MCMC M1 : D

Find posterior $p(z \mid \pi^*, y)$, marginalizing w.r.t. q and r.

MB

Use complete conditional from (c) to compute this posterior :

$$P(z \mid \pi^*, y) = \iint P(z \mid \pi^*, y, q, r)\, P(q \mid \pi^*, y)\, P(r \mid \pi^*, y)\, dq\, dr$$

Marginalizing out from the complete conditional is integrating the enlarged distribution with respect to q and r. This is equivalent to ignoring terms without q and r.

$$\propto \left[\prod_{j \in A_1} q_j^{a_1}\right]\left[\prod_{j \in A_0} r_j^{a_0}\right] (\pi^*)^{M_1} (1-\pi^*)^{M_0} \cdot \rho^{M_1} (1-\rho)^{M_0}$$

$$\propto \mathrm{Dir}(M_1; a_{i+1}, \ldots) \cdot \mathrm{Dir}(M_0; a_{0+1}, \ldots)$$ ignore

For MCMC II, used instead $P(z_i \mid \pi^*, y) = \delta(z_i = 1)\left[q_i^{a_1} \pi^* \cdot \rho\right] + \delta(z_i = 0)\left[r_i^{a_0} (1-\pi^*)(1-\rho)\right]$

as derived from part (c). [Bottom of page].