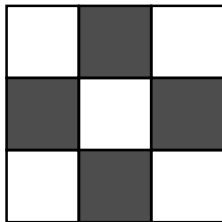
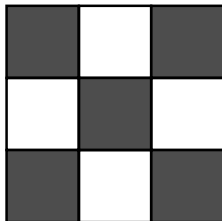
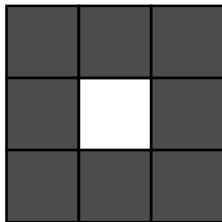
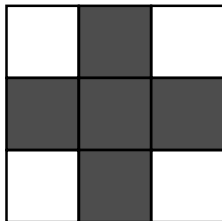


Neuronové sítě

Rozpoznávání



Rozpoznávání (Recognition)

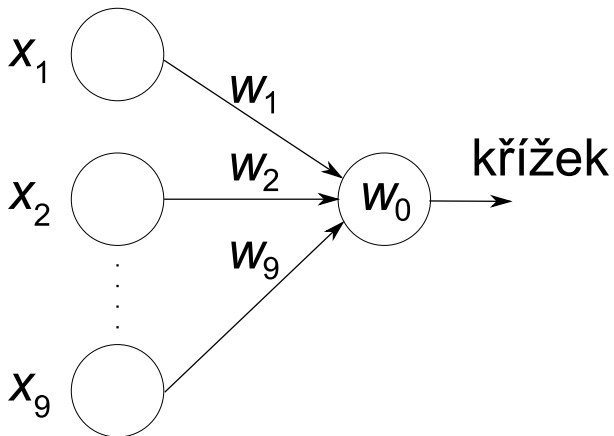


křížek

kolečko



Rozpoznávání



x_1	x_2	x_3
x_4	x_5	x_6
x_7	x_8	x_9



Rozpoznávání

x_0	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	y^*
+1	-1	+1	-1	+1	+1	+1	-1	+1	-1	+1
+1	+1	-1	+1	-1	+1	-1	+1	-1	+1	+1
+1	+1	+1	+1	+1	-1	+1	+1	+1	+1	-1
+1	-1	+1	-1	+1	-1	+1	-1	+1	-1	-1

$$\mathbf{X} = \begin{pmatrix} 1 & -1 & 1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \end{pmatrix}, \quad \bar{\mathbf{y}}^* = \begin{pmatrix} 1 \\ 1 \\ -1 \\ -1 \end{pmatrix}$$



Hebbovo učení

$$\bar{\mathbf{w}} = \mathbf{X}^T \bar{\mathbf{y}}^* = \begin{pmatrix} 1 & 1 & 1 & 1 \\ -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 \\ 1 & -1 & 1 & 1 \\ -1 & 1 & 1 & -1 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ -1 \\ -1 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ -2 \\ 0 \\ -2 \\ 4 \\ -2 \\ 0 \\ -2 \\ 0 \end{pmatrix}$$



Hebbovo učení

$$y = \text{sign}(\mathbf{X}\bar{\mathbf{w}}) = \text{sign} \begin{pmatrix} -4 \\ 12 \\ -12 \\ -12 \end{pmatrix} = \begin{pmatrix} -1 \\ 1 \\ -1 \\ -1 \end{pmatrix}$$

$$\mathbf{X}\bar{\mathbf{w}} = \begin{pmatrix} 1 & -1 & 1 & -1 & 1 & 1 & 1 & -1 & 1 & -1 \\ 1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 1 & 1 & -1 & 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 & 1 & -1 \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ -2 \\ 0 \\ -2 \\ 4 \\ -2 \\ 0 \\ -2 \\ 0 \end{pmatrix} = \begin{pmatrix} -4 \\ 12 \\ -12 \\ -12 \end{pmatrix}$$



Rosenblattovo učení

Použijte posloupnost (b, d, c, a, c, b, d, a, d, a, b, c)

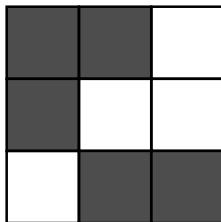
	w_0	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8	w_9	Σ	y	y^*
$\bar{w}^{(0)}$:	0	0	0	0	0	0	0	0	0	0			
b	1	1	-1	1	-1	1	-1	1	-1	1	0	0	1
$\bar{w}^{(1)}$:	1	1	-1	1	-1	1	-1	1	-1	1			
d	1	-1	1	-1	1	-1	1	-1	1	-1	-8	-1	-1
c	1	1	1	1	1	-1	1	1	1	1	0	0	-1
$\bar{w}^{(2)}$:	0	0	-2	0	-2	2	-2	0	-2	0			
a	1	-1	1	-1	1	1	1	-1	1	-1	-6	-1	1
$\bar{w}^{(3)}$:	1	-1	-1	-1	-1	3	-1	-1	-1	-1			
c	1	1	1	1	1	-1	1	1	1	1	-10	-1	-1
b	1	1	-1	1	-1	1	-1	1	-1	1	4	1	1
d	1	-1	1	-1	1	-1	1	-1	1	-1	-2	-1	-1
a	1	-1	1	-1	1	1	1	-1	1	-1	4	1	1

$$\bar{w} = (1, -1, -1, -1, -1, 3, -1, -1, -1, -1)^T$$



Rosenblattovo učení

$$y = \text{sign}(\mathbf{X}\bar{\mathbf{w}}) = \text{sign} \begin{pmatrix} 4 \\ 4 \\ -10 \\ -2 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ -1 \\ -1 \end{pmatrix}$$



$$\bar{\mathbf{x}} = (1, 1, 1, -1, 1, -1, -1, -1, 1, 1)^T$$

$$\bar{\mathbf{w}} = (1, -1, -1, -1, -1, 3, -1, -1, -1, -1)^T$$

$$\text{krizek} = \text{sign}(\bar{\mathbf{x}} \cdot \bar{\mathbf{w}}) = \text{sign}(-4) = -1$$



Více výstupů

