

Task 1

Vocabulary = { happy, new, year, holiday, term, starts, work, celebrations }
|Vocabulary| = 8

Prior:

$$P(c_1) = \frac{3}{5} = 0.6$$

$$P(c_2) = \frac{2}{5} = 0.4$$

Posterior: (with Add-One-Smoothing)

$$P(\text{happy}|c_1) = \frac{2+1}{5+8} = \frac{3}{13}$$

$$P(\text{new}|c_1) = \frac{2+1}{5+8} = \frac{3}{13}$$

$$P(\text{year}|c_1) = \frac{2+1}{5+8} = \frac{3}{13}$$

$$P(\text{holiday}|c_1) = \frac{1+1}{5+8} = \frac{2}{13}$$

$$P(\text{term}|c_1) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{starts}|c_1) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{work}|c_1) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{celebrations}|c_1) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{happy}|c_2) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{new}|c_2) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{year}|c_2) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{holiday}|c_2) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(\text{term}|c_2) = \frac{1+1}{5+8} = \frac{2}{13}$$

$$P(\text{starts}|c_2) = \frac{2+1}{5+8} = \frac{3}{13}$$

$$P(\text{work}|c_2) = \frac{1+1}{5+8} = \frac{2}{13}$$

$$P(\text{celebrations}|c_2) = \frac{0+1}{5+8} = \frac{1}{13}$$

$$P(c_1|d) = \frac{3}{13} * \frac{3}{13} * \frac{3}{13} * \frac{1}{13} = \frac{27}{28561} = c_{map}$$

$$P(c_2|d) = \frac{1}{13} * \frac{1}{13} * \frac{1}{13} * \frac{1}{13} = \frac{1}{28561}$$

The model assigned the class c_1 to the document.

Task 2