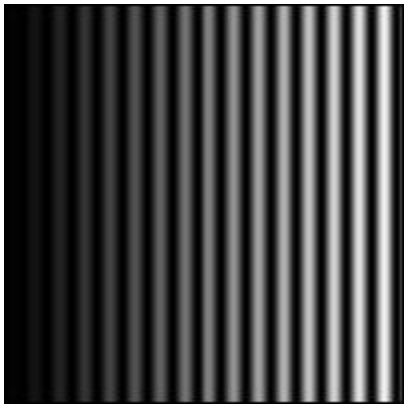
CSC784M – MP4 – 2T1819

(Due 26-Mar-2019, Tue, 6:00 PM)

INSTRUCTION: This activity is to be done individually or with your partner. For this MP, you will need to download the test images titled 'bag_xray.bmp', 'stripes.bmp', 'Washington.bmp', 'target_face.bmp' and 'fingerprint.bmp'. Submit your documentation (in *.pdf file format) and your M-file(s) online thru Canvas on or before the deadline. Documents must contain codes and explanations, answer to questions, as well as screenshots of your results. Submit a printed copy of your document before the start of the class on 26-Mar-2019.

bag_xray.bmp



stripes.bmp

Washington.bmp

target_face.bmp

fingerprint.bmp

1.) Let the input image be 'bag_xray.bmp'. Write an M-file that implements a 3-by-3 PSF to perform the following operations (refer to our lecture notes):
   a.) shift and subtract
   b.) edge detection
   c.) edge enhancement
   d.) edge detection plus thresholding (The output image should be a binary image with the edges displayed represented by black pixels while the rest of the image consist of white pixels. Apply thresholding such that the edges of the gun and the scissor are almost completely defined while having minimal noise or extra black dots in the background).

   Plot the output images in separate figures.
   Question: What is the value of your threshold in part (d)? How did you obtain this threshold? Explain briefly.

2.) Let the input image be ‘stripes.bmp’. Write an M-file that generates the following output images (refer to our lecture notes):
   a.) smoothed image (representing the uneven illumination found in the input image)
   b.) result of image subtraction [i.e., input image minus the image in part (a)]
   c.) result of image division [i.e., input image divided by the image in part (a)]

   Plot the output images in separate figures. (Note: Aside from actual image subtraction or division, some other steps may be necessary to produce the desired output images).

3.) Let the input image be ‘Washington.bmp’ (image to be searched), and let the target image be ‘target_face.bmp’. Write an M-file that generates the following outputs (refer to our lecture notes):
   a.) rotated and edge-detected target image
   b.) correlation image of the input and the target images (FFT correlation must be used; You may NOT use built-in functions such as ‘xcorr2’ and ‘conv2’)
   c.) automatic detection of the peak correlation location (row, column) in part (b)

   Plot the output images in separate figures.
   Question: What is your interpretation of your output in part (c)? Explain why it makes sense.

4.) Let the input image be ‘fingerprint.bmp’. Without using built-in functions such as ‘bwmorph’, ‘bwskel’, and the likes, write your own M-file that performs skeletonization or thinning on the given input image. Plot the original and the skeletonized images side-by-side for comparison. Explain your algorithm briefly.