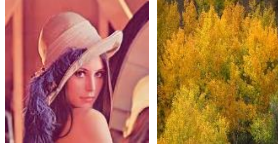


LAB 3



1. Apply Frequency Domain Filtering to enhance the LENA image using the steps below:
 - a. Read the lena.jpg image and convert the image to grayscale.
 - b. Apply a 2D Fourier Transform by computing the magnitude of the Discrete Fourier Transform of the grayscale image.
 - c. Shift the zero-frequency component of the Fourier Transform to center the Spectrum
 - d. Display the original image, grayscale image(a), magnitude spectrum(b) and centered spectrum(c)
 - e. Create an Ideal Low Pass filter with a Do of 50pixels and apply the mask by multiplying with the centered spectrum.
 - f. Apply inverse-shift and calculate the magnitude of the inverse DFT to restore the image back to the spatial domain.
 - g. Display the images from (e) and (f)
 - h. Create an Ideal High Pass filter with a Do of 50pixels and apply the mask by multiplying with the centered spectrum.
 - i. Apply inverse-shift and calculate the magnitude of the inverse DFT to restore the image back to the spatial domain.
 - j. Display the images from (h) and (i)
 - k. Are there any differences observed in the restored images (f and i)? If Yes|No explain why.

2. Histogram specification is the transformation of an image so that its histogram matches a specified histogram. Match the source image below to the reference image:
 - a. Read the source image (aspens_in_fall.jpg) and the reference image (forest.jpg)
 - b. Match the histograms of the source image to the reference image
 - c. Use the mask(mask.jpg) provided to mask the matched image from (b).
 - d. Display the source image, reference image, the matched image, and masked-matched image
 - e. Plot and compare the histograms and cumulative distribution functions (CDFs) for each image

References:

- Frequency Domain Filtering:
https://docs.opencv.org/4.x/de/dbc/tutorial_py_fourier_transform.html
- Image histogram:
https://docs.opencv.org/3.4/d8/dc8/tutorial_histogram_comparison.html