

Query Likelihood + Smoothing with $p(w | C)$

$$\log p(q | d) = \sum_{\substack{w_i \in d \\ w_i \in q}} c(w, q) \left[\log \frac{p_{\text{Seen}}(w_i | d)}{\alpha_d p(w_i | C)} \right] + n \log \alpha_d + \boxed{\sum_{i=1}^n \log p(w_i | C)}$$

$$f(q, d) = \sum_{\substack{w_i \in d \\ w_i \in q}} c(w, q) \left[\log \frac{p_{\text{Seen}}(w_i | d)}{\alpha_d p(w_i | C)} \right] + n \log \alpha_d$$

$$\boxed{p_{\text{Seen}}(w_i | d) = ?}$$

$$\boxed{\alpha_d = ?}$$

How to smooth $p(w | d)$?