Assignment 3 Report

Tom Gerson, Sebastien Boo

March 8, 2024

Task 1

a) Adding padding to the image :

$$\begin{matrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 1 & 2 & 3 & 1 & 0 \\ 0 & 3 & 9 & 1 & 1 & 4 & 0 \\ 0 & 4 & 5 & 0 & 7 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{matrix}$$

We then apply hadamard product between the kernel matrix and each of the matrix below, obtained by sliding the kernel with stride = 1 :

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 2 & 1 \\ 0 & 3 & 9 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ 2 & 1 & 2 \\ 3 & 9 & 1 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ 1 & 2 & 3 \\ 9 & 1 & 1 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ 2 & 3 & 1 \\ 1 & 1 & 4 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ 3 & 1 & 0 \\ 1 & 4 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 2 & 1 \\ 0 & 3 & 9 \\ 0 & 4 & 5 \end{bmatrix} \quad \begin{bmatrix} 2 & 1 & 2 \\ 3 & 9 & 1 \\ 4 & 5 & 0 \end{bmatrix} \quad \begin{bmatrix} 1 & 2 & 3 \\ 9 & 1 & 1 \\ 5 & 0 & 7 \end{bmatrix} \quad \begin{bmatrix} 2 & 3 & 1 \\ 1 & 1 & 4 \\ 0 & 7 & 0 \end{bmatrix} \quad \begin{bmatrix} 3 & 1 & 0 \\ 1 & 4 & 0 \\ 7 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 3 & 9 \\ 0 & 4 & 5 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 3 & 9 & 1 \\ 4 & 5 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 9 & 1 & 1 \\ 5 & 0 & 7 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 1 & 1 & 4 \\ 0 & 7 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 1 & 4 & 0 \\ 7 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

We obtain :

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 2 \\ 0 & 0 & 9 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ -4 & 0 & 4 \\ -3 & 0 & 1 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ -2 & 0 & 6 \\ -9 & 0 & 1 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ -4 & 0 & 2 \\ -1 & 0 & 4 \end{bmatrix} \quad \begin{bmatrix} 0 & 0 & 0 \\ -6 & 0 & 0 \\ -1 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 18 \\ 0 & 0 & 5 \end{bmatrix} \quad \begin{bmatrix} -2 & 0 & 2 \\ -6 & 0 & 2 \\ -4 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -1 & 0 & 3 \\ -18 & 0 & 2 \\ -5 & 0 & 7 \end{bmatrix} \quad \begin{bmatrix} -2 & 0 & 1 \\ -2 & 0 & 8 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -3 & 0 & 0 \\ -2 & 0 & 0 \\ -7 & 0 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 9 \\ 0 & 0 & 10 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -3 & 0 & 1 \\ -8 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -9 & 0 & 1 \\ -10 & 0 & 14 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -1 & 0 & 4 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} -1 & 0 & 0 \\ -14 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

b)

Task 2