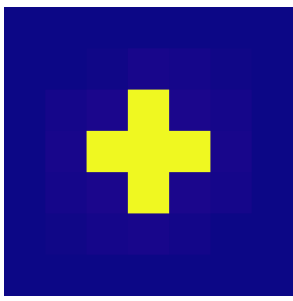
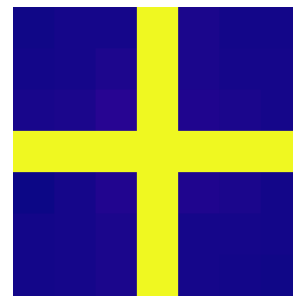


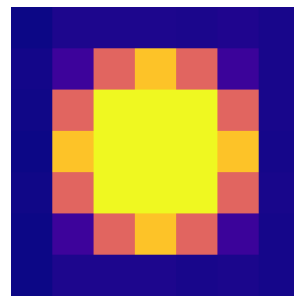
Opération : **fermeture**  
Jeu : **MNIST**



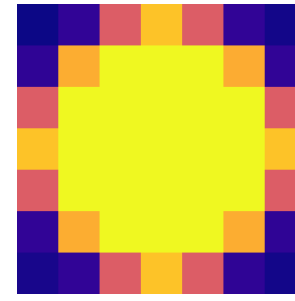
cross3



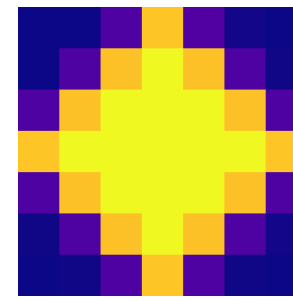
cross7



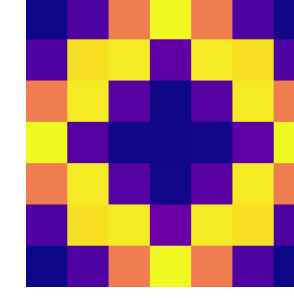
disk2



disk3



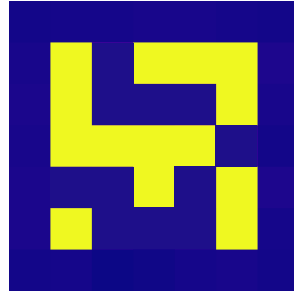
diamond3



complex



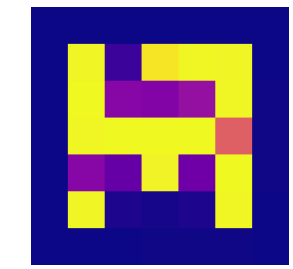
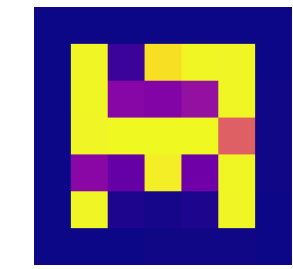
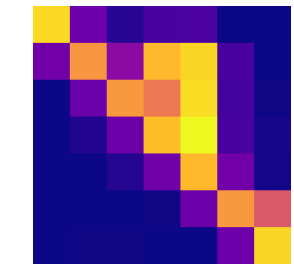
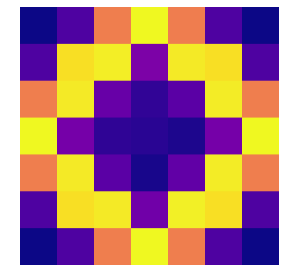
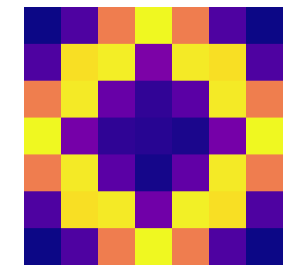
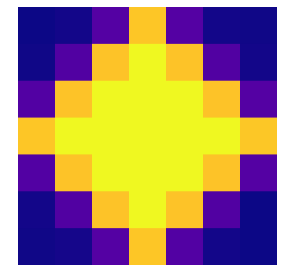
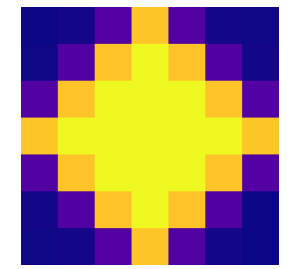
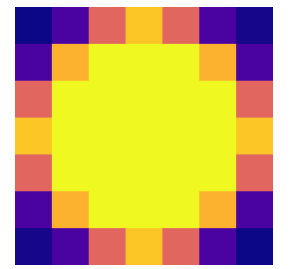
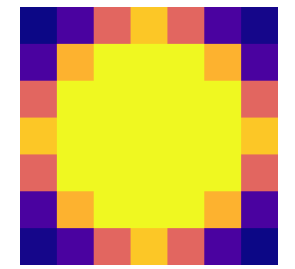
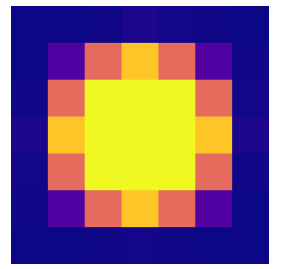
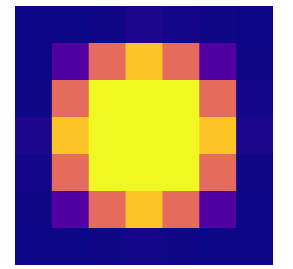
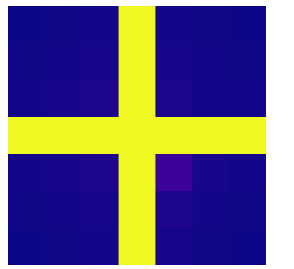
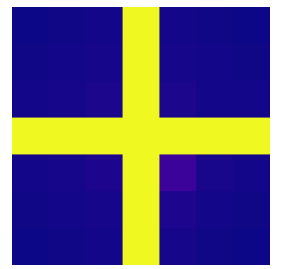
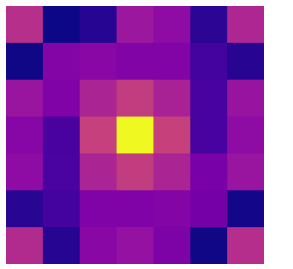
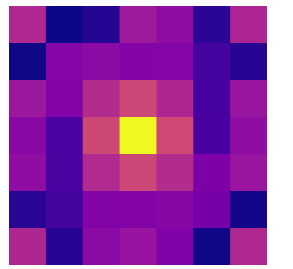
adiag



brand

*Initialisation*  
*aléatoire*

$w_1/w_2$



$\alpha_1$

$-0.34 \pm 0.001$

$62.56 \pm 0.39$

$62.14 \pm 0.03$

$64.42 \pm 0.14$

$63.18 \pm 0.34$

$47.21 \pm 0.52$

$81.37 \pm 3.29$

$55.17 \pm 0.38$

$\alpha_2$

$-2.37 \pm 0.005$

$-62.42 \pm 0.29$

$-60.55 \pm 0.01$

$-62.16 \pm 0.06$

$-63.08 \pm 0.25$

$-62.33 \pm 0.66$

$-20.73 \pm 0.49$

$-41.24 \pm 0.15$

RMSE<sub>1</sub>

$0.28 \pm 3 \times 10^{-4}$

$0.01 \pm 8 \times 10^{-4}$

$0.009 \pm 1 \times 10^{-4}$

$0.005 \pm 1 \times 10^{-4}$

$0.005 \pm 2 \times 10^{-4}$

$0.03 \pm 3 \times 10^{-3}$

$0.06 \pm 2 \times 10^{-3}$

$0.12 \pm 2 \times 10^{-3}$

RMSE<sub>2</sub>

$0.28 \pm 6 \times 10^{-4}$

$0.01 \pm 7 \times 10^{-4}$

$0.009 \pm 6 \times 10^{-5}$

$0.005 \pm 2 \times 10^{-4}$

$0.005 \pm 3 \times 10^{-4}$

$0.03 \pm 3 \times 10^{-3}$

$0.07 \pm 2 \times 10^{-3}$

$0.12 \pm 2 \times 10^{-3}$

LOSS

$1.3 \times 10^{-2} \pm 2 \times 10^{-5}$

$1.2 \times 10^{-5} \pm 2 \times 10^{-6}$

$1.4 \times 10^{-5} \pm 3 \times 10^{-6}$

$1.3 \times 10^{-5} \pm 2 \times 10^{-6}$

$1.5 \times 10^{-5} \pm 2 \times 10^{-6}$

$1.9 \times 10^{-5} \pm 3 \times 10^{-6}$

$5.2 \times 10^{-4} \pm 5 \times 10^{-6}$

$3.2 \times 10^{-4} \pm 6 \times 10^{-6}$

EPOCHS

$25 \pm 5$

$32 \pm 8$

$37 \pm 4$

$33 \pm 4$

$31 \pm 5$

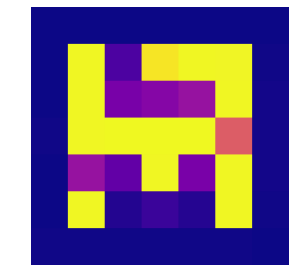
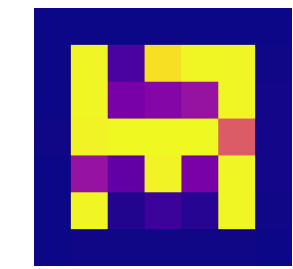
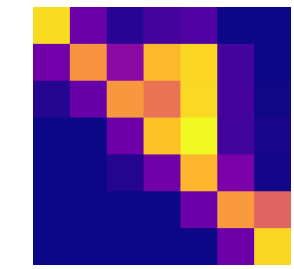
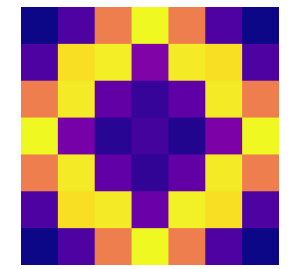
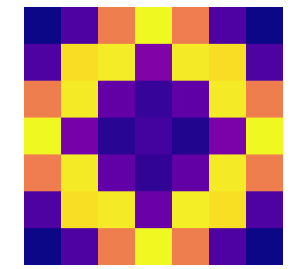
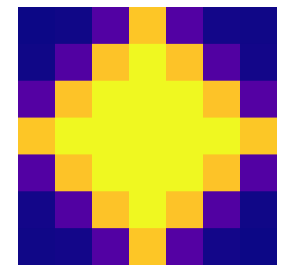
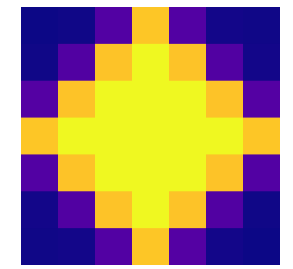
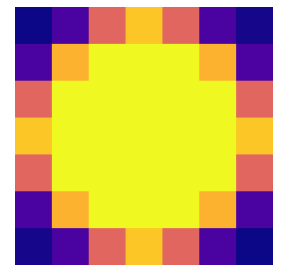
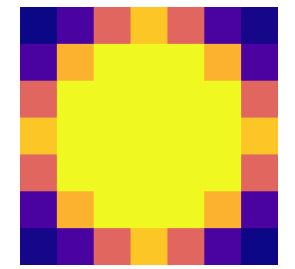
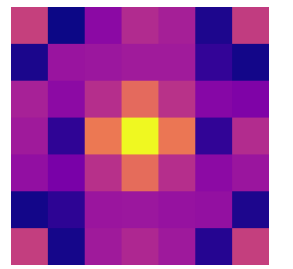
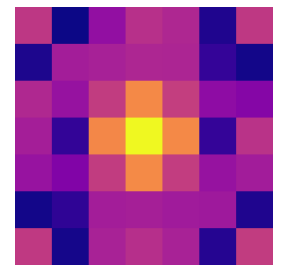
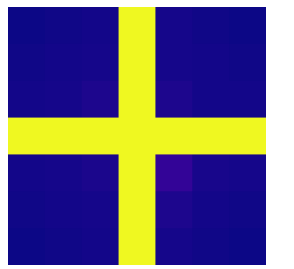
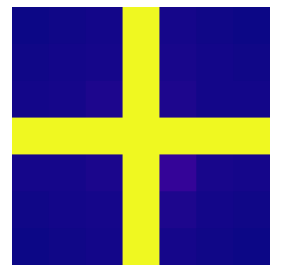
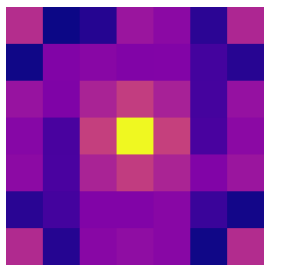
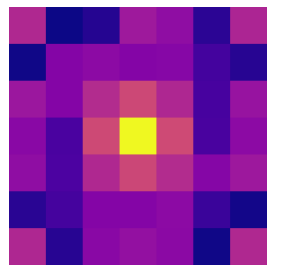
$33 \pm 7$

$34 \pm 7$

$30 \pm 5$

*Initialisation*  
*gaussienne*

$w_1/w_2$



$\alpha_1$

$-0.34 \pm 0.001$

$62.78 \pm 0.14$

$-0.33 \pm 0.001$

$64.07 \pm 0.73$

$63.28 \pm 0.35$

$46.72 \pm 0.62$

$68.23 \pm 14.45$

$55.29 \pm 0.22$

$\alpha_2$

$-2.36 \pm 0.005$

$-62.60 \pm 0.07$

$-3.24 \pm 0.004$

$-61.99 \pm 0.34$

$-63.16 \pm 0.20$

$-62.83 \pm 0.85$

$-38.56 \pm 18.10$

$-41.20 \pm 0.19$

RMSE<sub>1</sub>

$0.28 \pm 9 \times 10^{-4}$

$0.01 \pm 8 \times 10^{-4}$

$0.36 \pm 2 \times 10^{-4}$

$0.004 \pm 1 \times 10^{-4}$

$0.005 \pm 2 \times 10^{-4}$

$0.03 \pm 3 \times 10^{-3}$

$0.16 \pm 9 \times 10^{-2}$

$0.12 \pm 2 \times 10^{-3}$

RMSE<sub>2</sub>

$0.28 \pm 1 \times 10^{-3}$

$0.01 \pm 7 \times 10^{-4}$

$0.38 \pm 8 \times 10^{-4}$

$0.004 \pm 8 \times 10^{-5}$

$0.005 \pm 1 \times 10^{-4}$

$0.03 \pm 3 \times 10^{-3}$

$0.15 \pm 8 \times 10^{-2}$

$0.12 \pm 2 \times 10^{-3}$

LOSS

$1.3 \times 10^{-2} \pm 1 \times 10^{-5}$

$9.7 \times 10^{-6} \pm 3 \times 10^{-6}$

$1.6 \times 10^{-2} \pm 3 \times 10^{-5}$

$1.8 \times 10^{-5} \pm 1 \times 10^{-5}$

$1.3 \times 10^{-5} \pm 3 \times 10^{-6}$

$2.4 \times 10^{-5} \pm 5 \times 10^{-6}$

$1.2 \times 10^{-3} \pm 7 \times 10^{-4}$

$3.2 \times 10^{-4} \pm 6 \times 10^{-6}$

EPOCHS

$20 \pm 1$

$36 \pm 8$

$27 \pm 6$

$34 \pm 8$

$36 \pm 5$

$41 \pm 10$

$30 \pm 5$

$34 \pm 7$