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HW1

Problem 1

a) $W = [woof,\ meow,\ squeak]$
$D1 = [2, 1, 0]$
$D2 = [2, 0, 1]$

$$cos\ simularity = \frac{D1 \cdot D2}{||D1|| * ||D2||}$$

$||D1|| = ||D2|| = \sqrt{2^2 + 1^2 + 0^2} = \sqrt{5}$
$D1 \cdot D2 = 4$

$$Solution = \frac{4}{5}$$

b) $IDF = \log(\frac{N}{n_i})$
$W = [woof,\ meow,\ squeak]$
$IDF\ Vector = [\log(\frac{2}{2}), \log(\frac{2}{1}), \log(\frac{2}{1})]$
$\mu D1 = [0, 0.6931, 0]$
$\mu D2 = [0, 0, 0.6931]$
$$cos\ simularity = \frac{\mu D1 \cdot \mu D2}{||\mu D1|| * ||\mu D2||}$$
$\mu D1 \cdot \mu D2 = 0$

$$Solution = 0$$

c) $W = [woof,\ meow,\ squeak]$
$IDFVector = [\log(\frac{3}{2}), \log(\frac{3}{2}), \log(\frac{3}{2})]$
$\mu D1 = [0.811, 0.405465, 0]$
$\mu D2 = [0.811, 0, 0.405465]$

$\mu D1 \cdot \mu D2 = 0.65761$

$||\mu D1|| = \sqrt{5}\log(\frac{3}{2})$

$$||\mu D2|| = \sqrt{5}\log(\frac{3}{2})$$
$$Solution = 0.800003$$

Problem 2

a) $P(+ | \text{"great food served"}) =$

$P(+) * P(\text{"great"} | +) * P(\text{"food"} | +) * P(\text{"served"} | +) =$

$$(\frac{5}{10}) * (\frac{5}{10}) * (\frac{5}{10}) * (\frac{0}{10}) =$$

$$Solution = 0$$

$P(- | \text{"great food served"}) =$

$P(-) * P(\text{"great"} | -) * P(\text{"food"} | -) * P(\text{"served"} | -) =$

$$(\frac{5}{10}) * (\frac{0}{11}) * (\frac{5}{11}) * (\frac{1}{11}) =$$

$$Solution = 0$$

b) **If we were to apply Laplace smoothing, then** $P(+ | \text{"great food served"})$ **will be larger**

c) Using Jet