

Laplacian smoothing

Idea:

- Pull some probability from frequent bigrams to infrequent ones
- Just add 1 to the counts (**add-one smoothing**):

$$\hat{p}(w_i | w_{i-n+1}^{i-1}) = \frac{c(w_{i-n+1}^i) + 1}{c(w_{i-n+1}^{i-1}) + V}$$

- Or tune a parameter (**add-k smoothing**):

$$\hat{p}(w_i | w_{i-n+1}^{i-1}) = \frac{c(w_{i-n+1}^i) + k}{c(w_{i-n+1}^{i-1}) + Vk}$$