Improving RSJ: Adding TF

Basic doc. generation model:

$$\frac{P(R=1|Q,D)}{P(R=0|Q,D)} \propto \frac{P(D|Q,R=1)}{P(D|Q,R=0)}$$

Let D=d_1…d_k, where d_k is the frequency count of term A_k

$$\frac{P(R=1|Q,D)}{P(R=0|Q,D)} \propto \prod_{i=1}^{k} \frac{P(A_i=d_i|Q,R=1)}{P(A_i=d_i|Q,R=0)}$$

$$= \prod_{i=1,d_i\ge 1}^{k} \frac{P(A_i=d_i|Q,R=1)}{P(A_i=d_i|Q,R=0)} \prod_{i=1,d_i=0}^{k} \frac{P(A_i=0|Q,R=1)}{P(A_i=0|Q,R=0)}$$

$$\propto \prod_{i=1,d_i\ge 1}^{k} \frac{P(A_i=d_i|Q,R=1)P(A_i=0|Q,R=0)}{P(A_i=d_i|Q,R=0)P(A_i=0|Q,R=1)}$$

2-Poisson mixture model

$$p(A_i=f|Q,R)=p(E|Q,R)p(A_i=f|E)+P(\bar{E}|Q,R)p(A_i=f|\bar{E})$$

$$= p(E|Q,R)\frac{\mu_E^{\ f}}{f!}e^{-\mu_E}+P(\bar{E}|Q,R)\frac{\mu_{\bar{E}}^{\ f}}{f!}e^{-\mu_{\bar{E}}}$$

Many more parameters to estimate! (how many exactly?)