X observation

D decision

K hidden state

$W: D \times K \to \mathbb{R}$

$R(q) =$

$R: q(x W_x) \to \mathbb{R} = \sum_{x \in X} \sum_{k \in K} p(x,k) W(q(x), k)$

ztrátový soubor ztráty

$q: X \to D$

$p(x,k)$

$p(A) = p(C) = 0.5$

$p(x|A)$ → likelihood =

x_1	x_2	x_3	x_4
0.3	0.2	0.1	0.4

$p(x|C) =$

x_1	x_2	x_3	x_4
0.7	0.2	0.1	0.0

$W =$

D \ K	A	C
A	0	1
C	1	0

$q =$

x_1	x_2	x_3	x_4
A	A	C	C

$p(x, A) = p(x|A)\, p(A)$

$0{,}3 \cdot 0{,}5 \cdot 0 + 0{,}2 \cdot 0{,}5 \cdot 0 + 0{,}1 \cdot 0{,}5 \cdot 1 + 0{,}4 \cdot 0{,}5 \cdot 1$

$+ 0{,}7 \cdot 0{,}5 \cdot 1 + 0{,}2 \cdot 0{,}5 \cdot 1 \ldots = \underline{\underline{0{,}7}}$

$$p(x|A) = \frac{1}{\sqrt{2\pi}\,\sigma_A} e^{\frac{-(x-\mu_A)^2}{2\sigma_A^2}}$$

$q(x) \begin{cases} A \\ C \end{cases}$

$$R(q) = \int_{x \in X} \sum_{k \in K} \frac{p(x,k)}{q} \cdot W(q(x), k)$$

$$g^*(x) = \arg\max_k p(k|x) = \arg\max_k \frac{p(x,k)}{p(x)} = \arg\max_k p(x,k) =$$

$p(x)$ nezávisí na k

$$= \arg\max_k p(x|k)\, p(k)$$

$$p(x|A)\cdot p(A) \geq p(x|C)\, p(C)$$

$$\frac{1}{\sqrt{2\pi}\sigma_A} e^{\frac{-(x-\mu_A)^2}{2\sigma_A^2}} \cdot p(A) \geq \frac{1}{\sqrt{2\pi}\sigma_C} e^{\frac{-(x-\mu_C)^2}{2\sigma_C^2}}\, p(C)$$

$$\frac{1}{\sigma_A} e^{\frac{-(x-\mu_A)^2}{2\sigma_A^2}} \cdot p(A) \geq \frac{1}{\sigma_C} e^{\frac{-(x-\mu_C)^2}{2\sigma_C^2}}\, p(C)$$

$$\frac{1}{\sigma_A} \ln\left(\frac{-(x-\mu_A)^2}{2\sigma_A^2}\right) p(A) \geq \frac{1}{\sigma_C} \ln\left(\frac{-(x-\mu_C)^2}{2\sigma_C^2}\right) p(C)$$

($x^2 - 2x\mu_A + \mu_A^2$, $x^2 - 2x\mu_C + \mu_C^2$)

$$\frac{1}{\sigma_A} \ln\left(\frac{-x^2 + 2x\mu_A - \mu_A}{2\sigma_A^2}\right) p(A) \geq \frac{1}{\sigma_C} \ln\left(\frac{-x^2 + 2x\mu_C - \mu_C^2}{2\sigma_C^2}\right) p(C)$$

$$\Big\Vert$$

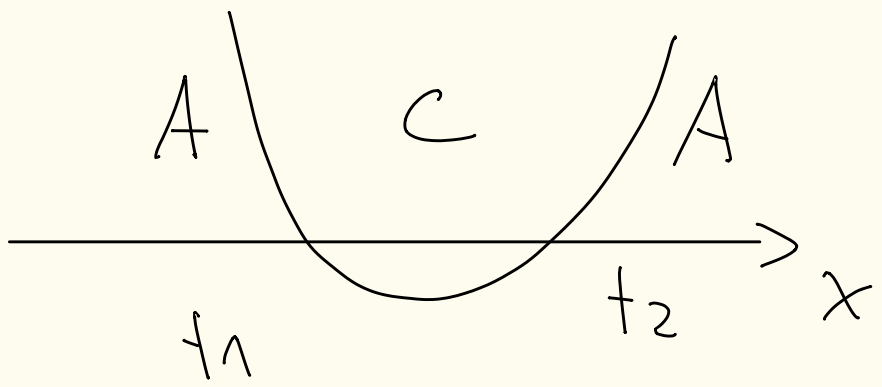
$$ax^2 + bx + c \geq 0$$

$$a = \sigma_A^2 - \sigma_C^2$$

$$b = 2\sigma_C^2\mu_A - 2\sigma_A^2\mu_C$$

$$c = \sigma_A^2\mu_C^2 - \sigma_C^2\mu_A^2 - \ln\left(\frac{p(C)}{p(A)}\frac{\sigma_A}{\sigma_C}\right) 2\sigma_A^2\sigma_C^2$$

$\rightarrow$ t_1, t_2 kvůli x


A
C
A
t_1
t_2
x