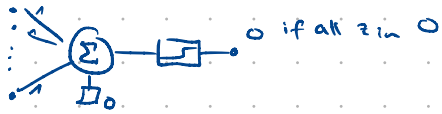
Ex 2 - Task 1

Charlotte Doll and Johannes Bahrenberg



logical or: $z_{out} = f(z) = \Psi(z \cdot \beta + b)$ with $\Psi = \sigma$ sigmoid fct., $\beta = \begin{pmatrix} 100 \\ \vdots \\ 100 \end{pmatrix}$, $b = -50$ ✓

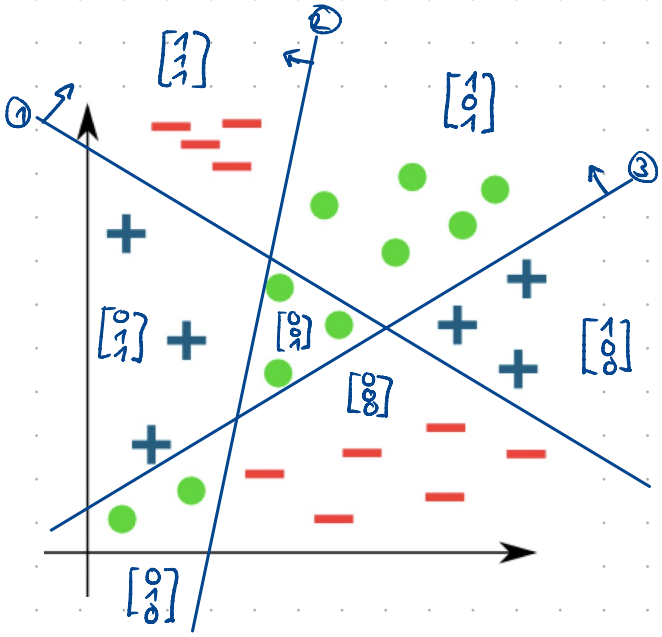
masked logical or: $z_{out} = g(z;c) = \Psi(z \cdot \beta + b; c)$ with $\Psi = \sigma$, $\beta = c \cdot 100$, $b = -50$ ✓

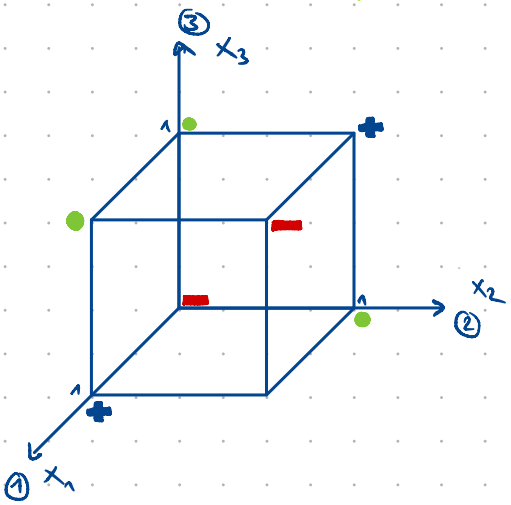
perfect match: $z_{out} = h(z;c) = \Psi(\beta \cdot \|z - c\| + b)$ $\beta = -100$ (scalar now), $b = 50$, $\Psi = \sigma$ ✓

↳ I like this solution slightly too

This is a comment

layer 1:





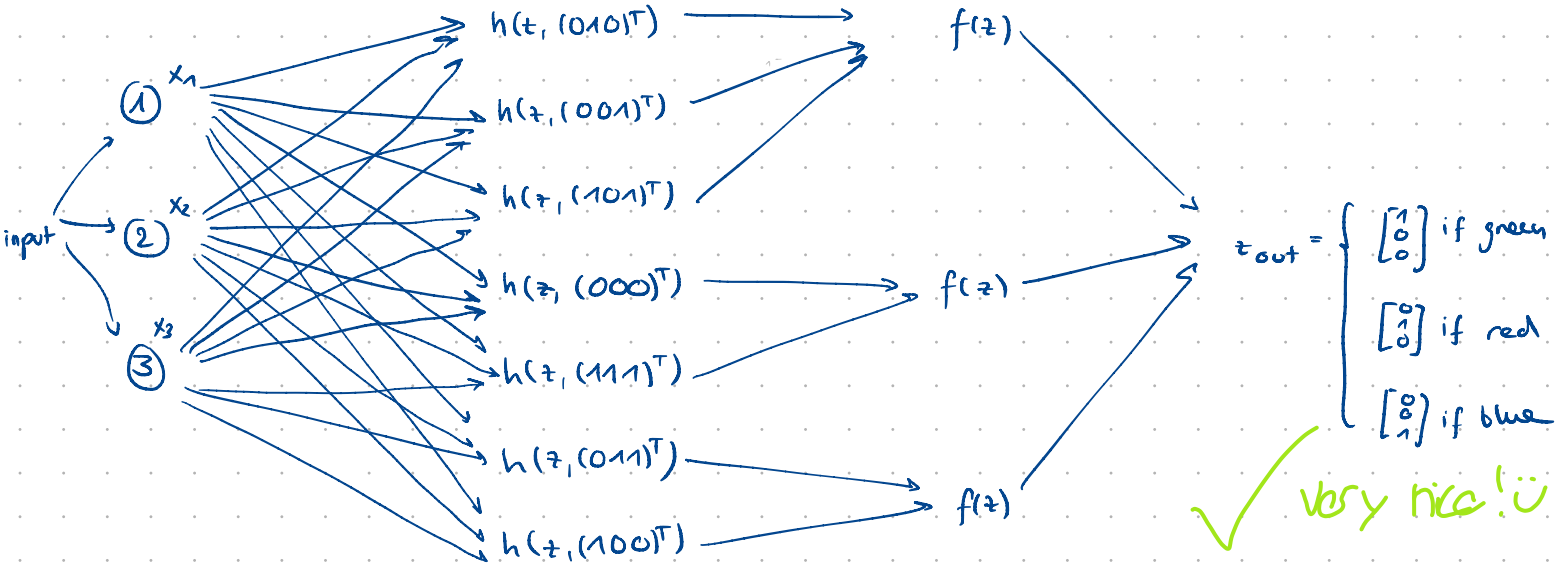
layer 2:

green: $\begin{bmatrix}0\\1\end{bmatrix}, \begin{bmatrix}0\\1\end{bmatrix}, \begin{bmatrix}1\\0\end{bmatrix} \rightarrow \begin{bmatrix}1\\0\end{bmatrix}$

red: $\begin{bmatrix}0\\0\end{bmatrix}, \begin{bmatrix}1\\1\end{bmatrix} \rightarrow \begin{bmatrix}0\\1\end{bmatrix}$

blue: $\begin{bmatrix}0\\1\end{bmatrix}, \begin{bmatrix}1\\0\end{bmatrix} \rightarrow \begin{bmatrix}0\\0\\1\end{bmatrix}$

layer 1 | layer 2 | layer 3



✓ very nice! ☺

Ex 2 – Task 2

$z_0 = X$, $\tilde{z}_L = z_{L-1} \cdot B_L + b_L$, $z_L = \phi_L(\tilde{z}_L)$ $\quad X, z_L, b_L$: row vectors

assume ϕ_L is identity fct $\rightarrow z_L = \tilde{z}_L$

for $L > 1$ layers $\rightarrow$ $z_L = (\dots((z_0 B_1 + b_1)B_2 + b_2)B_3 + b_3)\dots)B_L + b_L$

$$= (\dots(z_0 B_1 B_2 + b_1 B_2 + b_2)B_3 + b_3)\dots)B_L + b_L$$

$$= (\dots(z_0 B_1 B_2 B_3 + b_1 B_2 B_3 + b_2 B_3 + b_3)\dots)B_L + b_L$$

$$= z_0 \cdot \underbrace{\prod_{i=1}^{L-1} B_i}_{\text{new 1-layer weights}} + \underbrace{\sum_{i=1}^{L} b_i \prod_{j=i+1}^{L} B_j}_{\text{new 1-layer bias}}$$

✓