Dirichlet distribution (of order K).

a random vector $(p_1\ p_2\ \cdots\ p_K)$, with $\sum_1^K p_i = 1$

with density

$$C \cdot p_1^{\alpha_1 - 1} \cdot p_2^{\alpha_2 - 1} \cdots p_{K-1}^{\alpha_{K-1} - 1} \cdot \left(1 - \sum_{i=1}^{K-1} p_i\right)^{\alpha_K - 1} = f(p_1\ p_2 \cdots p_{K-1})$$

on $0 < p_1, p_2 \cdots p_{K-1} < 1$

$$\text{density} = C \cdot p_1^{\alpha_1 - 1}\ p_2^{\alpha_2 - 1} \cdots p_{K-1}^{\alpha_{K-1} - 1}\ (p_K)^{\alpha_K - 1}.$$

$$\uparrow$$

$$p_K = 1 - \sum_{i=1}^{K-1} p_i$$

Compare this to beta density.

$$C \cdot p^{\alpha - 1}(1-p)^{\beta - 1} = C \cdot p_1^{\alpha - 1} \cdot p_2^{\beta - 1}$$

$$\uparrow$$

$$p_2 = 1 - p_1$$

Dirichlet distribution is often used for the prior dist. for multinomial random variable [just as beta is used for the prior of binomial random variable]