Faculty of Information Technology
Islamic University of Gaza
Semester 20241

Course: Image Processing ICTS 6338

Assignment 1: Chapter- Digital Image Fundamentals

Assignment Tasks:

I. You are required to write a Python program that performs the following tasks:

- Read a colored image using OpenCV (I prefer to use your face image)
- Convert the colored image to a grayscale image.
- Convert the grayscale image into a binary image.
- Simulate intensity quantization by reducing the grayscale image to 4 levels.
- Compute and display the histogram of:
    a. The original grayscale image.
    b. The binary image.
    c. The quantized image.
- Save the resulting images with appropriate filenames.

II. Interpolation Task

- Resize the original grayscale image to double its original size using two different interpolation methods: (Use cv2.resize() function in OpenCV)
    d. Nearest Neighbor Interpolation (Specify interpolation=cv2.INTER_NEAREST**)**
    e. Bilinear Interpolation (Specify interpolation=cv2.INTER_LINEAR**)**
- Display and save both resized images.
- Compare the visual quality between the two interpolated images by observing sharpness and smoothness.

III. Technical Requirements:

- Required Libraries: OpenCV, NumPy, Matplotlib
- Code must be properly **commented and documented**.

IV. Notes:

- You must process at least **two different images**.
- Pay attention to image formats and conversions.