

bagel with cheese  
 $w_1 \quad w_2 \quad w_3$

Initialize:

$$a_{11} = 1 \times 1 + 2 \times 1 + 3 \times 1 = 6$$

$$a_{12} = 1 \times 0 + 2 \times 0 + 3 \times 0 = 0$$

$$a_{13} = 1 \times 2 + 2 \times 2 + 3 \times 0 = 6$$

Normalize: ( $\sqrt{K} = 2$ )

$$a_{11} = 6/2 = 3$$

$$a_{12} = 0/2 = 0$$

$$a_{13} = 6/2 = 3$$

For word  $w_i$  (bagel)

$$\sum_k a_{ik} > b$$

$$\begin{cases} a_{11} = \frac{3}{6} = 0.5 \\ a_{12} = \frac{0}{6} = 0 \\ a_{13} = \frac{3}{6} = 0.5 \end{cases}$$

$$\begin{aligned} Z_i &= \sum_j a_{ij} v_j = 0.5 \times [2, 0, 1] \\ &\quad + 0 \times [2, 3, 0] \\ &\quad + 0.5 \times [1, 2, 2] \end{aligned}$$

$$= [1.5, 1, 1.5]$$