Assignment-7

1. A spam filter is designed by looking at commonly occurring phrases in spam. Suppose that 80% of email is spam. In 10% of the spam emails, the phrase "free money" is used, whereas this phrase is only used in 1% of non-spam emails. A new email has just arrived, which does mention "free money". What is the probability that it is spam?

Answer:

A: *The event email is spam*

B: *The event* of *email has free memory space*

$P(A) = 0.8$

$P(B) = 0.1$

$\mathrm{P(B|A)} = 0.1$

$$\mathrm{P(A|B)} = \frac{\mathrm{P(B|A)} \times \mathrm{P(A)}}{\mathrm{P(B)}} = \frac{0.1 \times 0.8}{(0.1 \times 0.8) + (0.01 \times 0.2)} = \frac{0.08}{0.08 + 0.002} = \frac{0.08}{0.082} = 0.9756$$