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Assignment 2

1.

Given that binary strings are broken strings of 1s with gaps of 0s for 1 to 5 pixels, a 5x5 kernel size would cover the largest gap of 0s that represents 5 pixels. Therefore, to ensure there are no gaps, the minimum kernel size is 5x5. For the threshold function to return a sharper version of the blurred image, the threshold value depends on the average value returned by the averaging filter. Its smallest average is found when a certain neighborhood of pixels from the blurred image contains only 2 pixels. This value r represents a gray level, which serves as an input for the thresholding function that should return a value s. For the blurred pixel to be sharp, r must be lower than s. Therefore, the threshold value must be set lower than r (or the smallest average given by the averaging mask.

2.

0 0 1 0 0

1 1 -8 1 1

0 0 1 0 0

0 0 1 0 0] = Let’s call it A

Then, [1 0 0 0 0 + [0 0 0 0 1 = [1 0 0 0 1 = Let’s call it B

0 1 0 0 0 0 0 0 1 0 0 1 0 1 0

0 0 -4 0 0 0 0 -4 0 0 0 0 -8 0 0

0 0 0 -1 0 0 1 0 0 0 0 1 0 1 0

0 0 0 0 1] 1 0 0 0 0] 1 0 0 0 1]

* A + B = [1 0 1 0 1

0 1 1 1 0

1 1 -16 1 1

0 1 1 1 0

1 0 1 0 1]

This 5x5 mask must be built with uniform response in all directions: horizontal, vertical, and diagonal. The sum of all values in the filter must be equal to 0. This filter should yield a sharper image as there is more differentiation (more values in the matrix) in all directions unlike the aforementioned filters due to their smaller size.

3.

a)

//explanation

b)