Bayes Practice Problems

Friday, December 18, 2020 3:22 PM

Message contents	Class label
watch free anime downloads	spam
see you at the house	not spam
do you want takeout	not spam
sell your house now	spam

1) "watch anime now"

$P(\text{watch anime now} \mid \text{spam}) =$

$P(\text{watch} \mid \text{spam}) + P(\text{anime} \mid \text{spam}) + P(\text{now} \mid \text{spam})$

$= \frac{2}{21} + \frac{2}{21} + \frac{2}{21} = \frac{6}{21}$

$P(\text{watch anime now} \mid \neg\text{spam}) =$

$P(\text{watch} \mid \neg\text{spam}) + P(\text{anime} \mid \neg\text{spam}) + P(\text{now} \mid \neg\text{spam})$

$= \frac{1}{14} + \frac{1}{14} + \frac{1}{14} = \frac{3}{14}$

$\frac{6}{21} > \frac{3}{14}$

Likely to be spam

2) "takeout and anime at my house"

$P(\text{takeout} \mid \text{spam}) + P(\text{and} \mid \text{spam}) + P(\text{anime} \mid \text{spam}) + P(\text{my} \mid \text{spam}) + P(\text{house} \mid \text{spam}) =$

$\Rightarrow \frac{1}{21} + \frac{1}{21} + \frac{2}{21} + \frac{1}{21} + \frac{2}{21} = \frac{7}{21}$

$P(\text{takeout and anime at my house} \mid \text{not spam}) =$

$\Rightarrow \frac{2}{14} + \frac{1}{14} + \frac{1}{14} + \frac{1}{14} + \frac{2}{14} = \frac{7}{14}$

$\frac{7}{14} > \frac{7}{21}$

Likely not spam

3) "Sell me your anime collection"

$P(\text{sell me your anime collection} \mid \text{spam}) =$

$$\Rightarrow \frac{2}{21} + \frac{1}{21} + \frac{2}{21} + \frac{2}{21} + \frac{1}{21} = \frac{8}{21}$$

$P(\text{sell me your anime collection} \mid \neg \text{spam}) =$

$$\Rightarrow \frac{1}{19} + \frac{1}{19} + \frac{1}{19} + \frac{1}{19} + \frac{1}{19} = \frac{5}{19}$$

$$\frac{8}{21} > \frac{5}{19}$$

likely spam