Signal and Image Processing
Assignment 6

Nikolaj Dybdahl Rathcke (rfq695)

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1   Question 1

1.1

The image $\widetilde{I}(i,j)$ which is obtained by shifting the image I one pixel to the right is called a translation of I with translation vector d. This simple operation of shifting the image by one pixel cannot simply be obtained by a multiplication with a transformation matrix T, but instead we also need to do a vector addition with d, i.e. $\widetilde{I} = TI + d$. Obviously in this particular case, the transformation T is just the identity matrix as we do not perform any scaling or rotation etc. The filter for the operation is given by:

$$\widetilde{I}(i,j) = \sum_i \sum_j I(i-x, j-y)$$

Where x and y indicate how many pixels I is shifted on the x- and y-axis.

1.2

The code found in `src/q1_2.m` translates an image I of size $(77, 77)$ with a white square in the middle of size 3 by 3. It is translated with the vector $d = \begin{bmatrix} 30 \\ 30 \end{bmatrix}$ using Matlab's built-in function `imtranslate`. Figure **??** show the original image and the result after translation with d.
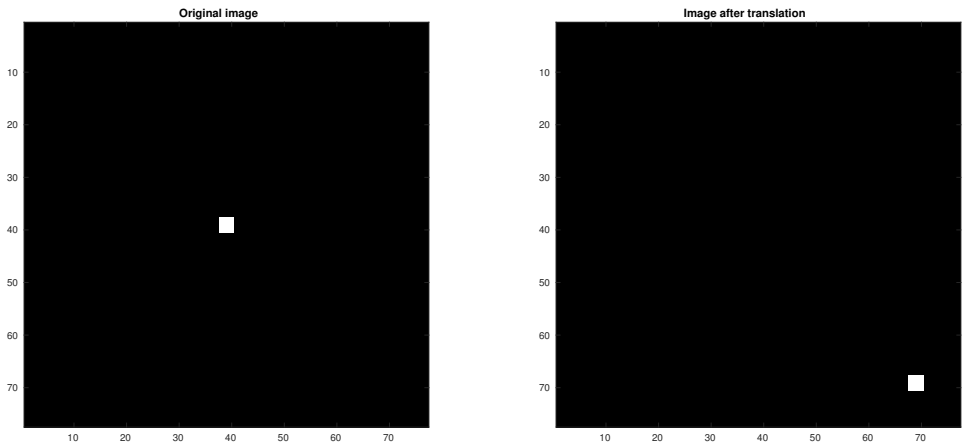

Figure 1: An image I and the result after translating it with vector d.

1.3

TODO

1.4

TODO

2   Question 2

2.1

TODO

2.2

TODO