Tutorial - 01

1: Image Loading and Manipulation

1. **Load and Display Grayscale Image**

    - Load the grayscale image cell.tif. After loading, display the image with its original pixel values.
    - What is the dimension of the image? Use the size() function to find out.

2. **Display Color Image**

    - Load the color image onion.png. After loading, display this image with its original pixel values.
    - Compare the dimensions of the grayscale image and the color image. Discuss how the dimensions reflect the image types.

3. **Pixel Value Manipulation in Grayscale Image**

    - Print the pixel value at location (25, 50) in the grayscale image.
    - Change the pixel value at this location to 255 (white). Display the modified image and observe any changes.
    - Choose another location in the grayscale image, print its value, and set it to a different intensity (e.g., 100). Display the result.

2: Pixel Manipulation in Color Image

1. **Accessing and Modifying RGB Values**

    - Print the RGB pixel value at location (25, 50) in the color image.
    - Print only the red value at this location. Discuss how this value influences the overall color.
    - Set the pixel value at (25, 50) to white (i.e., [255, 255, 255]). Display the modified image and compare it with the original.

3: Grayscale Conversion

1. **Convert Color Image to Grayscale**

    - Load the color image onion.png again and convert it to grayscale.
    - Display the original color image and the grayscale image in a 2x1 subplot layout. Use appropriate titles for each subplot.

2. **Discuss Differences**

    - Discuss the differences in detail and information between the original color image and the grayscale image. What information is lost in the grayscale conversion?

4: Color Channel Separation

1. **Extract and Display Color Channels**

    - Extract the red, green, and blue channels from the color image onion.png.
    - Display all four images (original and the three channels) in a 2x2 subplot layout. Label each subplot accordingly.

2. **Analysis of Channels**

    - Discuss the significance of each color channel. How does each channel contribute to the overall color of the image?
    - Choose one of the color channels (e.g., green) and modify it (e.g., set all values to zero) before displaying the result. Discuss how this modification affects the image.