Maschinelles Lernen 1 - Assignment 2

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1 Exercise

f = a house will be flooded $\quad \neg f$ = a house won't be flooded
x = house stands in a high risk area $\quad \neg x$ = house stands in a low risk area
$P(f) = 0.0005 \quad P(\neg f) = 0.9995$
$P(x) = 0.04 \quad P(\neg x) = 0.96$
$P(x|f) = 0.8 \quad P(\neg x|f) = 0.2$
α_1 = buying insurance $\quad \alpha_2$ = not buying insurance

We estimate the houses value is 210,000 €, since the text states that 100,000 € is less than half the value.

$\lambda(\alpha_1|f) = 1100€ \quad \lambda(\alpha_1|\neg f) = 1100€$
$\lambda(\alpha_2|f) = 110000€ \quad \lambda(\alpha_1|\neg f) = 0€$

(a) Bayes Rule:

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

Compute $P(f|x)$:

$$P(f|x) = \frac{P(x|f)P(f)}{P(x)} = \frac{0.8 \cdot 0.0005}{0.04} = 0.01$$

(b) Compute $R(\alpha_1|x)$ and $R(\alpha_2|x)$:

$P(\neg f|x) = 1 - P(f|x) = 0.99$
$R(\alpha_1|x) = \lambda(\alpha_1|f)P(f|x) + \lambda(\alpha_1|\neg f)P(\neg f|x) = 1100€ * 0.01 + 1100€ * 0.99 = 1100€$
$R(\alpha_2|x) = \lambda(\alpha_2|f)P(f|x) + \lambda(\alpha_2|\neg f)P(\neg f|x) = 110000€ * 0.01 + 0€ * 0.99 = 1100€$

Since $R(\alpha_2|x) = R(\alpha_1|x)$ no option would be more viable than the other.

(c) insert text

2 Exercise

(a) insert text

(b) insert text

3 Exercise

(a) insert text

(b) insert text

4 Exercise