Assignment 7

Question 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?

Ans:-

1. **Given**

   Probability of spam = $P(spam) = 0.8$

   Then Probability of not spam = $P(not\ spam) = 0.2$

   Probability of phrase 'Free Money' for spam email = $P(free\ money/spam) = 0.1$

   Probability of phrase 'Free Money' for not spam email = $P(free\ money/not\ spam) = 0.01$

2. **To find -** $P(spam/free\ money)$

3. **Solution**

   1. $P(spam/free\ money) = \frac{P(free\ money/spam)*P(spam)}{P(free\ money/spam)*P(spam)+P(free\ money/not\ spam)*P(not\ spam)}$

      Substituting the values

      $P(spam/free\ money) = \frac{0.1*0.8}{0.1*0.8+0.2*0.01} = 0.9756$