Lab Session 4: Image Transform

Digital Image Processing

Exercise 1:

- Write a Matlab program to create a box (see the image below), calculate its 2D Discrete Fourier Transform (2D DFT), then visualize its 2D DFT using: abs(), log() and fftshift() functions

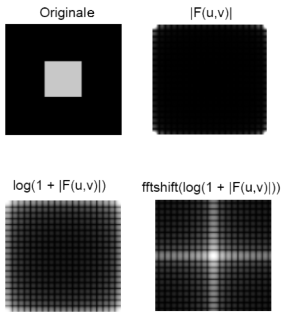

Figure 1: 2D DFT box visualization

Exercise 2:

- Write a Matlab program to rotate the box created in exercise 1 an amount of 45^o, calculate the magnitude and phase of the rotated box in frequency domain and compare the results with the magnitude and phase of the original box.

Exercise 3:

- Write a Matlab program to create the translated "cameraman.tif" image by 128 rows and cols, calculate the magnitude and phase of the translated

cameraman in frequency domain and compare the results with the magnitude and phase of the original cameraman image. Note: "cameraman.tif" image is loaded from Matlab image toolbox.

Figure 2: Translated cameraman by 128 rows and cols

Exercise 4:

- Write a Matlab program to create a box with circle inside (see the image below), multiply the box with a cosine wave, then calculate its magnitude in frequency domain. Compare the results with the magnitude of original box.

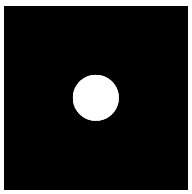

Figure 3: Modulated circle

Exercise 5:

(a) write a Matlab program to calculate 2D DFT of Lena grayscale image, remove low frequency details, perform inverse 2D DFT and visualize the recovered Lena image. Compare the results to original Lena image.

(b) write a Matlab program to calculate 2D DFT of Lena grayscale image, remove high frequency details, perform inverse 2D DFT and visualize the recovered Lena image. Compare the results to original Lena image.