East West University

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Course Title:Digital Image Processing
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Section:3

Course Instructor
Md Ashraful Haider Chowdhury
Lecturer
Department of Computer Science & Engineering

Submitted by
Name:Nuran Farhana Prova
ID:2023-1-60-075
Department of CSE
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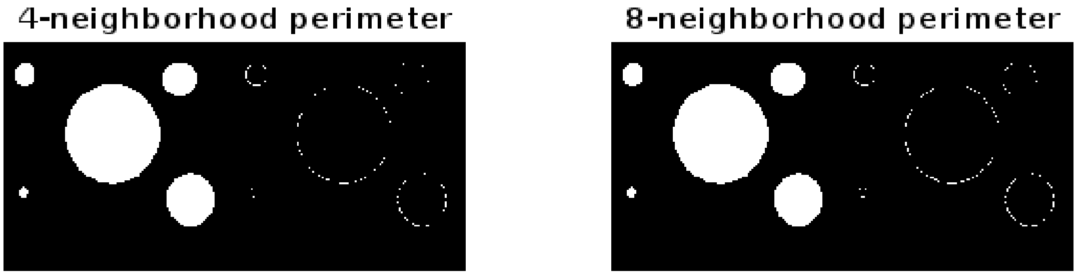
1.Determine the perimeter of an object by using 4 connected neighborhoods and 8 connected neighborhoods.

```
clc;
clear all;
close all;
cd('D:\CSE438\LAB');
pwd;
img = imread('picture1.png');
if size(img, 3) == 3
   img = rgb2gray(img);
end
bw = imbinarize(img);
n4 = bwperim(bw, 4);
n8 = bwperim(bw, 8);
figure;
subplot(1, 2, 1);
imshowpair(bw, n4, 'montage');
title('4-neighborhood perimeter');
subplot(1, 2, 2);
imshowpair(bw, n8, 'montage');
title('8-neighborhood perimeter');
```

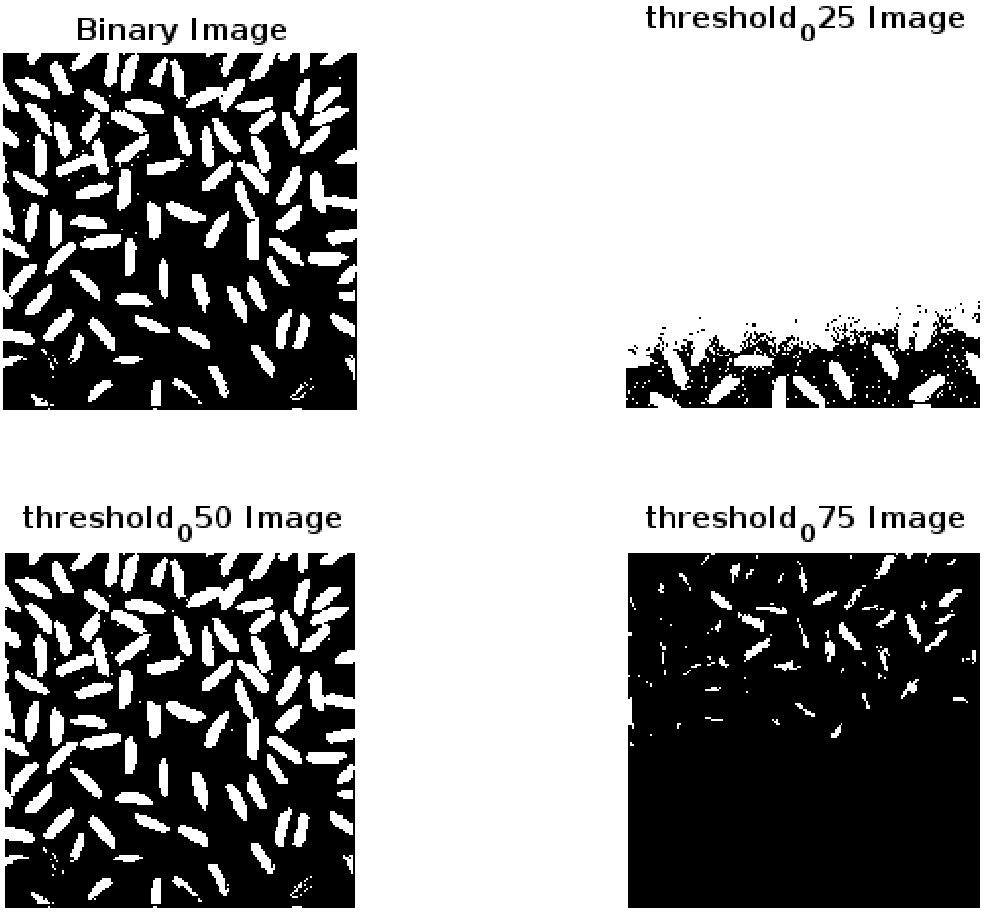


4-neighborhood perimeter

8-neighborhood perimeter

2.Create a binary image using a threshold.

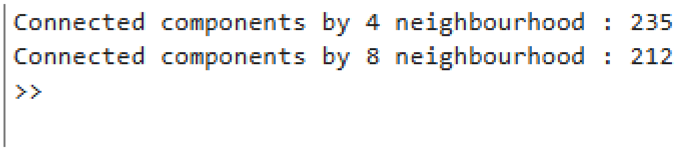
```
clc;
clear all;
close all;
img=imread("picture 2.png");
binary_image=im2bw(img);
threshold_025 = im2bw(img,0.25);
threshold_050 = im2bw(img,0.50);
threshold_075 = im2bw(img,0.75);
figure;
subplot(2,2,1); imshow(binary_image); title('Binary Image');
subplot(2,2,2); imshow(threshold_025); title('threshold_025 Image');
subplot(2,2,3); imshow(threshold_050); title('threshold_050 Image');
subplot(2,2,4); imshow(threshold_075); title('threshold_075 Image');
```



3.Determine the number of objects in the binary image generated in Question 2 using the

concept of connectivity.

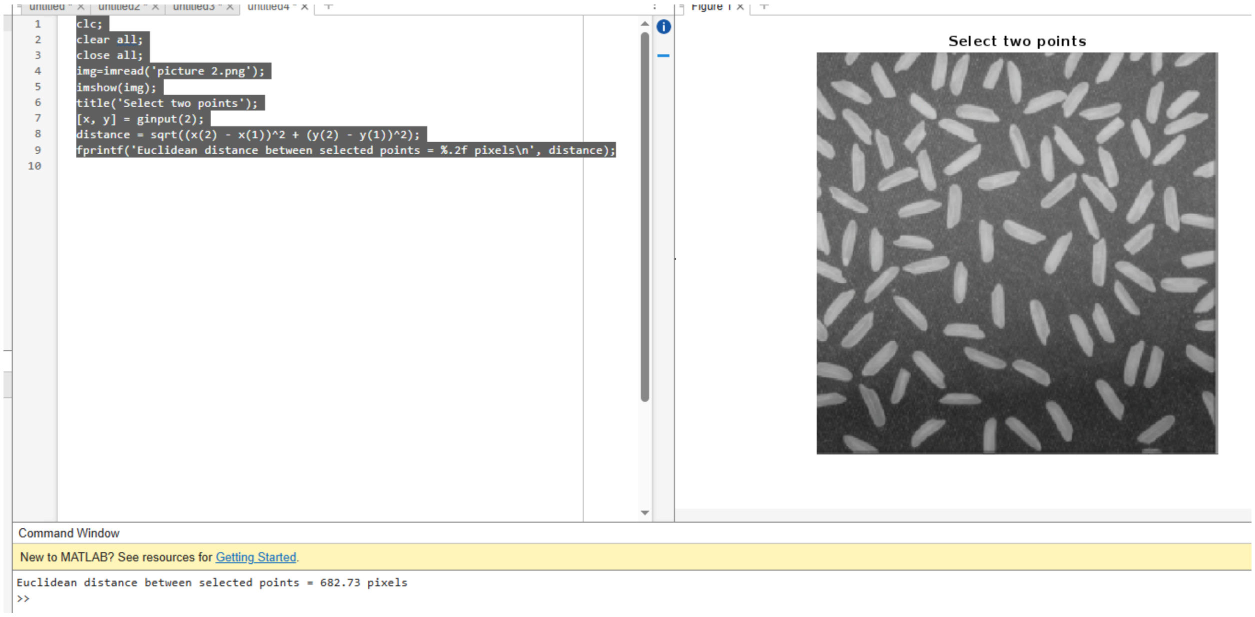
```
clc;
clear all;
close all;
img=imread('picture 2.png');
binary_image=im2bw(img);
components4=bwconncomp(binary_image,4);
number4=components4.NumObjects;
components8=bwconncomp(binary_image,8);
number8=components8.NumObjects;
fprintf('Connected components by 4 neighbourhood : %d\n', number4);
fprintf('Connected components by 8 neighbourhood : %d\n', number8);
```



```
Connected components by 4 neighbourhood : 235
Connected components by 8 neighbourhood : 212
>>
```

4.Find the Euclidean distance between two points of the image.

```
clc;
clear all;
close all;
img=imread('picture 2.png');
imshow(img);
title('Select two points');
[x, y] = ginput(2);
distance = sqrt((x(2) - x(1))^2 + (y(2) - y(1))^2);
fprintf('Euclidean distance between selected points = %.2f pixels\n',
distance);
```



```
clc;
clear all;
close all;
img=imread('picture 2.png');
imshow(img);
title('Select two points');
[x, y] = ginput(2);
distance = sqrt((x(2) - x(1))^2 + (y(2) - y(1))^2);
fprintf('Euclidean distance between selected points = %.2f pixels\n', distance);
```

New to MATLAB? See resources for Getting Started.

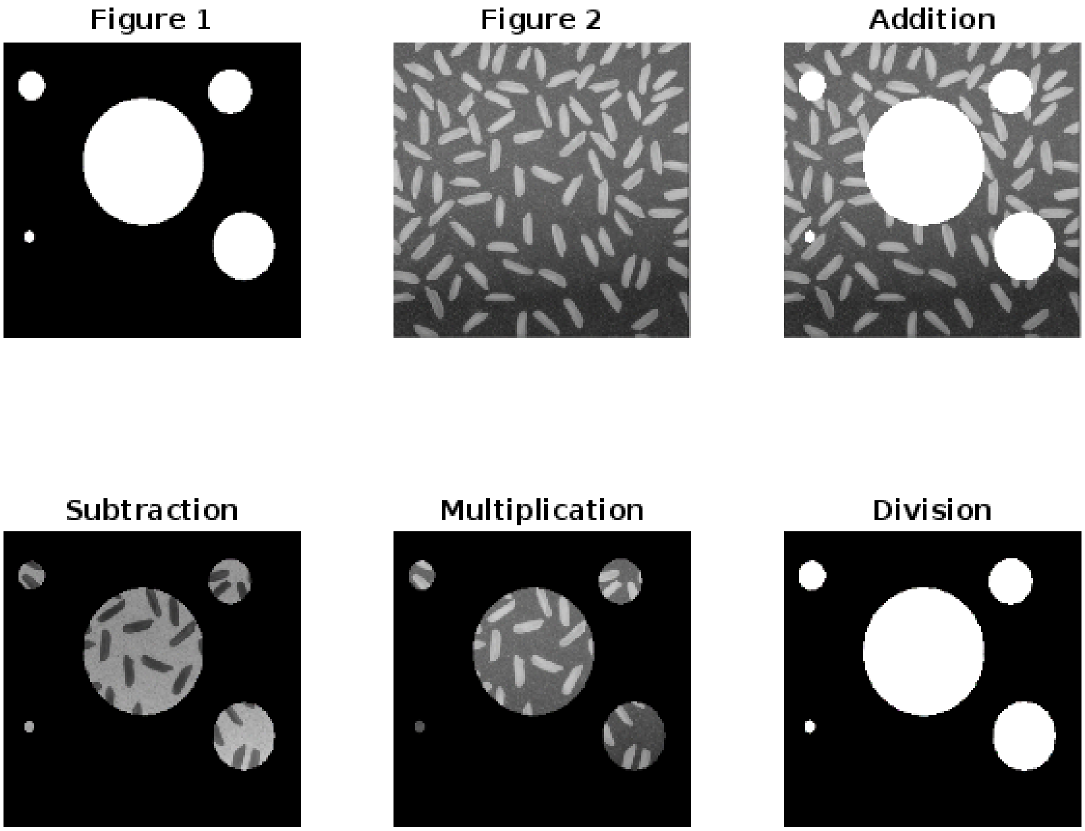
```
Euclidean distance between selected points = 682.73 pixels
>>
```

5.Apply the following operations using Fig.1 and Fig.2:

a. Addition
b. Subtraction
c. Multiplication
d. Division

```
clc;
clear all;
close all;
Fig1 = imread('picture1.png');
Fig2 = imread('picture 2.png');
sizeFig1 = size(Fig1);
sizeFig2 = size(Fig2);
if ~isequal(sizeFig1, sizeFig2)
   Fig2 = imresize(Fig2, sizeFig1(1:2));
end
doubleFig1 = im2double(Fig1);
doubleFig2 = im2double(Fig2);
addedImage        = imadd(Fig1, Fig2);
subtractedImage   = imsubtract(Fig1, Fig2);
multipliedImage   = doubleFig1 .* doubleFig2;
dividedImage      = doubleFig1 ./ (doubleFig2 + eps);

subplot(2, 3, 1), imshow(Fig1), title('Figure 1');
subplot(2, 3, 2), imshow(Fig2), title('Figure 2');
subplot(2, 3, 3), imshow(addedImage), title('Addition');
subplot(2, 3, 4), imshow(subtractedImage), title('Subtraction');
subplot(2, 3, 5), imshow(multipliedImage), title('Multiplication');
subplot(2, 3, 6), imshow(dividedImage), title('Division');
```

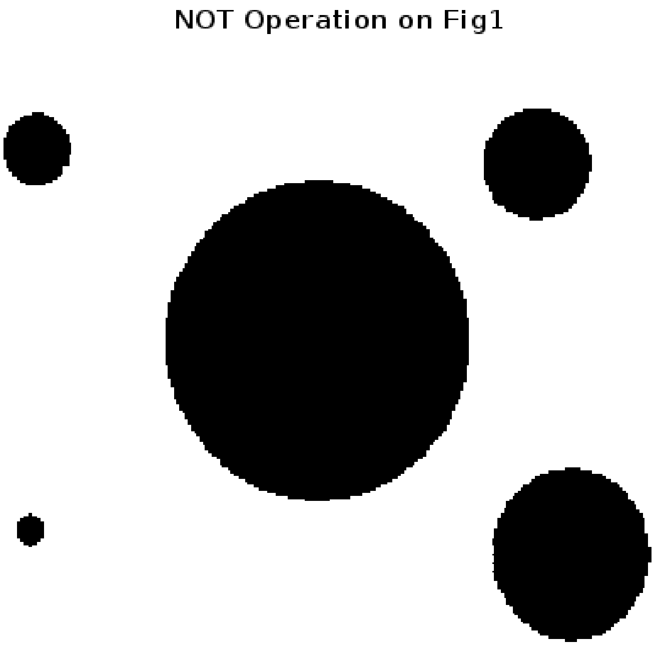


6.Apply the following operations using Fig.1 and Fig.2:

a. AND
b. OR
c. NOT

```
clc;
clear all;
close all;
Fig1 = imread('picture1.png');
Fig2 = imread('picture 2.png');
sizeFig1 = size(Fig1);
sizeFig2 = size(Fig2);
if ~isequal(sizeFig1, sizeFig2)
   Fig2 = imresize(Fig2, sizeFig1(1:2));
end
if size(Fig1,3) == 3
```

```
   Fig1_gray = rgb2gray(Fig1);
else
   Fig1_gray = Fig1;
end
if size(Fig2,3) == 3
   Fig2_gray = rgb2gray(Fig2);
else
   Fig2_gray = Fig2;
end
threshold = 128;
Fig1_bw = imbinarize(Fig1_gray, threshold/255);
Fig2_bw = imbinarize(Fig2_gray, threshold/255);
andImage = Fig1_bw & Fig2_bw;
orImage = Fig1_bw | Fig2_bw;
notImage = ~Fig1_bw;
subplot(2,2,1), imshow(Fig1_bw), title('Fig1 Binary');
subplot(2,2,2), imshow(Fig2_bw), title('Fig2 Binary');
subplot(2,2,3), imshow(andImage), title('AND Operation');
subplot(2,2,4), imshow(orImage), title('OR Operation');
figure;
imshow(notImage);
title('NOT Operation on Fig1');
```

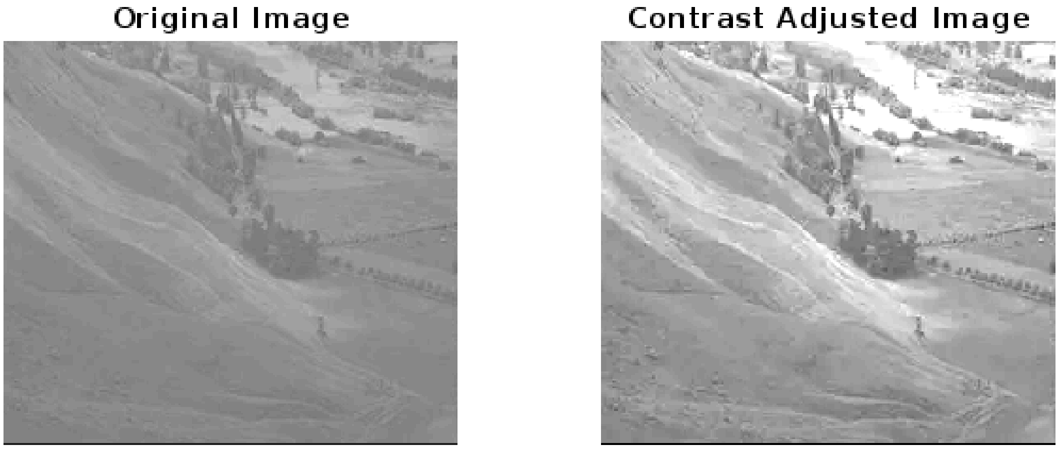


7.Adjust the contrast of the following image.

```
img = imread('picture 4.png');
if size(img,3) == 3
```

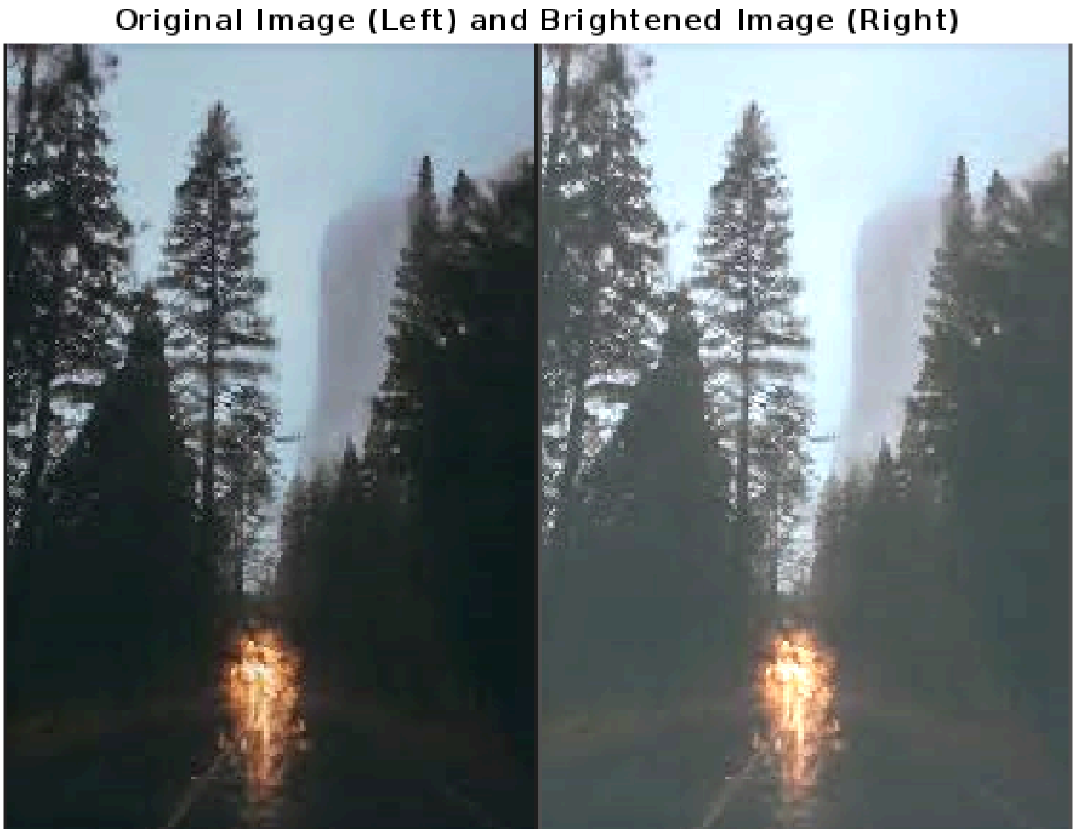
```
   img_gray = rgb2gray(img);
else
   img_gray = img;
end
adjusted_img = imadjust(img_gray, [0.3 0.7], [0 1]);

figure;
subplot(1,2,1); imshow(img_gray); title('Original Image');
subplot(1,2,2); imshow(adjusted_img); title('Contrast Adjusted Image');
```



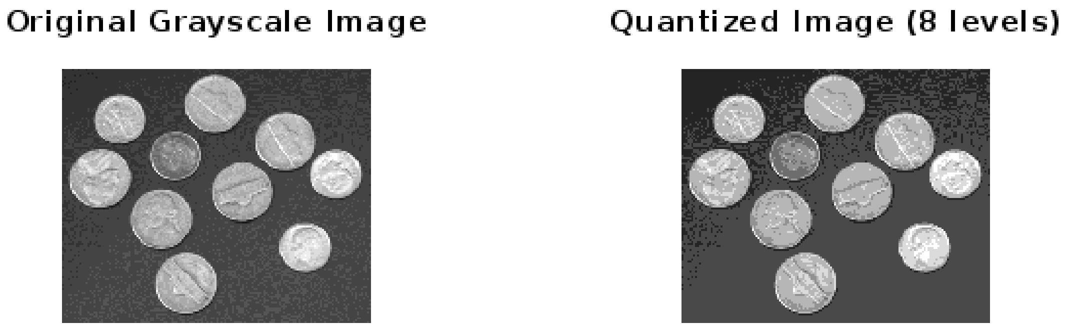
8. Brighten the following image

```
img = imread('Picture 5.png');
img_double = im2double(img);
brightened_img = img_double + 0.2;
brightened_img(brightened_img > 1) = 1;
imshowpair(img, brightened_img, 'montage');
title('Original Image (Left) and Brightened Image (Right)');
```



9. Quantize the Grayscale image by 8 levels.

```
img = imread('picture 6.png');
if size(img,3) == 3
   img_gray = rgb2gray(img);
else
   img_gray = img;
end
img_double = im2double(img_gray);
L = 8;
temp = img_double * (L-1);
quantized = round(temp);
quantized_img = quantized / (L-1);
figure;
subplot(1,2,1), imshow(img_gray), title('Original Grayscale Image');
subplot(1,2,2), imshow(quantized_img), title('Quantized Image (8 levels)');
```



10. Find the digital negative of the image.

```
img = imread('picture 7.png');
if size(img, 3) == 3
   img_gray = rgb2gray(img);
else
   img_gray = img;
end
img_double = im2double(img_gray);
negative_img = 1 - img_double;
figure;
subplot(1, 2, 1), imshow(img_gray), title('Original Grayscale Image');
subplot(1, 2, 2), imshow(negative_img), title('Digital Negative Image');
```