

Multinomial likelihood

$$P(X|\theta) = \frac{n!}{x_1! \dots x_K!} \theta_1^{x_1} \dots \theta_K^{x_K}$$

$$p(\theta) = \text{Dir}(\theta|\alpha) = \frac{1}{B(\alpha)} \prod_{k=1}^K \theta_k^{\alpha_k - 1}$$

$$p(\theta|X) \propto \prod_{k=1}^K \theta_k^{\alpha_k + x_k - 1}$$

