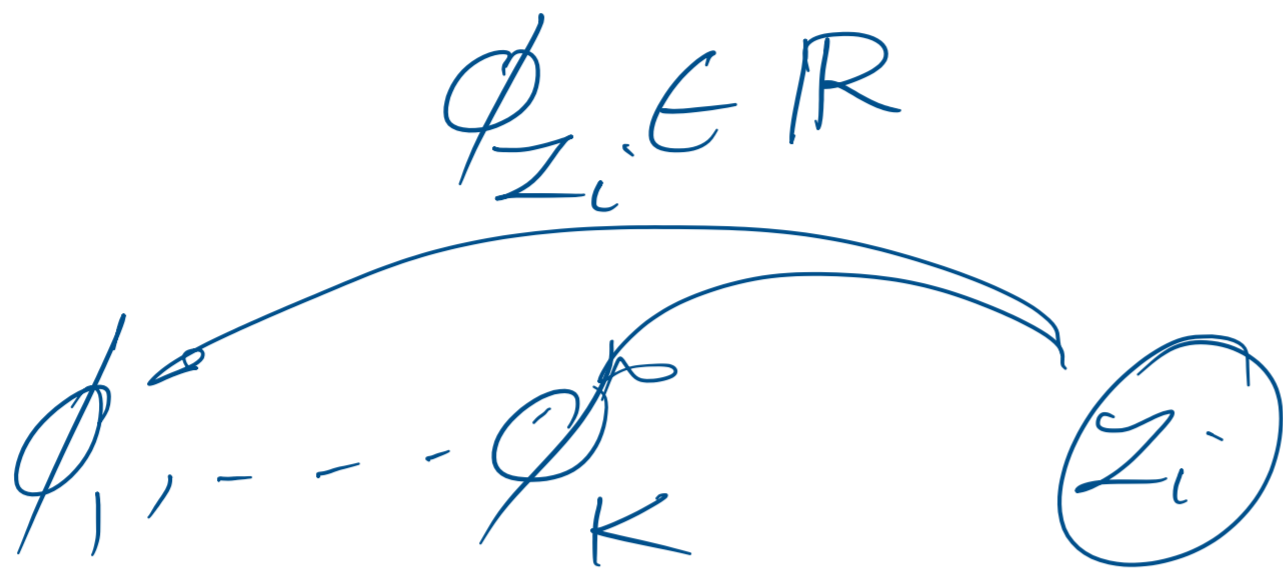


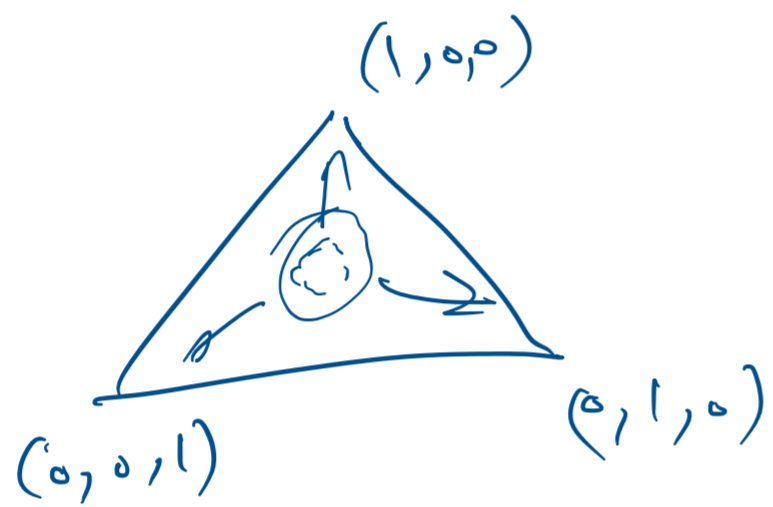
$X_i \sim \text{Cat}(\phi_{z_i})$        $Z_i \sim \text{Cat}(\theta)$

$\theta \in \mathbb{R}^K$

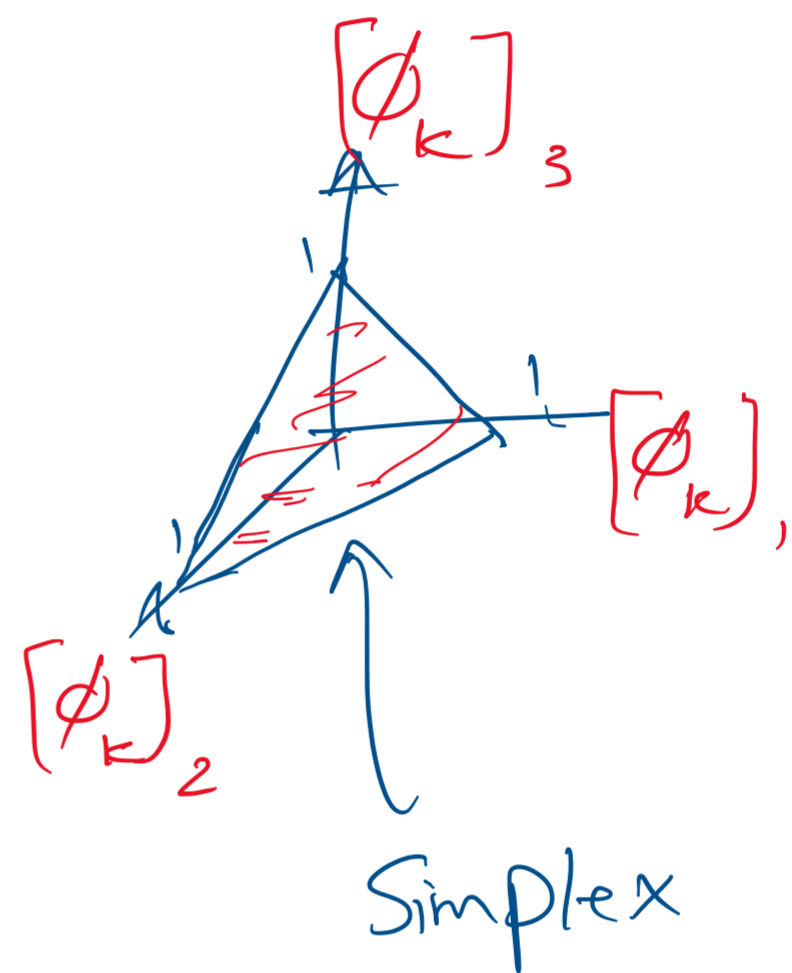


$\phi_k \sim \text{Dir}(\alpha)$

$\phi_k \in \mathbb{R}^3$        $\phi_k$



$\alpha \rightarrow \infty$



$\text{Dir}(\phi) = \frac{1}{B(\alpha)} \prod_k [\phi]_k^{\alpha}$

$\log B(\alpha) + \sum \alpha \log(\phi)$

$\min_{\phi} L(X, \phi)$

$+ \lambda \|\phi\|$   
 reg we 1

$\sum_i \log([\phi]_{k_i} + \epsilon)$

$\sum_i [\phi]_{k_i} = 1$

