



# Digital Image Processing

(EE - 333)

## DE-43 Mechatronics

Syndicate – A

Assignment: 01

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MTS-Syndicate A

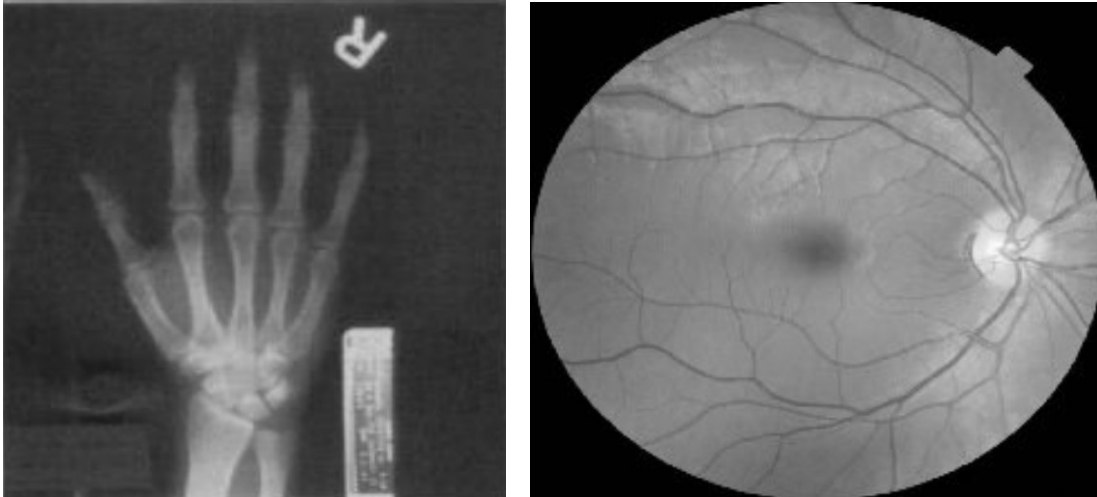
Submitted to: Dr. Tahir Nawaz

## Assignment 1

### Question 1:

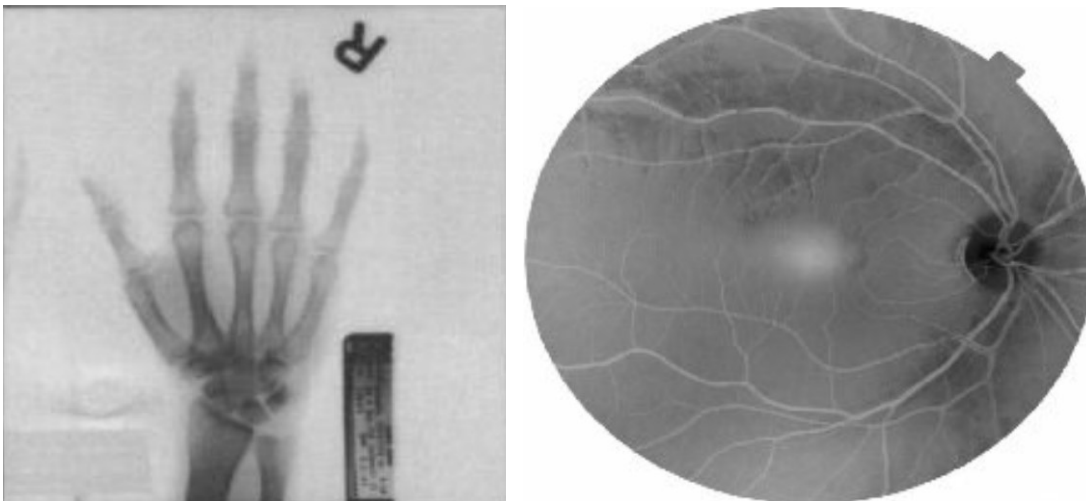
#### *Solution:*

#### Input images:



*Figure 1: Original input images.*

#### Resulting output images (Image negatives):



*Figure 2: Resulting Output images.*

#### Comments:

Image negative is the reverse or complement of the original image. Image negative enhances the contrast of the original image by reversing the Gray level order, that is darker regions become lighter and vice versa, allowing users to better visualize an image. This transformation is particularly useful in scenarios where enhancing image contrast is desired, such as in medical imaging (like X-rays), object detection, and photography.

Formula for finding image negative is  $(L-1) - \text{original image}$ . Where  $L = 2^n$  and  $n$  is the number of bits.

#### Applications:

- Medical Imaging: It can improve the visibility of structures in X-ray images, making it easier for medical professionals to identify abnormalities.
- Forensics: Enhancing the contrast of surveillance or crime scene images can aid in identifying details that may not be visible in the original image.
- Photography: It can be used to create artistic effects or to correct images with poor contrast, enhancing the overall quality of the photograph.

#### Question 2:

#### Solution:

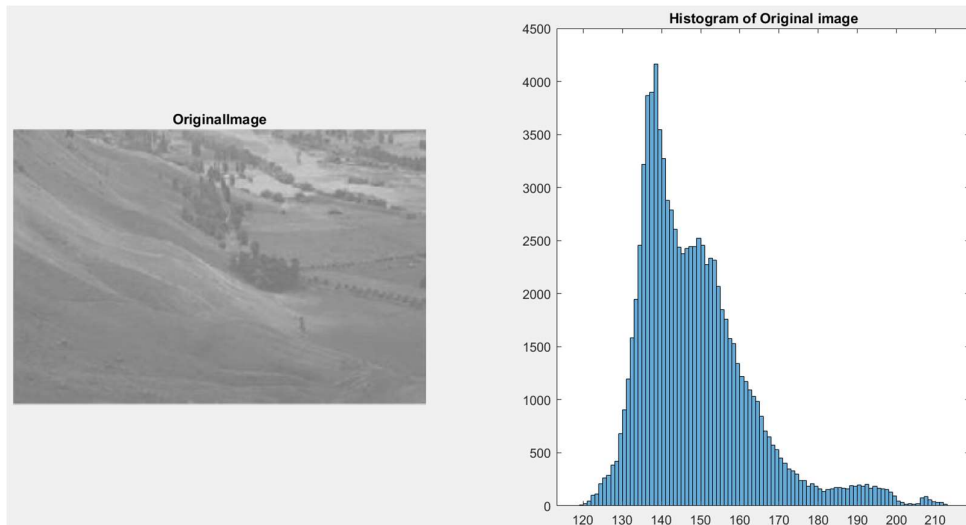


Figure 3: Original Image

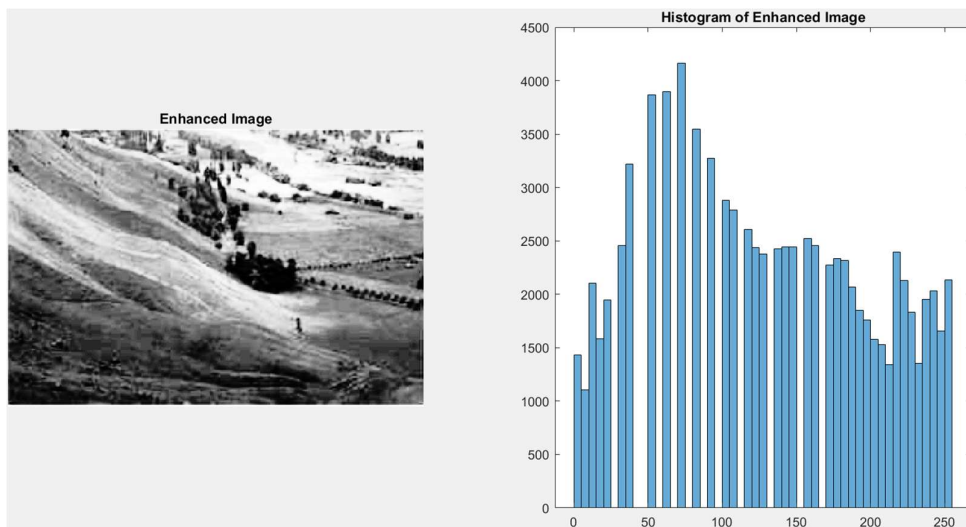


Figure 4: Enhanced Image

**Comments:**

Histogram equalization is another contrast improvement technique that aims to improve contrast by redistributing the intensity values of an image's histogram. Compared to the image negative transformation, histogram equalization might produce more balanced and natural-looking results, especially when dealing with images with non-uniform lighting conditions or uneven distributions of intensity values. It can be particularly useful in scenarios where a more balanced and natural enhancement is required.

**References:**

<https://www.youtube.com/watch?v=0wpg3RXdOOQ> (Histogram Equalization)

Lecture slides

<https://www.mathworks.com/help>

[chat.openai.com](https://chat.openai.com)