theta_{td})_{t \in T}$:

$$Dir(\phi_t|\beta) = \frac{\Gamma(\beta_0)}{\prod_w \Gamma(\beta_w)} \prod_w \phi_{wt}^{\beta_w - 1} \quad \beta_0 = \sum_w \beta_w, \beta_t > 0$$

- **Inference:**
  - Variational Bayes
  - Gibbs Sampling

- **Output:**
  - Posterior probabilities for parameters (also Dirichlet!).

Asuncion A., Welling M., Smyth P., Teh Y. W. On smoothing and inference for topic models, 2009.