Coshe da Queute, João Filipe
Intelligence artificielle   TP 8

8.1 fonction logiques
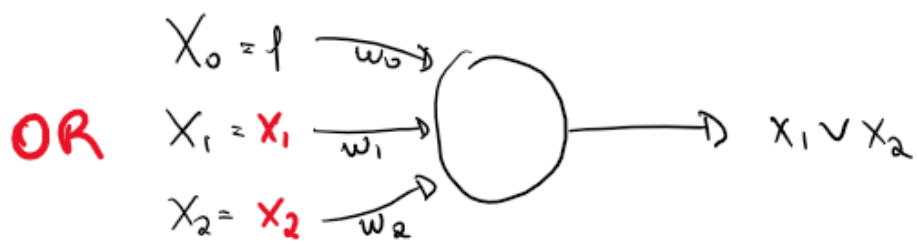
$X_0 = 1$ —w_0→

AND $X_1 = X_1$ —w_1→ $X_1 \wedge X_2$

$X_2 = X_2$ —w_2→
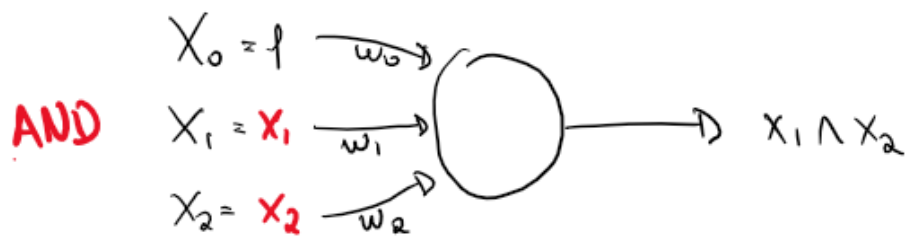
but : trouver w_0, w_1, w_2 tq

$$\sum_{i=0}^{2} X_i w_i \geq 0 \quad \Longleftrightarrow \quad X_1 = 1 \wedge X_2 = 1$$

$\Rightarrow w_0 = -1,5 \; , \; w_1 = 1 \; , \; w_2 = 1$

exemple : $X_1 = 1 \; , \; X_2 = 0$

$\rightarrow \quad X_0 \cdot w_0 + X_1 \cdot w_1 + X_2 \cdot w_2$

$= \quad 1 \cdot -1,5 + 1 \cdot 1 + 0 \cdot 1$

$= \quad -0,5 \quad \rightarrow -0,5 < 0 \rightsquigarrow$ Faux ✔

$X_0 = 1$ $\xrightarrow{w_0}$

OR $\quad X_1 = x_1 \xrightarrow{w_1}$ $\qquad \Rightarrow x_1 \vee x_2$

$X_2 = x_2 \xrightarrow{w_2}$

But : trouver w_0, w_1, w_2 tq

$$\sum_{i=0}^{2} x_i w_i \geqslant 0 \quad \Longleftrightarrow \quad x_1 = 1 \vee x_2 = 1$$

$\Rightarrow w_0 = -0,5 \; , \; w_1 = 1 \; , \; w_2 = 1$

exemple : $\quad x_1 = 0 \; , \; x_2 = 0$

$\rightarrow \quad x_0 \cdot w_0 + x_1 \cdot w_1 + x_2 \cdot w_2$

$= 1 \cdot -0,5 + 0 \cdot 1 + 0 \cdot 1$

$= -0,5 \quad \rightsquigarrow -0,5 < 0 \rightsquigarrow$ Faux ✔

8.2 entrainement de réseau

On initialise $w_0 = w_1 = w_2 = 1$, $\alpha = 1$, $x_0 = 1$

1ère itération

etape ①

	x_1	x_2	Y
$e =$	1	1	1

$in = w_1 \cdot x_1 + w_2 x_2 + w_0 = 3$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot x_0 = w_0 = 1$

$w_1 = w_1 + \alpha \cdot Err \cdot x_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot x_2 = w_2 = 1$

etape ②

	x_1	x_2	Y
$e =$	1	0	1

$in = w_1 \cdot x_1 + w_2 \cdot x_2 + w_0 = 2$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot x_0 = w_0 = 1$

$w_1 = w_1 + \alpha \cdot Err \cdot x_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot x_2 = w_2 = 1$

etape ③

	x_1	x_2	Y
$e =$	0	1	1

$in = w_1 \cdot x_1 + w_2 \cdot x_2 + w_0 = 2$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot x_0 = w_0 = 1$

$w_1 = w_1 + \alpha \cdot Err \cdot x_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot x_2 = w_2 = 1$

etape ④

	x_1	x_2	Y
$e =$	0	0	0

$in = w_1 \cdot x_1 + w_2 + x_2 + w_0 = 1$

$Err = y - g(in) = -1$

$w_0 = w_0 + \alpha \cdot Err \cdot x_0 = 0$

$w_1 = w_1 + \alpha \cdot Err \cdot x_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot x_2 = w_2 = 1$

2ème itération $(w_0 = 0, w_1 = 1, w_2 = 1)$

étape ①

	X_1	X_2	Y
$e =$	1	1	1

$in = w_1 \cdot X_1 + w_2 X_2 + w_0 = 2$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot X_0 = w_0 = 0$

$w_1 = w_1 + \alpha \cdot Err \cdot X_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot X_2 = w_2 = 1$

étape ②

	X_1	X_2	Y
$e =$	1	0	1

$in = w_1 \cdot X_1 + w_2 \cdot X_2 + w_0 = 1$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot X_0 = w_0 = 0$

$w_1 = w_1 + \alpha \cdot Err \cdot X_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot X_2 = w_2 = 1$

étape ③

	X_1	X_2	Y
$e =$	0	1	1

$in = w_1 \cdot X_1 + w_2 \cdot X_2 + w_0 = 1$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot X_0 = w_0 = 0$

$w_1 = w_1 + \alpha \cdot Err \cdot X_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot X_2 = w_2 = 1$

étape ④

	X_1	X_2	Y
$e =$	0	0	0

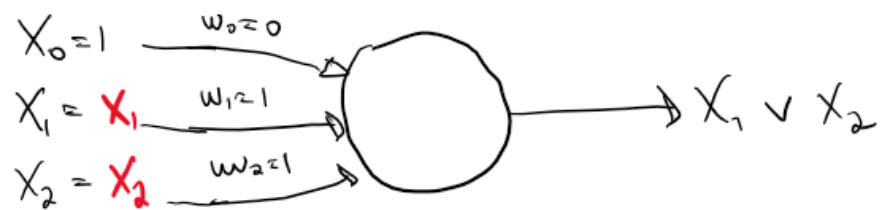$in = w_1 \cdot X_1 + w_2 \cdot X_2 + w_0 = 0$

$Err = y - g(in) = 0$

$w_0 = w_0 + \alpha \cdot Err \cdot X_0 = 0$

$w_1 = w_1 + \alpha \cdot Err \cdot X_1 = w_1 = 1$

$w_2 = w_2 + \alpha \cdot Err \cdot X_2 = w_2 = 1$

• W fin = w debut , d'itération. → ou s'arrête

↝

$X_0 = 1$ $\quad$ $w_0 = 0$

$X_1 = X_1$ $\quad$ $w_1 = 1$ $\qquad \longrightarrow X_1 \lor X_2$

$X_2 = X_2$ $\quad$ $w_2 = 1$

X_1	X_2	guess $= y$
1	1	1
1	0	1
0	1	1
0	0	0