# Homework #5

## 5.1    Image dilation and erosion



Figure 1: The comparison of dilation (left) and erosion (right) Lena.

We implement the binary dilation and erosion algorithm in a simple way. Define the dilation operator $Q = P \oplus K$ as follow, taking dilation as finding the local maximum value through a given 3-5-5-5-3 kernel:

$$\begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

In the other hand, $P = Q \ominus K$ is defined as finding the local minimum in that given region.



Figure 2: The comparison of opening (left) and closing (right) Lena.

## 5.2    Cascading dilation and erosion

We try to cascade two operations to form the new image with different effect. For image opening:

we cascade erosion and dilation; for image closing we cascade dilation and erosion. The result shows in Figure 2.

## Appendix

The program is written by MATLAB. To run the program, copy the input data to the folder "dat/", and run "src/hw5_sh.m" without any argument to get the output in "out/".