

PMP - Lab 06

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

$$P(Pos|B) = 0.95$$

$$P(Neg|\bar{B}) = 0.9$$

a) Daca testul este pozitiv ~~nu este~~ care este sansa ca persoana testata are B

$$P(B) = 0.01$$



~~$P(B|Pos)$~~

$$P(B|Pos) = \frac{P(Pos|B) \cdot P(B)}{P(Pos)}$$

$$P(Pos) = P(Pos|B) \cdot P(B) + P(Pos|\bar{B}) \cdot P(\bar{B}) \Rightarrow$$
$$0.1 \qquad \qquad \qquad 0.99$$

$$P(P_{\text{Pos}}) = 0.95 \cdot 0.01 + 0.1 \cdot 0.99 = 0.1085$$

$$P(B|P_{\text{Pos}}) = \frac{P(P_{\text{Pos}}|B) \cdot P(B)}{P(P_{\text{Pos}})} = \frac{0.95 \cdot 0.01}{0.1085} \approx 0.08455 \\ \approx 8.455\%$$

b)

$$P(\text{Neg}|B) = \Delta \quad \text{aus}$$

$$\Delta = ? \text{ a.i. } P(B|P_{\text{Pos}}) = 0.5$$

$$P(B|P_{\text{Pos}}) = \frac{P(P_{\text{Pos}}|B) \cdot P(B)}{P(P_{\text{Pos}})} = \frac{P(P_{\text{Pos}}|B) \cdot P(B)}{P(P_{\text{Pos}}|B) \cdot P(B) + P(P_{\text{Pos}}|\bar{B}) \cdot P(\bar{B})}$$

$$= 0.5 = \frac{0.95 * 0.01}{0.95 \cdot 0.01 + (1-\Delta) \cdot 0.99} = 0.5 = \frac{0.0095}{0.0095 + 0.99 - 0.99\Delta} \Leftrightarrow$$

$$\Leftrightarrow 0.5(0.0095 + 0.99 - 0.99\Delta) = 0.0095 \Leftrightarrow 0.00475 + 0.495(1-\Delta) = 0.0095$$

$$\Leftrightarrow 0.495(1-\Delta) = 0.00475 \Rightarrow 1-\Delta = \frac{0.00475}{0.495} = \frac{475}{49500} = \frac{19}{1980} \Leftrightarrow$$

$$\Delta = 1 - \frac{19}{1980} = \frac{1961}{1980} = 0.9904 \rightarrow \Delta = 99.04\%$$