

# Image and Video Processing

## Programming Assignment 1

### Binary Image Processing



Submitted by

**Madhu Krishnan A P**

(Student ID: 24100488)

M.Tech VLSI and Embedded Systems

Cochin University of Science and Technology

Cochin - 22

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# 1 Introduction

The basic image processing techniques were performed on image samples using the **Matlab image processing toolbox**. The operations included the following.

- **Image Acquisition:** This operation loads an image file from disk into MATLAB for processing. It can handle binary, grayscale, and colour images.
- **Data Handling:** This stores the loaded image data in the MATLAB workspace, making it accessible for further use.
- **Image Metadata Analysis:** Retrieves the dimensions of the image (height, width, and channels).  
Binary image: [Height, Width]  
Grayscale image: [Height, Width]  
Color image: [Height, Width, Channels]
- **Image Analysis:** Accesses and displays the value of a specific pixel at coordinates (x, y)  
For binary images: 0 (black) or 1 (white).  
For grayscale images: Intensity value between 0 (black) and 255 (white).  
For color images: Intensity values for the Red, Green, and Blue channels (0–255).
- **Visualization:** Displays the image in a MATLAB figure window for visualization.
- **Image Storage:** Saves the processed or loaded image to disk in a specified format.

## 2 Binary Image

### 2.1 Load the image and store the data in the workspace

```
1 binaryImage = imread('D:\M.Tech\Semester 2\Image and video processing\Assignment  
  ↪ 1\binary_image.png');  
2 assignin('base', 'binaryImage', binaryImage);
```

### 2.2 Size of the image

```
1 binarySize = size(binaryImage);  
2 disp('Size of Binary Image:');  
3 disp(binarySize);
```

#### 2.2.1 Output: Image Dimensions

The size of the binary image is:

Size of Binary Image:  
1280 1920

### 2.3 Create a figure window and display the binary image

```
1 figure;  
2 imshow(binaryImage);  
3 title('Binary Image');  
4 imwrite(binaryImage, 'D:\M.Tech\Semester 2\Image and video processing\Assignment  
  ↪ 1\saved_binary_image.png');
```



Figure 1: Binary Image

### 2.3.1 Output: Binary Image

The binary image loaded from the specified path is shown below:

## 2.4 Display the pixel value at (x, y) in the binary image

```

1 x = 1100;
2 y = 620;
3 disp(['Pixel value at (', num2str(x), ', ', num2str(y), ') in Binary Image:']);
4 disp(binaryImage(y, x));

```

### 2.4.1 Output: Pixel Value

The pixel value at coordinate (1100, 620) is:

Pixel value at (1100, 620) in Binary Image:

1

## 2.5 Screenshots

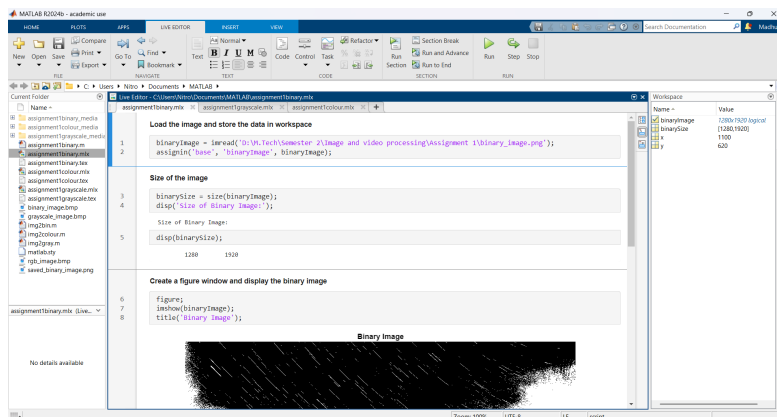


Figure 2: Binary image processing

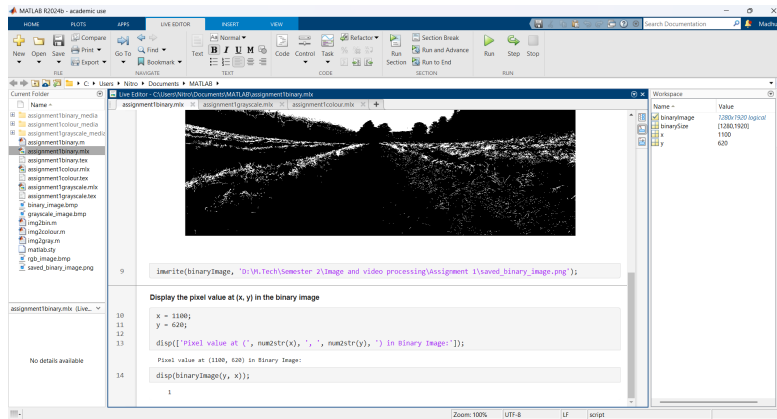


Figure 3: Binary image processing

## 3 Grayscale image

### 3.1 Load the image and store the data in the workspace

```
1 grayscaleImage = imread('D:\M.Tech\Semester 2\Image and video processing\Assignment
  ↳ 1\grayscale_image.png');
2 assignin('base', 'grayscaleImage', grayscaleImage);
```

### 3.2 Size of the image

```
1 grayscaleSize = size(grayscaleImage);
2 disp('Size of Grayscale Image:');
3 disp(grayscaleSize);
```

#### 3.2.1 Output: Image Dimensions

The size of the grayscale image is:

Size of Grayscale Image:  
1280          1920

### 3.3 Create a figure window and display the grayscale image

```
1 figure;
2 imshow(grayscaleImage);
3 title('Grayscale Image');
```

#### 3.3.1 Output: Displayed Grayscale Image

The grayscale image loaded and displayed in the figure window is shown below:



Figure 4: Grayscale Image

### 3.4 Display the pixel value at (x, y) in the grayscale image

```

1 x = 150;
2 y = 220;
3
4 disp(['Pixel value at (', num2str(x), ', ', num2str(y), ') in Grayscale Image:']);
5 disp(grayScaleImage(y, x));

```

#### 3.4.1 Output: Pixel Value

The pixel value at coordinate (150, 220) is:

Pixel value at (150, 220) in Grayscale Image:  
132

### 3.5 Screenshots

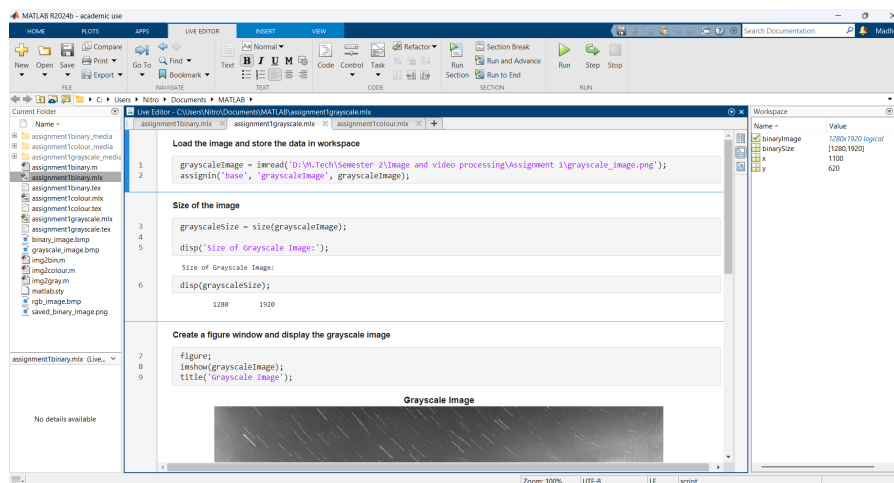


Figure 5: Grayscale image processing

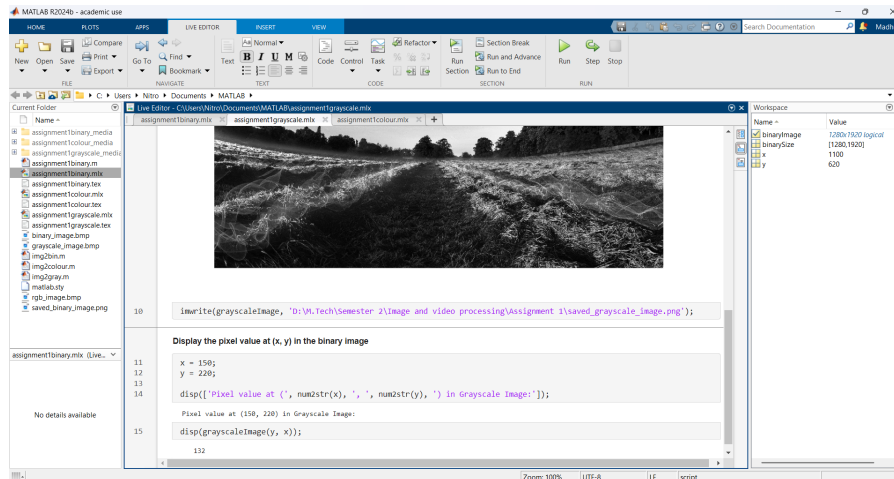


Figure 6: Grayscale image processing

## 4 Colour image processing

### 4.1 Load the image and store the data in the workspace

```
1 colorImage = imread('D:\M.Tech\Semester 2\Image and video processing\Assignment
  ↳ 1\rgb_image.png');
2 assignin('base', 'colorImage', colorImage);
```

### 4.2 Size of the image

```
1 colorSize = size(colorImage);
2 disp('Size of Color Image:');
3 disp(colorSize);
```

#### 4.2.1 Output: Image Dimensions

The size of the color image is:

Size of Color Image:  
 1280          1920          3

### 4.3 Create a figure window and display the color image

```
1 figure;
2 imshow(colorImage);
3 title('Color Image');
```

#### 4.3.1 Output: Displayed Color Image

The color image loaded and displayed in the figure window is shown below:



Figure 7: Color Image

#### 4.4 Display the pixel value at (x, y) in the color image

```

1 x = 650;
2 y = 500;
3
4 disp(['Pixel value at (', num2str(x), ', ', num2str(y), ') in Color Image:']);
5 disp(['R: ', num2str(colorImage(y, x, 1)), ' G: ', num2str(colorImage(y, x, 2)), ' B: '
    '↪ ', num2str(colorImage(y, x, 3))]);

```

##### 4.4.1 Output: Pixel Value

The pixel value at coordinate (650, 500) in the color image is:

Pixel value at (650, 500) in Color Image:

R: 136 G: 92 B: 117

#### 4.5 Screenshots

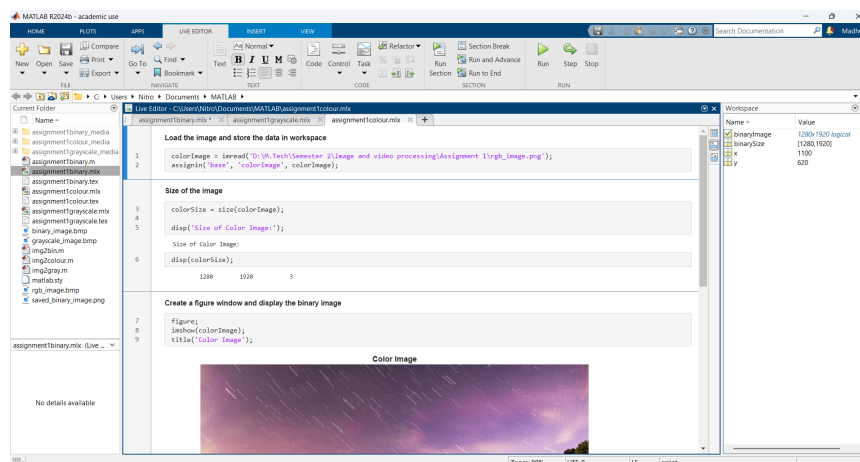


Figure 8: Colour image processing



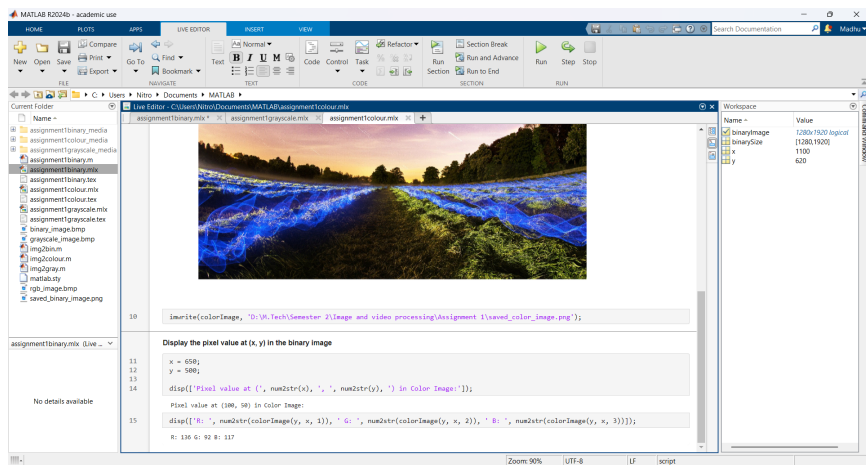


Figure 9: Colour image processing