**Lab- 4**

**CSET340- Advanced Computer Vision and Video analytics**

**Task-1:- To find histogram value and display histogram of a grayscale and color image**

Objectives:-

1. To compute and analyze the histogram values for grayscale and color images.
   a. Convert the colored image to grayscale and analyze the histogram values further.
2. To visualize the histogram for both grayscale and color images.
   a. M1:- x-axis has grey levels/ Intensity values and the y-axis has the number of pixels in each grey level.
   b. M2:- x-axis represents the grey level, while the y-axis represents the probability of occurrence of that grey level.
3. Observe how the histogram changes for bright and dark images in grayscale.
4. Enhance the contrast of an image using histogram equalization.

Note:-

- Use cv2.calcHist(), cv2.equalizeHist() for this part of the assignment.
- For colored image divide the image into channels and process it in the same way as a gray image.

**Task-2:- To perform Discrete Fourier transform (FFT) and Inverse Fourier transform (IFFT) to an image. Take a grayscale image ( colored image is optional).**

1. To compute the Fourier Transform (FT) of an image using FFT.
   a. Compute the DFT of the input image using the Fast Fourier Transform (FFT).
   b. Display the magnitude spectrum of the Fourier Transform.
2. To reconstruct the original image using Inverse FFT (IFFT).
   a. Apply the Inverse Fourier Transform (IFFT) to reconstruct the original image.
   b. Display the original, magnitude spectrum, and reconstructed images.
3. To verify the Rotation Property of Fourier Transform
   a. Rotate the input image by an angle (e.g., 45). Use either cv2.rotate() or cv2. getRotationMatrix2D () function to rotate an image.
   b. Compute the FFT of the rotated image.
   c. Compare the magnitude spectrum of the rotated image with the original image's spectrum.
   d. Verify that the Fourier Transform magnitude spectrum is also rotated by the same angle by visualizing it.

Note:-

- When an image is rotated by an angle, its Fourier Transform magnitude spectrum also rotates by the same angle.
- All submissions on LMS and marks will be deducted for late submission
- Submit both the .ipynb file and the result doc file for assignment on LMS.