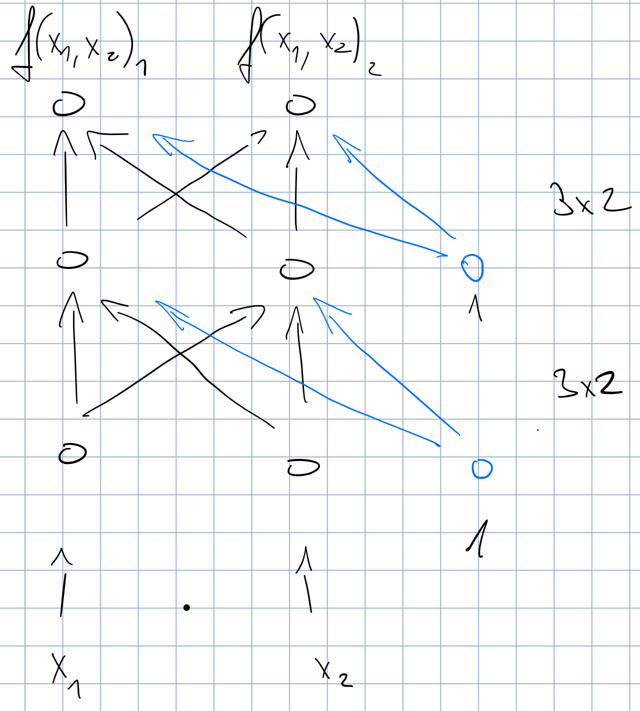
$$f(x_1, x_2) = 2 - |x_1 - x_2|$$

$$f(0,0) =_2 10$$

$$f(0,1) =_2 01$$

$$f(1,0) =_2 01$$

$$f(1,1) =_2 10$$



$$f(x_1, x_2)_1 = \text{NOT XOR}(x_1, x_2)$$

$$f(x_1, x_2)_2 = \text{XOR}(x_1, x_2)$$

$$x \cdot \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} = \vec{0}$$ ~ To mi nepomůže s rozlišením 01 třídy.

XOR Solution one-bit:

$OR(x_1, x_2)$ AND Flipped $OR(x_1, x_2)$

0	0	0
0	1	1
1	0	1
1	1	1

0	0	1
0	1	1
1	0	1
1	1	0

stačí jeden prvek pro excitaci

0	1	0
1	1	1
1	1	1
1	0	0

Task 1: Input values $x_i \in N(\mu, \sigma^2)$: $\mu = 0$, $\sigma > 0$.

Weights initialized from $\langle -a, a \rangle$. What should „a" be?

Is $\mu = 0$?

$$\xi = \sum_i^N w_i x_i \quad . \quad E[\xi] = E\left[\sum_i^N w_i x_i\right] = \underbrace{\sum_i^N E[w_i] \cdot E[x_i]}_{\text{because they are independent}}$$

Because $x_i \sim N(0, \sigma^2) \Rightarrow E[x_i] = 0$,

$w_i \sim \mathcal{U}(-a, a) \Rightarrow E[w_i] = 0$

then $E[\xi] = 0$

what shoud the a be?

$$Var(\xi) = \overbrace{Var\left(\sum_i^N w_i x_i\right) = \sum_i^N Var(w_i x_i)}^{\text{independent...}} = \sum_i^N Var(w_i) \cdot Var(x_i) =$$

$$= \sigma^2 \cdot \sum_i^N Var(w_i) = \sigma^2 \cdot \sum_i^N \frac{4a^2}{12} = \sigma^2 \cdot \sum_i^N \frac{a^2}{3} = N\sigma^2 \cdot \frac{a^2}{3}$$

$$Var(\mathcal{U}(a, b)) = \frac{(b-a)^2}{12}$$

If we set $A = 1$:

$$1 = N \cdot \sigma^2 \cdot \frac{a^2}{3} \rightsquigarrow a^2 = \frac{3}{N\sigma^2}$$

$$a = \sqrt{\frac{3}{N\sigma^2}}$$

Therefore the initial weights should be drawn from uniform distr. $\mathcal{U}(-a, a)$, where a is equal

Mikoláš Fromm