

Need to compute $P(\text{Comp} | D6)$, $P(\text{Pet} | D6)$
 and compare: $P(\text{Comp} | D7)$, $P(\text{Pet} | D7)$

$$P(\text{Comp} | D6) = P(D6 | \text{Comp}) P(\text{Comp}) = \prod_{w \in D6} P(w | \text{Comp}) P(w)$$

Need to compute $P(w | C)$, $P(C)$ where $C \in \{\text{Comp}, \text{Pet}\}$
 $w \in \text{Vocabulary}$

$$P(C) = \frac{\# \text{training docs with class } C}{\# \text{training docs}}$$

$$\Rightarrow P(\text{Comp}) = \frac{3}{5}, \quad P(\text{Pet}) = \frac{2}{5}$$

$$P(w | C) = \frac{\# w}{\# \text{ words in training docs with class } C}$$

$\Rightarrow P(\text{Computer} \text{Comp}) = \frac{4}{10}$	$P(\text{Computer} \text{Pet}) = \frac{2}{10}$
$P(\text{Mouse} \text{Comp}) = \frac{4}{10}$	$P(\text{Mouse} \text{Pet}) = \frac{1}{10}$
$P(\text{Dog} \text{Comp}) = \frac{1}{10}$	$P(\text{Dog} \text{Pet}) = \frac{4}{10}$
$P(\text{Cat} \text{Comp}) = \frac{1}{10}$	$P(\text{Cat} \text{Pet}) = \frac{3}{10}$

$$\Rightarrow P(\text{Comp} | D6) = \frac{4}{10} \cdot \frac{4}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{3}{5} = \frac{48}{5 \cdot 10^4} \quad 96 > 48$$

$$P(\text{Pet} | D6) = \frac{2}{10} \cdot \frac{2}{10} \cdot \frac{3}{10} \cdot \frac{4}{10} \cdot \frac{2}{5} = \frac{96}{5 \cdot 10^4} \quad \Rightarrow D6 \in \text{Pet}$$

$$P(\text{Comp} | D7) = \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{4}{10} \cdot \frac{4}{10} \cdot \frac{3}{5} = \frac{48}{5 \cdot 10^4} \quad 48 > 36$$

$$P(\text{Pet} | D7) = \frac{3}{10} \cdot \frac{3}{10} \cdot \frac{2}{10} \cdot \frac{1}{10} \cdot \frac{2}{5} = \frac{36}{5 \cdot 10^4} \quad \Rightarrow D7 \in \text{Comp}$$