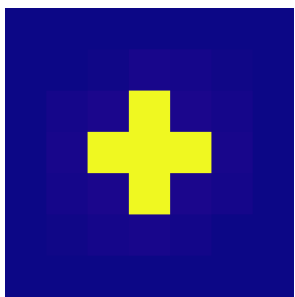
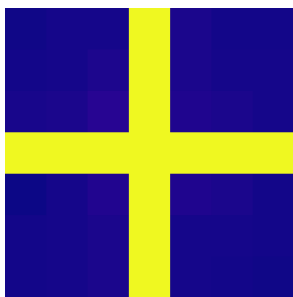


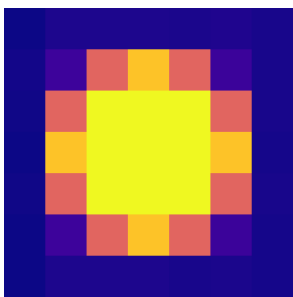
Opération : **fermeture**
Jeu : **MNIST**



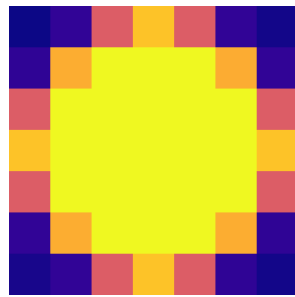
cross3



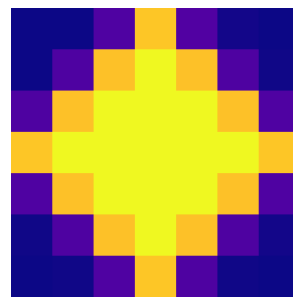
cross7



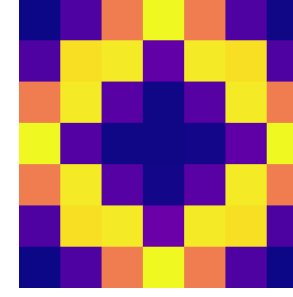
disk2



disk3



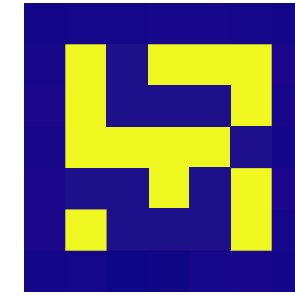
diamond3



complex



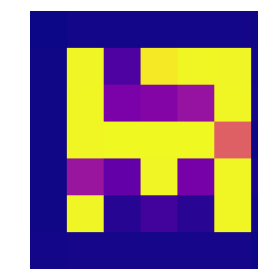
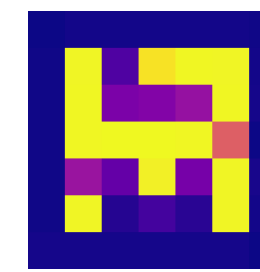
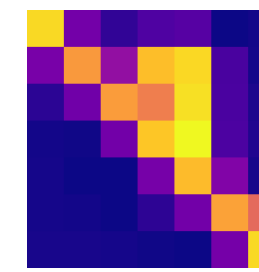
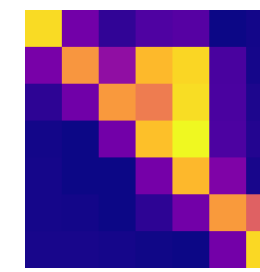
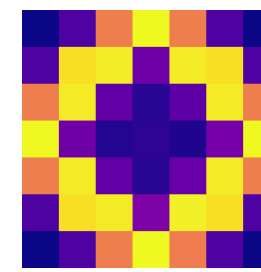
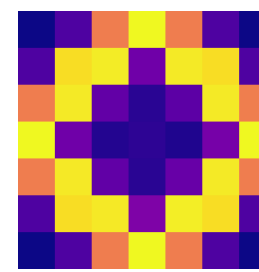
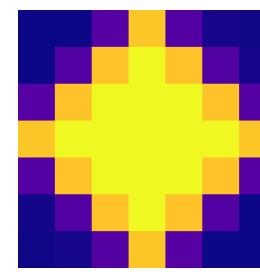
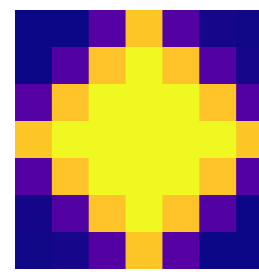
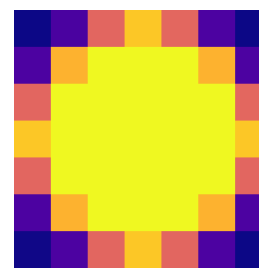
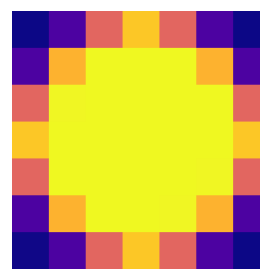
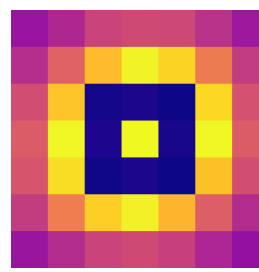
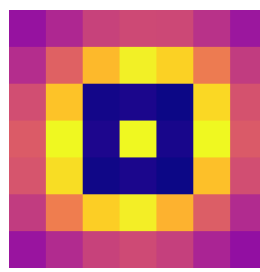
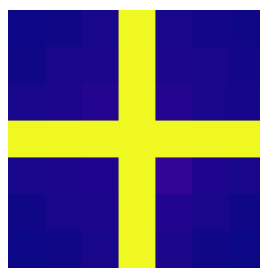
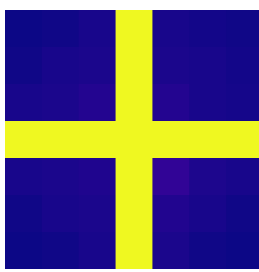
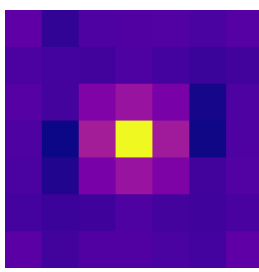
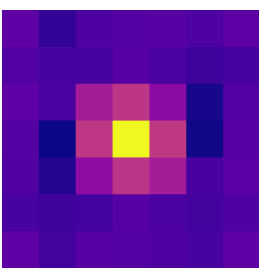
adiag



brand

Sans $C_{awayOPP}$

w_1/w_2



α_1

-0.42 ± 0.001

50.25 ± 0.06

1.51 ± 0.05

54.82 ± 0.23

52.21 ± 0.22

29.24 ± 0.06

39.68 ± 7.81

38.01 ± 0.06

α_2

-5.73 ± 0.014

-49.46 ± 0.05

-1.91 ± 0.09

-49.41 ± 0.15

-50.90 ± 0.22

-40.95 ± 0.08

-17.53 ± 0.08

-28.65 ± 0.09

RMSE₁

$0.22 \pm 7 \times 10^{-4}$

$0.02 \pm 8 \times 10^{-4}$

$0.56 \pm 2 \times 10^{-2}$

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

$0.007 \pm 2 \times 10^{-4}$

$0.03 \pm 2 \times 10^{-3}$

$0.07 \pm 8 \times 10^{-3}$

$0.13 \pm 8 \times 10^{-4}$

RMSE₂

$0.23 \pm 1 \times 10^{-3}$

$0.02 \pm 7 \times 10^{-4}$

$0.56 \pm 2 \times 10^{-2}$

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

$0.007 \pm 4 \times 10^{-4}$

$0.03 \pm 2 \times 10^{-3}$

$0.08 \pm 8 \times 10^{-3}$

$0.13 \pm 7 \times 10^{-4}$

LOSS

$2.1 \times 10^{-3} \pm 2 \times 10^{-5}$

$1.1 \times 10^{-5} \pm 2 \times 10^{-6}$

$1.8 \times 10^{-3} \pm 9 \times 10^{-5}$

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

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

$2.2 \times 10^{-5} \pm 3 \times 10^{-6}$

$5.2 \times 10^{-4} \pm 1 \times 10^{-5}$

$3.2 \times 10^{-4} \pm 3 \times 10^{-6}$

EPOCHS

30 ± 8

34 ± 7

19 ± 6

33 ± 11

29 ± 4

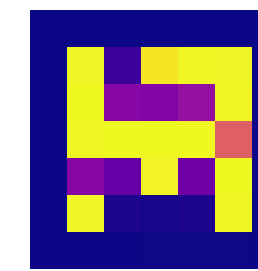
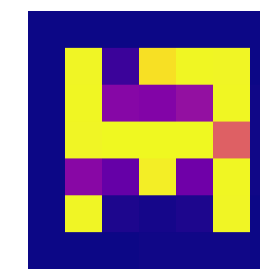
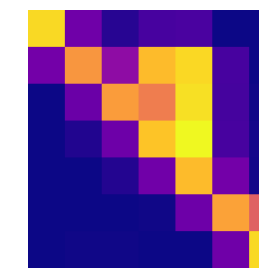
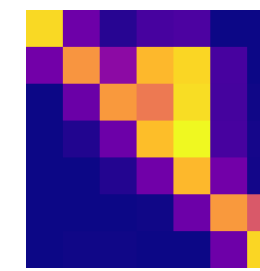
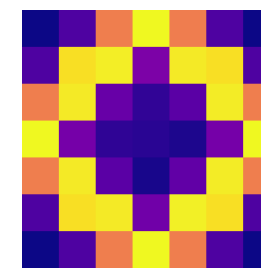
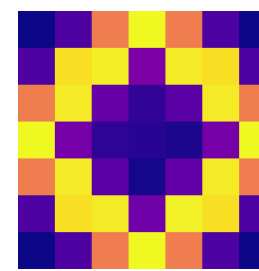
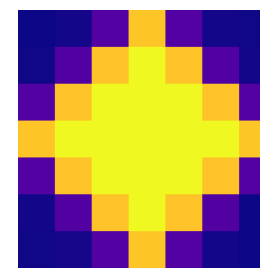
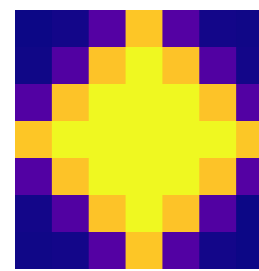
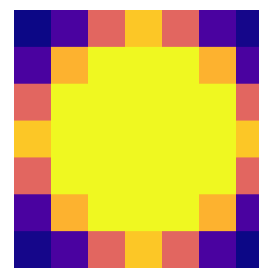
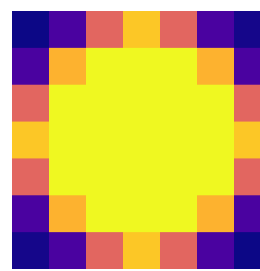
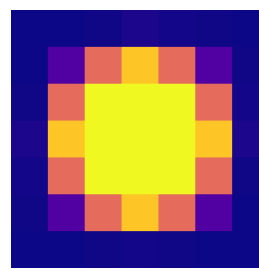
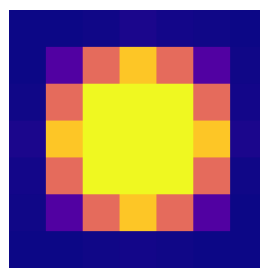
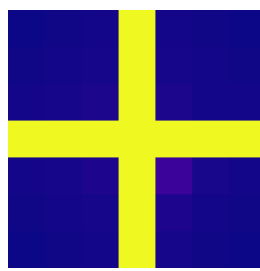
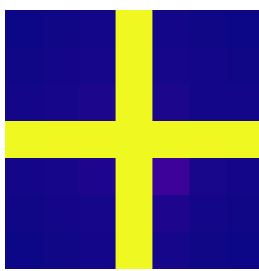
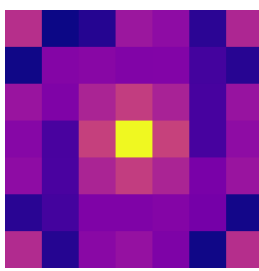
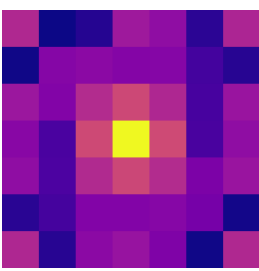
30 ± 5

34 ± 5

32 ± 4

Avec $C_{awayOPP}$

w_1/w_2



α_1

-0.34 ± 0.001

62.56 ± 0.39

62.14 ± 0.03

64.42 ± 0.14

63.18 ± 0.34

47.21 ± 0.52

81.37 ± 3.29

55.17 ± 0.38

α_2

-2.37 ± 0.005

-62.42 ± 0.29

-60.55 ± 0.01

-62.16 ± 0.06

-63.08 ± 0.25

-62.33 ± 0.66

-20.73 ± 0.49

-41.24 ± 0.15

RMSE₁

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

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

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

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

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

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

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

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

RMSE₂

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

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

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

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

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

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

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

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

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 ± 5

32 ± 8

37 ± 4

33 ± 4

31 ± 5

33 ± 7

34 ± 7

30 ± 5