

Assignment-2
CS419/619: Computer Vision (Spring 2025)
Submission Deadline: 24/02/2025

Problem 1:

Implement functions named 'dft2()' and 'idft2()' to compute the Fourier transform and the inverse Fourier transform of an image, **by utilizing the separability property of Fourier transform**. Compare the results of your method with the built-in function 'numpy.fft.fft2' and 'numpy.fft.ifft2' available in numpy library. You can utilize the 'cameraman.tif' image as input for your implementation.

Please store the codes and output images in a folder named 'Prob1' with the proper title to represent the function used to compute the output.

Problem 2:

(i) Compute and show the Fourier transform of given images "cameraman.tif" and "pout.tif" along with their **magnitude and phase separately**. Also, display the reconstructed images from magnitude and phase.

(ii) Take images A (e.g., cameraman.tif) and B (e.g., pout.tif), compute the magnitude and phase of Fourier transform of both images A and B, then reconstruct the images using (a) magnitude of A and phase of B, (b) the magnitude of B and phase of A.

(iii) Take an image (e.g., pout.tif), compute the Fourier transform, and reconstruct the images after removing the low-frequency and high-frequency values.

(iv) Take an image (e.g., cameraman.tif), compute the Fourier transform, and reconstruct the images after performing band-pass and band-stop filtering.

Please store all your code files and resultant images in a folder named "Prob2".

Problem 3:

Add **periodic noise** to the image (using vertical black strips of certain intervals on a white background) "cameraman.tif" and apply the Fourier transform.

(i) Plot the Fourier transform of an input image with noise and without noise.

(ii) Analyze the output of the Fourier transform of a noisy image, remove the noise using high pass filtering in the Fourier domain, and show the reconstructed output of the denoised image.

Please keep the output images and code in a folder named "Prob3".

How to submit:

To submit the assignment, please follow these steps:

1. Store your code and output images in a folder named "<Enroll.no.>_<Name>_A2" and upload the zip file of this folder through the Google form link given below.
2. Google form link: <https://forms.gle/sK5nKqgRGR6isEU7>