Image filtering and restoration

1. Explain our work:
2. Read the image and show it on the grayscale.

Show the 3 components of the image (red, green, blue).

1/ Do edge detection by using the kernel in this method

kx = [-1 0 1 ; ky = [ -1 -2 -1

-2 0 2 ; 0 0 0

-1 0 1 ; ]; 1 2 1 ]

Kx: the center column is neutral, the left common emphasizes the dark region to the left and the right column emphasizes the bright region to the right.

Ky: the center row is neutral, the top row emphasizes the dark region to the top and the bottom column emphasizes the bright region to the bottom.

Convolution red, green, and blue with kernel in each x and y direction.

The result is an RGB color.

2/ Sharping process:

kx\_sharp = [ 0 -1 0

-1 5 -1

0 -1 0 ]

It deducts the contributions of its neighbors and highlights the core pixel's contribution five times.

Applying convolution to each color channel (red, green, and blue) with the sharpening kernel.

The result is an RGB image.

3/ Blurring image:

k\_average = ones(7) / 49.

This kernel is a 7\*7 matrix each element = 1/49 and it's a simple average or smoothing operation with a 7x7 neighborhood.

Applying convolution to each color channel (red, green, and blue) with the average kernel.

The result is an RGB image.

4/ Blurring motion image:

Kernel blur motion horizontal = zeros (25).

K blur motion horizontal (13, :) = 1/25.

We use this kernel as it 25\*25 matrix each element = 0 while the center row elements = 1/25 and it effectively averages the pixel values along each horizontal line.

Applying convolution to each color channel (red, green, and blue) with the chosen kernel.

Combining three color channels (red, green, and blue) into a single RGB image. (هو ده

The result is an RGB image.

C- restoring the original image from the motion blur image:

First, we do motion blur to the image as mentioned above, after that, we convert the blurred motion image and the kernel used to the frequency domain by fft2.

We add a constant called epsilon to prevent division by zero.

Do a deconvolution operation In the frequency domain, by dividing each element of the blurred motion image by the corresponding element of (motion kernel ft + epsilon).

We do an inverse Fourier Transform to the restored image.

Display the restored image.