EE608 - Digital Image Processing

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Assignment 1

Assigned Date: 01/02/2023

Due Date: 08/02/2023

Problem 1: Gray Images

1.Read the contents of an image into an array I (recall from class that digital images are represented as an array of numbers). Use matplotlib to read and display images - https://matplotlib.org/tutorials/introductory/images.html. Display the image I (2)
2. Print the maximum and minimum pixel values of I. Based on these values, how many bits are needed (used) per pixel? What is the resolution of I? Print your answer. (2)
3. What is the size of the compressed image you downloaded? Print your answer. Based on the previous answers and assuming 256 gray levels, how efficienctly (compressed image size versus 8 bits per pixel size) is the image compressed for storage? Print your answer. (2)
4. Write a function that accepts as input an image I and a bitplane index i.e., a number b such that $0 \leq b \leq B-1$. The function must display the bitplane b of the image I as a binary image. Use the convention that $b = 0$ corresponds to the least significant bitplane and $b = B-1$ corresponds to the most significant bitplane. (4)
5. Write a function, which takes an 8-bit image and , the number of bits (B) to which the image needs to be quantized to and returns the B-bit quantized image. Display results for the image for 8,4,2,1 bits. Observe how the quality is degrading with the number of bits(10)

Problem 2: RGB Image

(a) foreground image (b) background image (c) result

Figure 1: Foreground+Background Merging

1. Write a function to read RGB image and display each channel seperately and convert RGB image to a grayscale image.(4) (Don't use in-built functions).
2. Write a function that takes a color image and finds the most frequently occurring color from the image.(5)

3. Write a function, which takes two images foreground and background that extracts the foreground object and places it in the background and returns the resultant image.(Refer Figure1) (10)

Problem 3: Digital Video

1. Write a function to read the Mp4 video using python and extract the frames from the video.(3)
2. Quantize the extracted frames with desired number of bits (B-Given by user) and convert the images back to a video (MP4) and play the video. (3)