Exercise 1 (Theoretical)

Suppose that the four inspectors at a film factory are supposed to stamp the expiration date on each package of film at the end of the assembly line. John, who stamps 20% of the packages, fails to stamp the expiration date once in every 200 packages; Tom, who stamps 60% of the packages, fails to stamp the expiration date once in every 100 packages; Jeff, who stamps 15% of the packages, fails to stamp the expiration date once in every 90 packages; and Pat, who stamps 5% of the packages, fails to stamp the expiration date once in every 200 packages. If a customer complains that his/her package of film does not show the expiration date, what is the probability that it was inspected by John?

Temos algumas opções:

A: pacote não marcado

J: pacote marcado por John

T: pacote marcado por Tom

Je: pacote marcado por Jeff

P: pacote marcado por Pat

Precisamos então de todos os documentos não marcados para saber a chance de ter sido um

erra de John, já que:

$$P(J|A) = \frac{P(A|J) \cdot P(J)}{P(A)}$$

$$P(A) = P(J)P(A|J) + P(T)P(A|T) + P(J_e)P(A|J_e) + P(P_a)P(A|P_a)$$

$$P(T)P(A|J) = \frac{0.2}{200} \qquad P(T)P(A|T) = \frac{0.6}{100}$$

$$P(J_e)P(A|J_e) = \frac{0.15}{90} \qquad P(P_a)P(A|P_a) = \frac{0.05}{200}$$

Logo:

$$P(A) = 0.008\overline{916} \cong 0.00892$$

Como já vimos

$$P(J|A) = \frac{P(A|J)\,P(J)}{P(A)} = \frac{\frac{0.2}{200}}{0.00892}$$

$$P(J|A) = 0.11215 \;//$$