

$$similarity = \cos(\theta) = \frac{v_I v_O}{\sqrt{\sum_{t=1}^T v_I} \sqrt{\sum_{w=1}^W v_w}} = \frac{v_I}{\sqrt{\sum_{t=1}^T v_I}} \frac{v_O}{\sqrt{\sum_{w=1}^W v_w}}$$