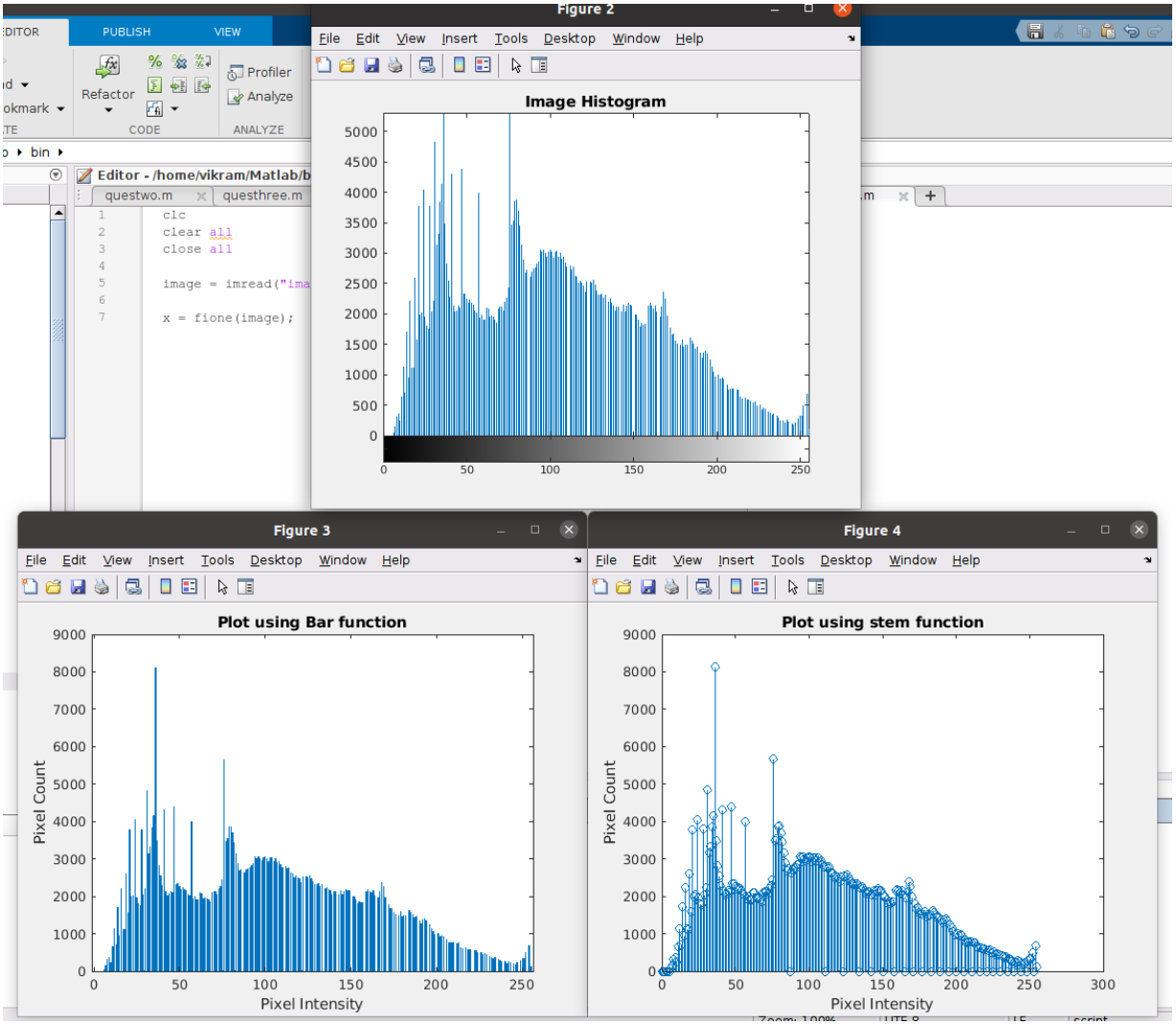
Vikram Shahapur
ECE 620
Final assignment
14597876

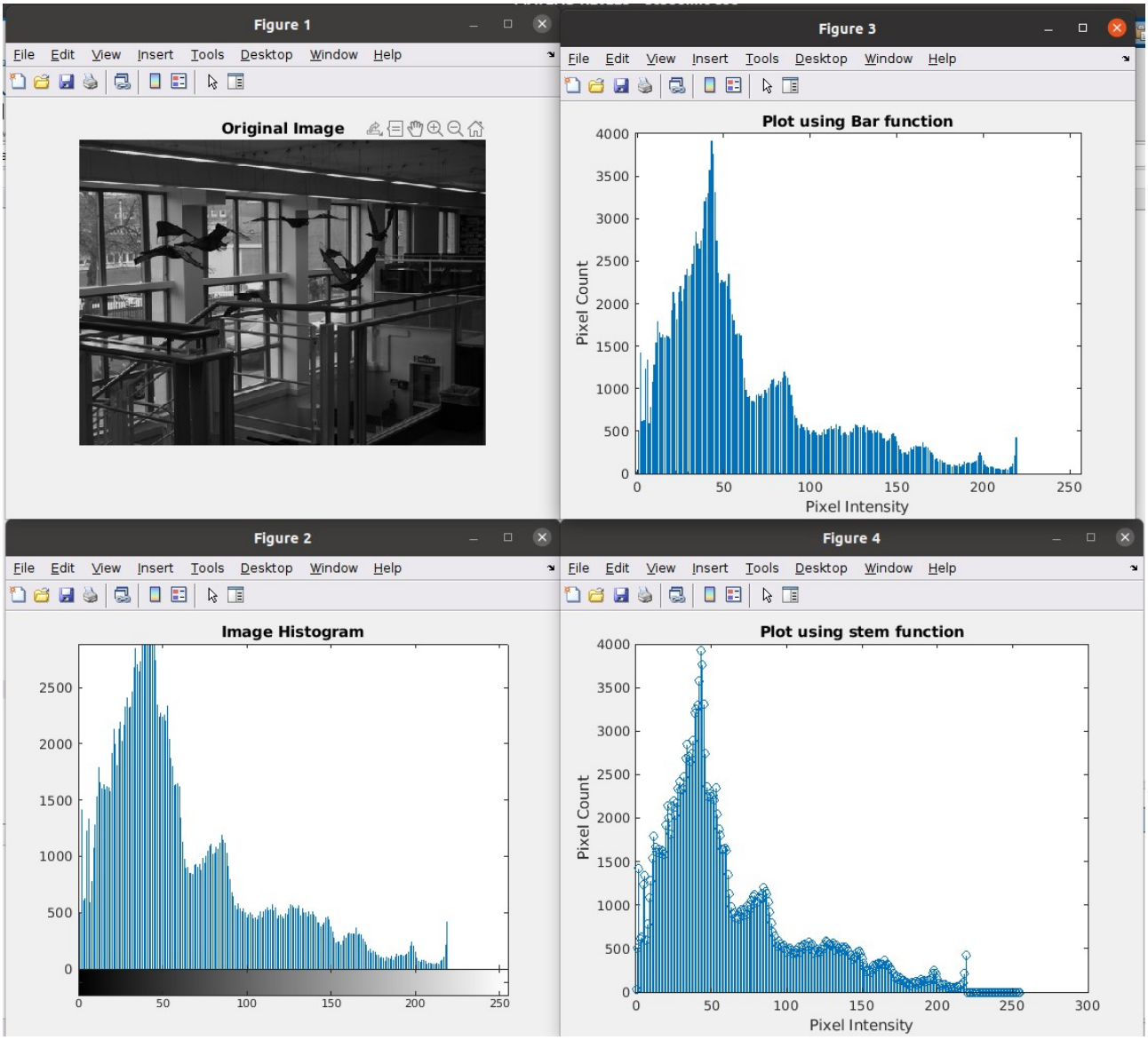
Answer 1)
Code:
fione.m

```
function [image]=fione(image)

% Display the image
figure(1);
imshow(image);
title('Original Image');

% Display the histogram
figure(2);
imhist(image);
title('Image Histogram');

figure(3);
[counts, bins] = imhist(image);
bar(bins, counts);
title('Plot using Bar function');
xlabel('Pixel Intensity');
ylabel('Pixel Count');

figure(4);
[counts, bins] = imhist(image);
stem(bins, counts);
title('Plot using stem function');
xlabel('Pixel Intensity');
ylabel('Pixel Count');

end
```

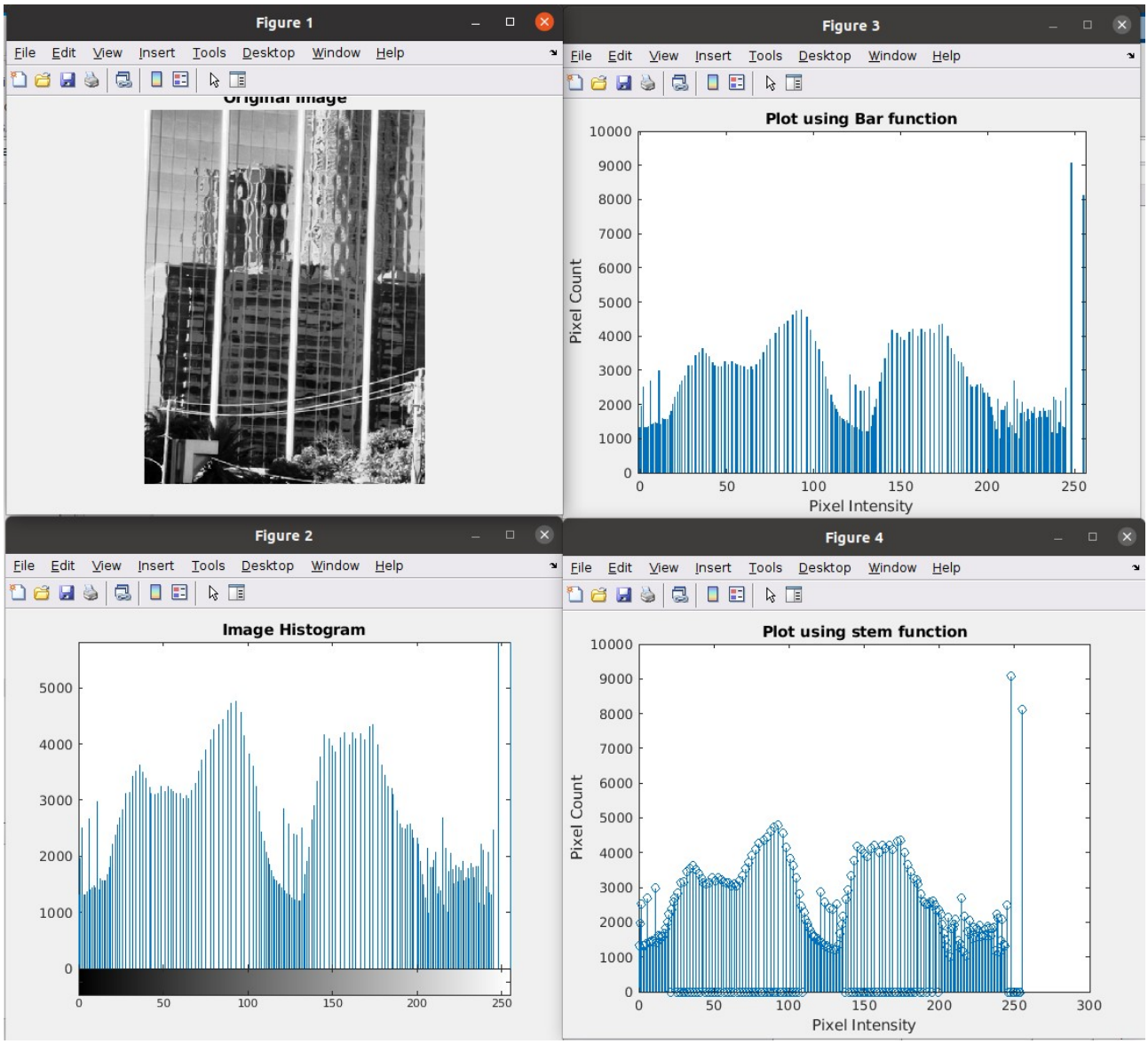
```
clc
clear all
close all

image = imread("imageCE1.tif");
x = fione(image);
```



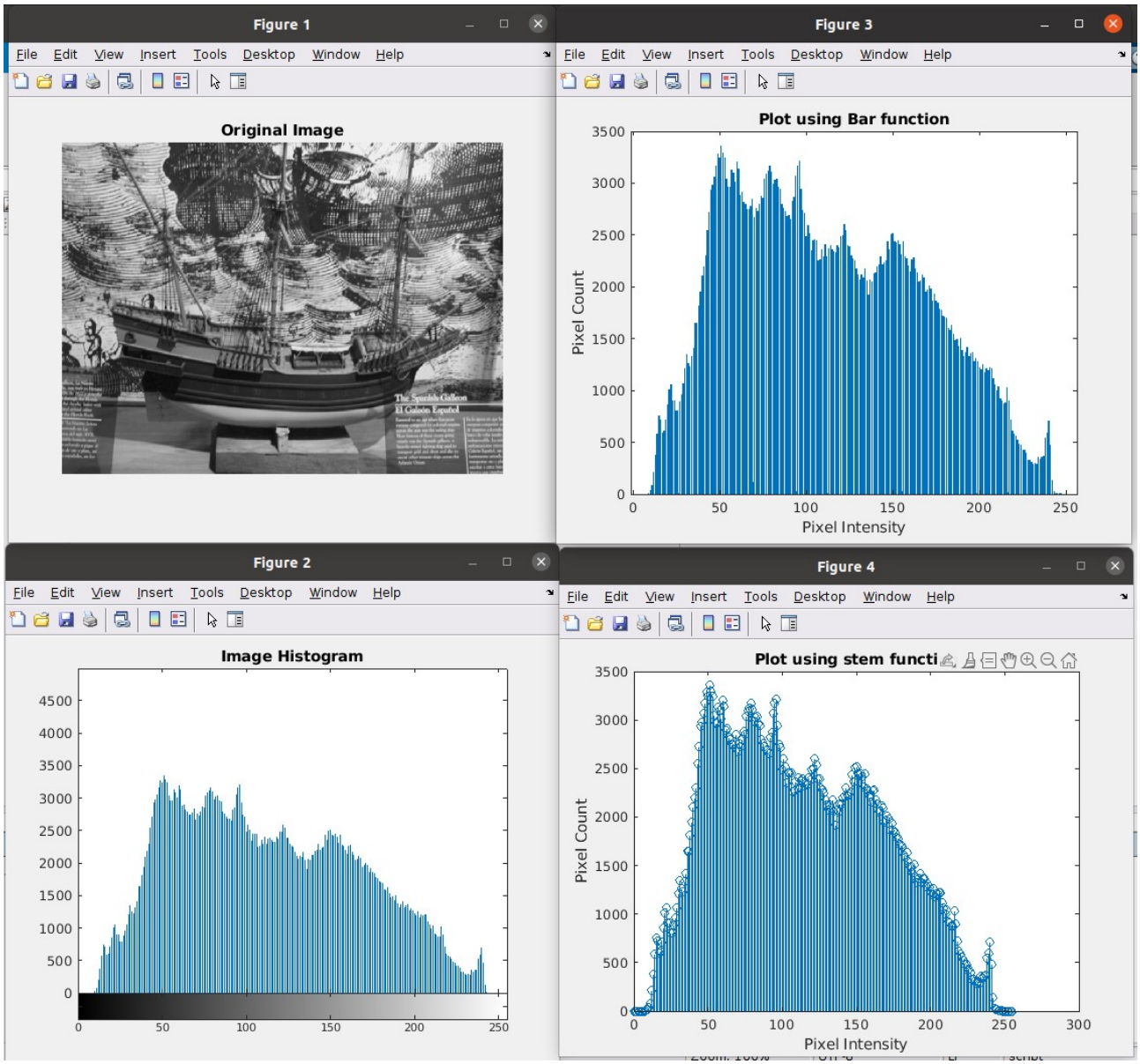
```
clc
clear all
close all

image = imread("imageCE2.tif");
x = fione(image);
```



```
clc
clear all
close all

image = imread("imageCE3.tif");
x = fione(image);
```



```
clc
clear all
close all

image = imread("imageCE4.tif");
x = fione(image);
```



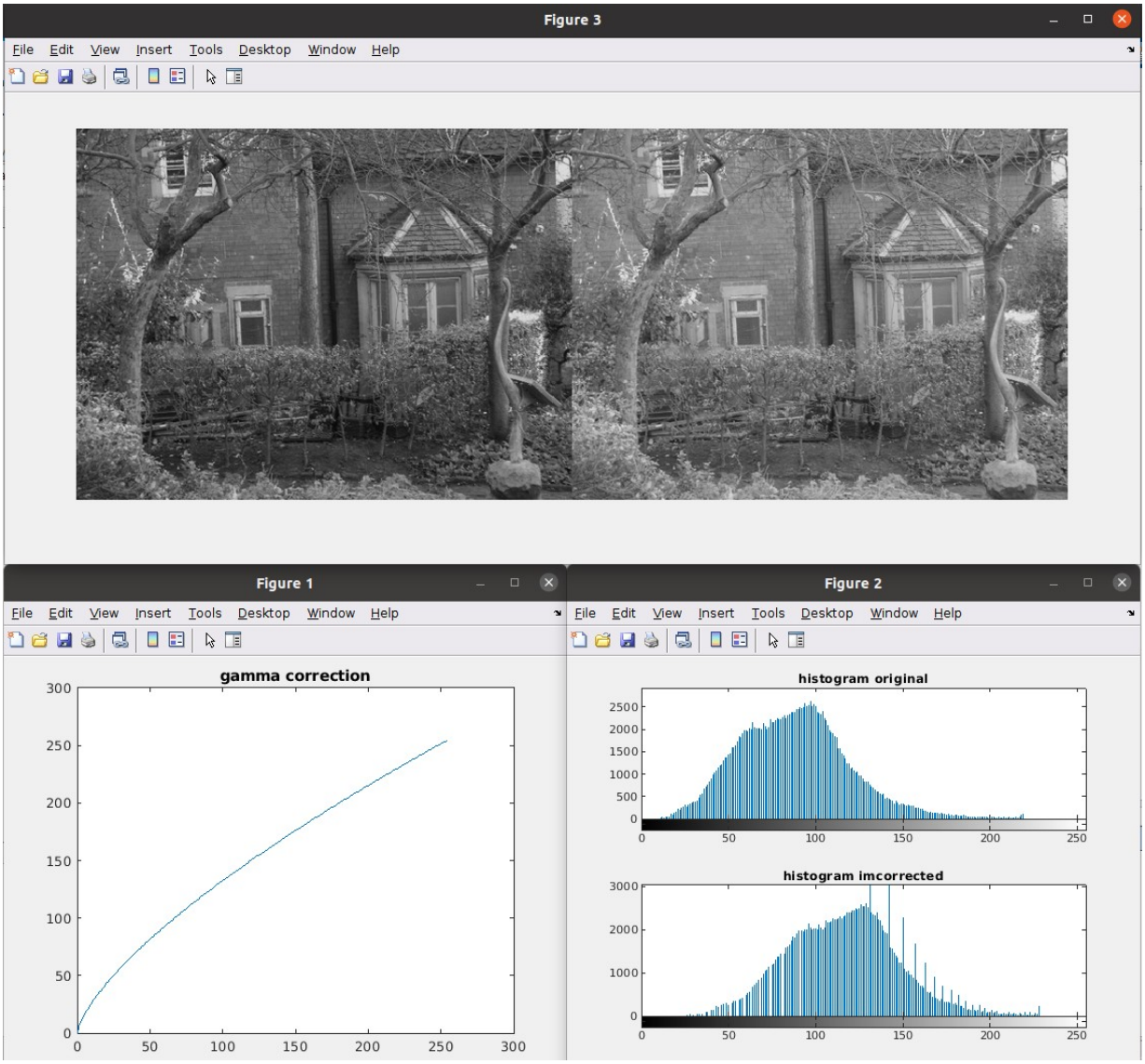
According to the plot Image 1 and image 3 are contrast enhanced because in image 1 sudden peaks and gaps have been introduced and histogram is not smooth anymore. In Image 3
we can see multiple peaks in the plot which is a fingerprint for contrast enhancement.

Answer 2)
Code:

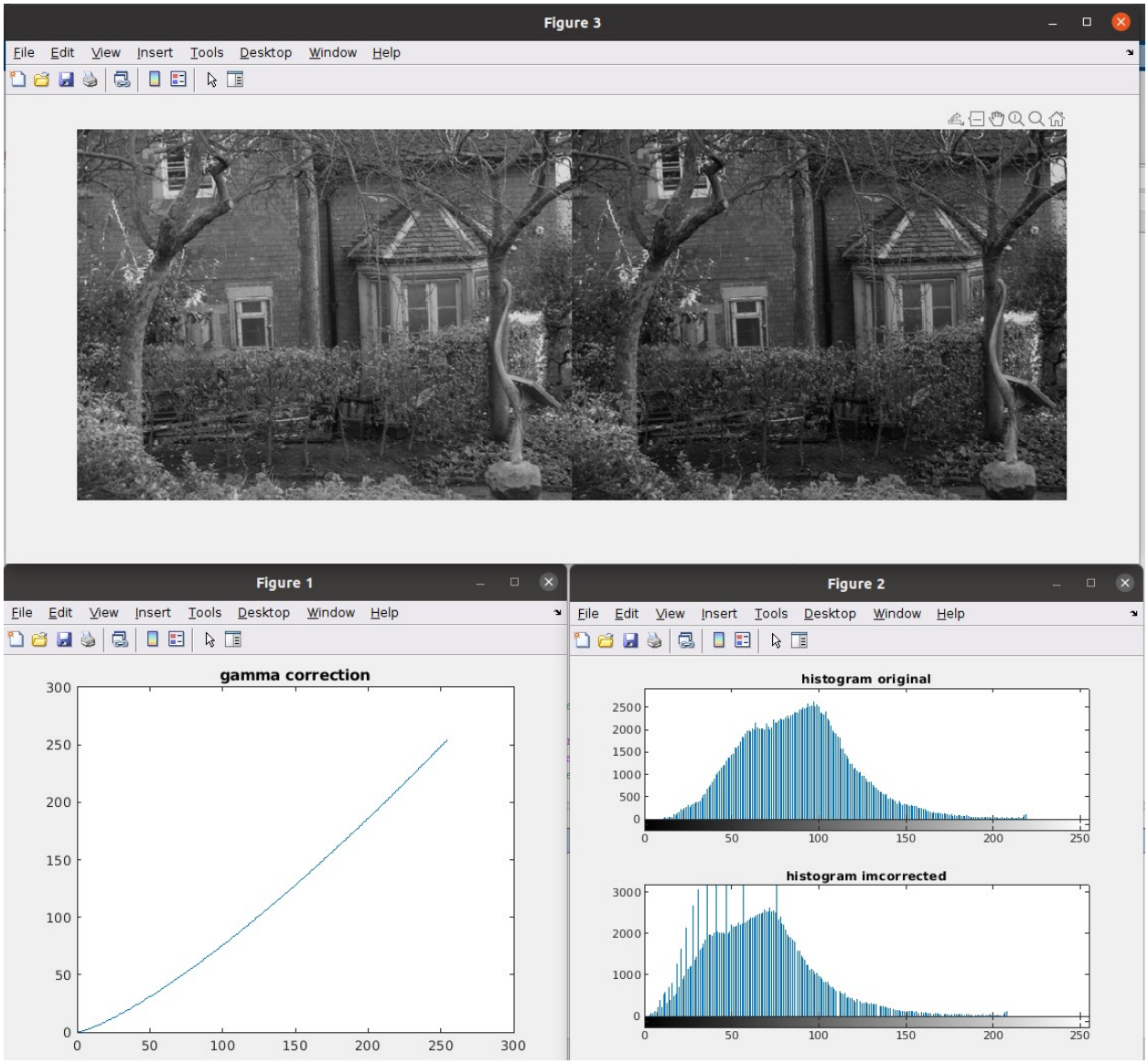
```
clc
clear all
close all

%Read the image
MP = imread("unaltIm1.tif");

%Get the input for the Gamma value
prompt = ("Enter Gamma value ");
gamma = input(prompt);

%Normalize the image to the range [0,1]
im = double(MP)/255;

%Transformation function
u = 0:1/255:1;
v = 255*(u.^gamma);

%Plotting the graph
figure; plot(u,v); title('gamma correction');

%Implementing the transform function
imcorrected = v(round(im*(255))+1);

%Convert the image to 8-bit integer format
imcorrected = uint8(imcorrected);

%Histogram equalization
%HE = histeq(MP);

%Plot the pixel histogram to see the difference
figure;
subplot(2,1,1); imhist(MP); title('histogram original');
subplot(2,1,2); imhist(imcorrected); title('histogram imcorrected');
%subplot(3,1,3); imhist(HE); title("HIstogram equalization");

%Compare the images before and after contrast enhancement
figure;
montage({MP,imcorrected},"Size",[1 2]);
```

We can conclude from the result that the concentration of the pixel value histogram shifts towards left if the gamma value is greater than 1 and the concentration of the pixel value histogram shifts towards right if the gamma value is less than 1 extreme right being white pixels and extreme left being black pixels.
There are isolated peaks observed on the right side of the histogram and sudden gaps on the left side of the histogram if the gamma value is less than 1.
If the gamma value is greater than 1, the isolated peaks is on the left side of the histogram and sudden gaps on the right side.
This indicates that gamma values less than 1 makes the pixel values near 255 peak(increase the number of light pixels) so that the image becomes lighter. And also removes some of the pixel values which are near 0 that is why sudden gaps are introduced indicating less dark pixels in the image.
If the gamma value is greater than 1 it makes the pixel values near 0 peak(increase the number of dark pixels) so that the image becomes darker. And also removes some of the pixel values which are near 255 that is why sudden gaps are introduced indicating less lighter pixels in the image.

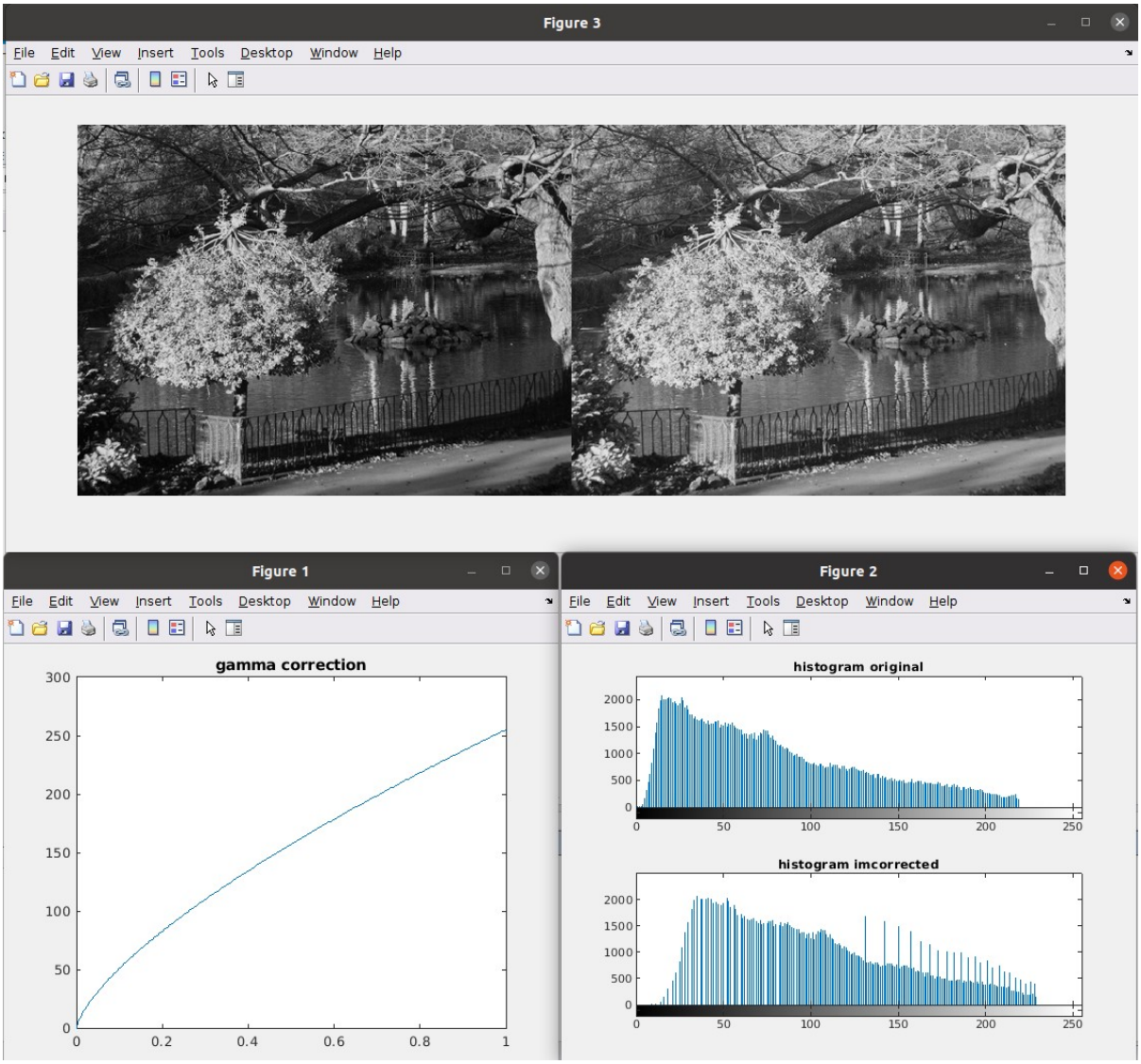
When Gamma value = 0.7 for unaltIm1.tif



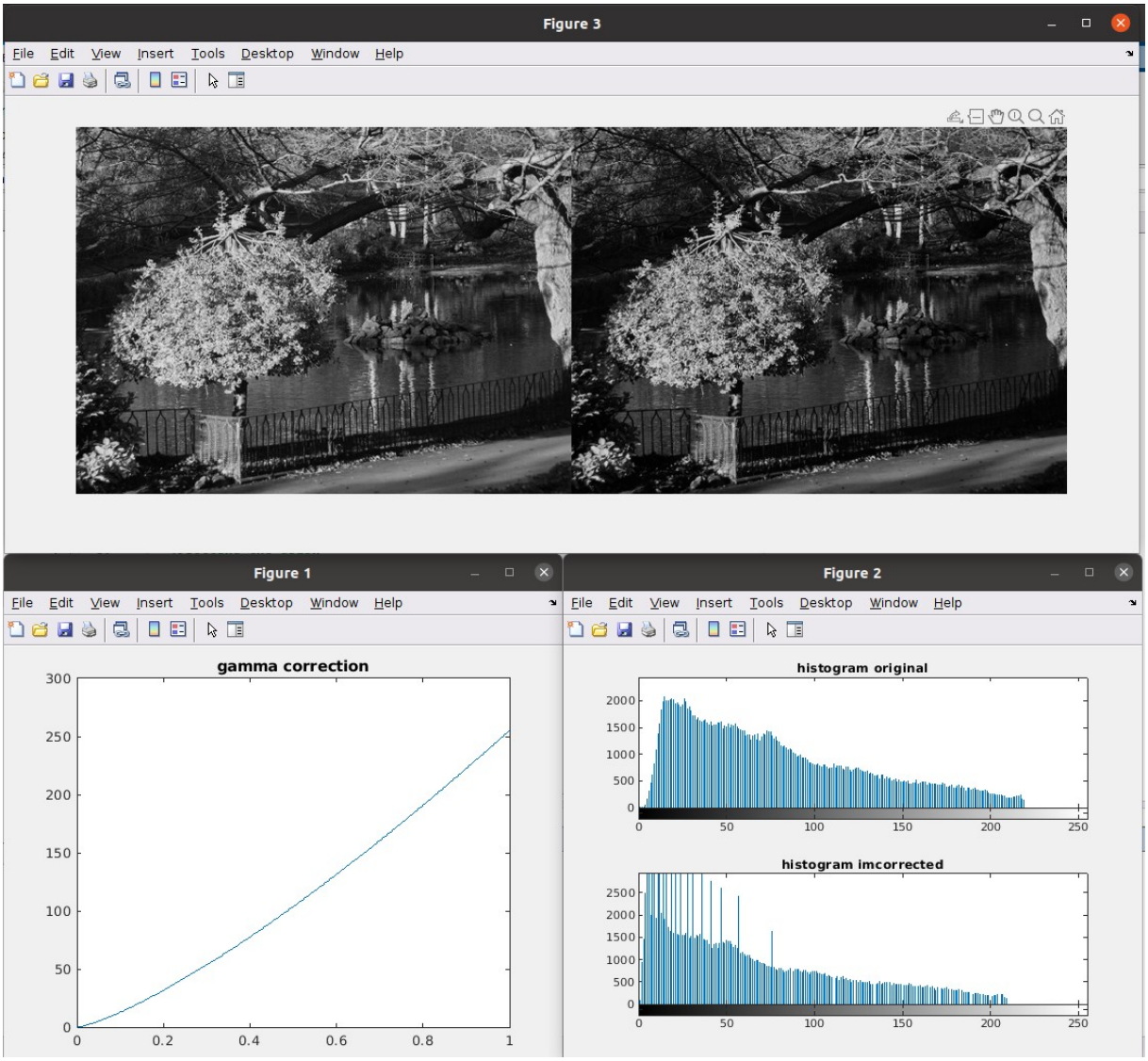
When Gamma value = 1.3 for unaltIm1.tif



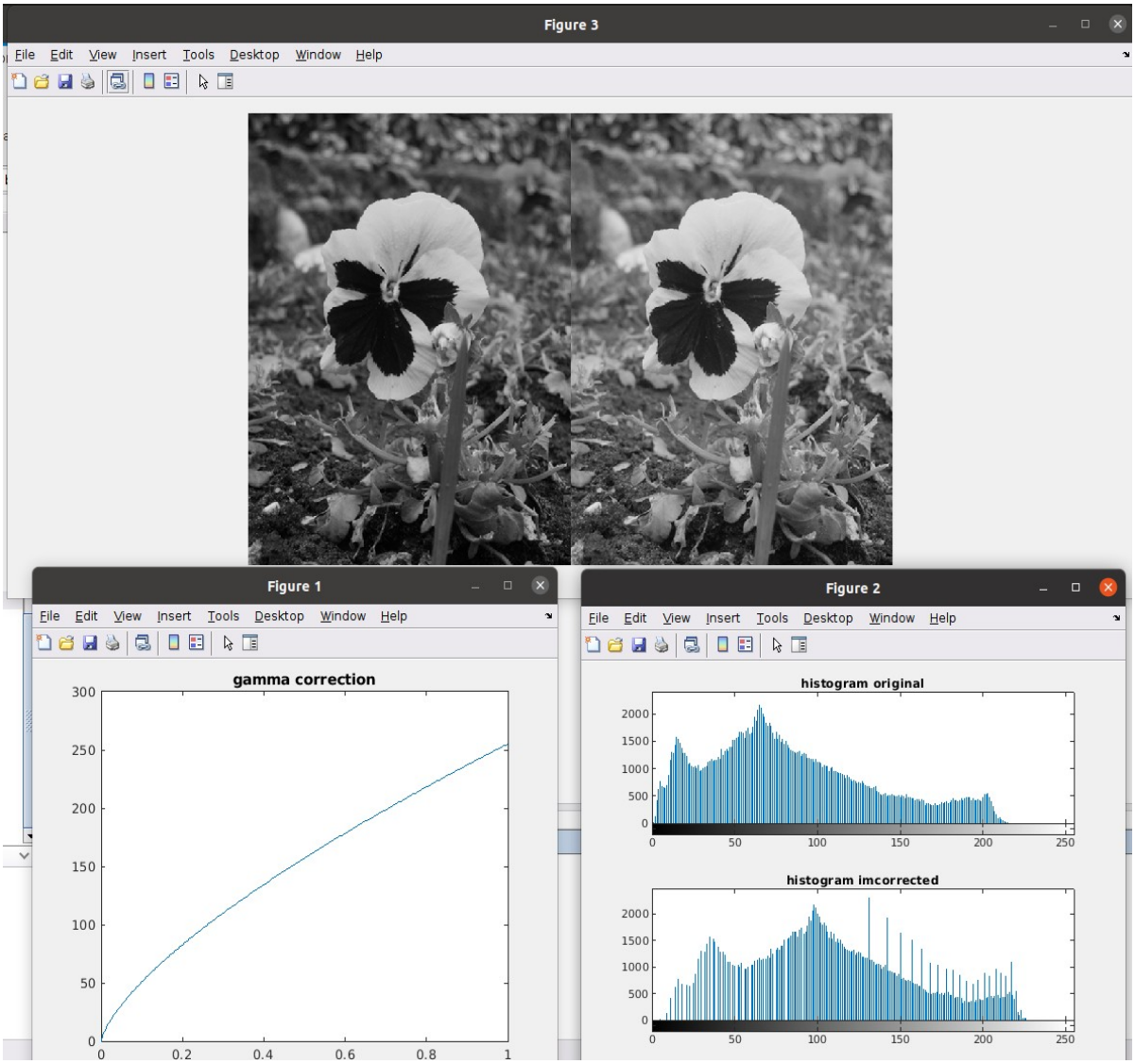
When Gamma value = 0.7 for unaltIm2.tif



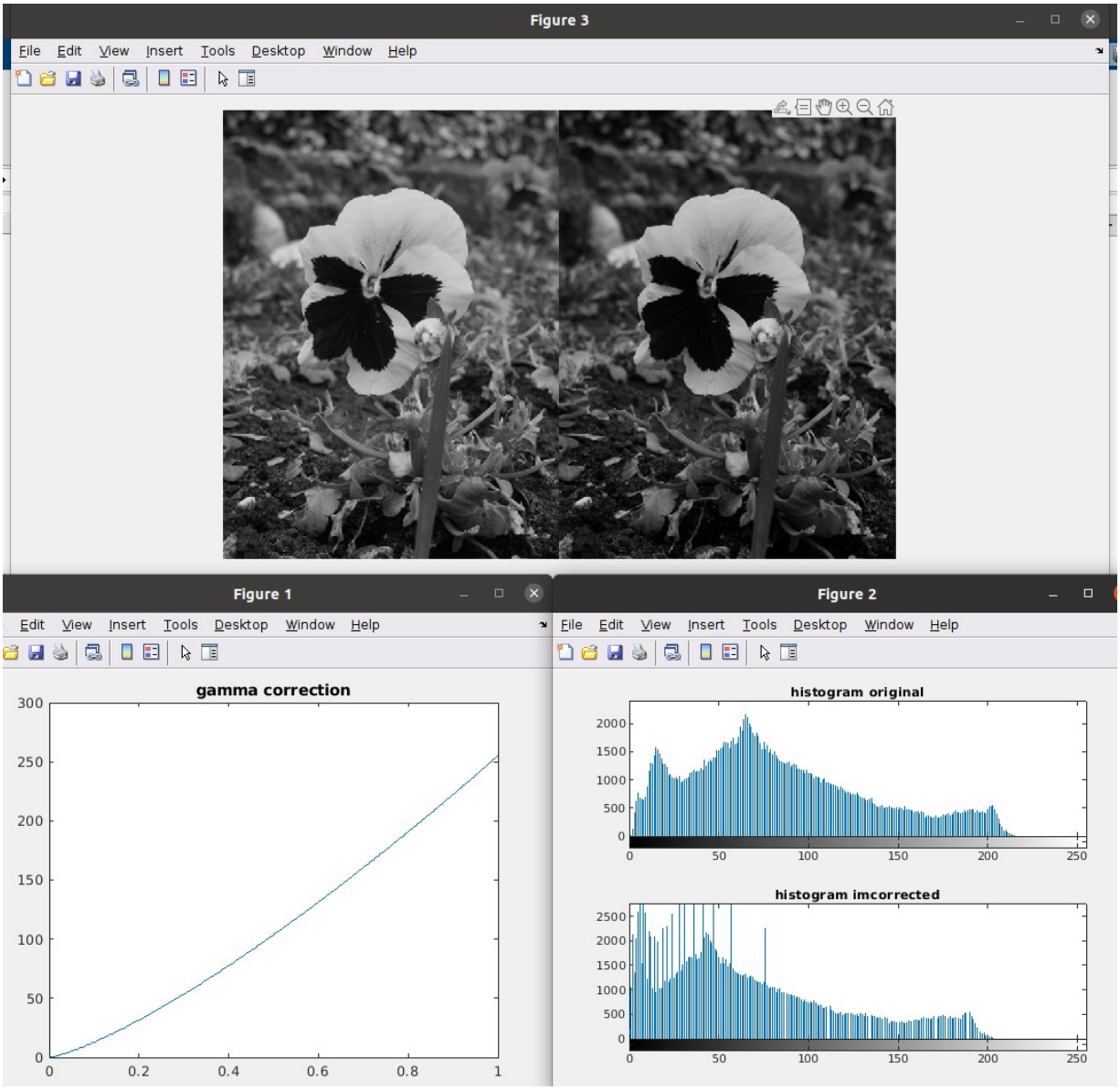
When Gamma value = 1.3 for unaltIm2.tif



When Gamma value = 0.7 for unaltIm3.tif

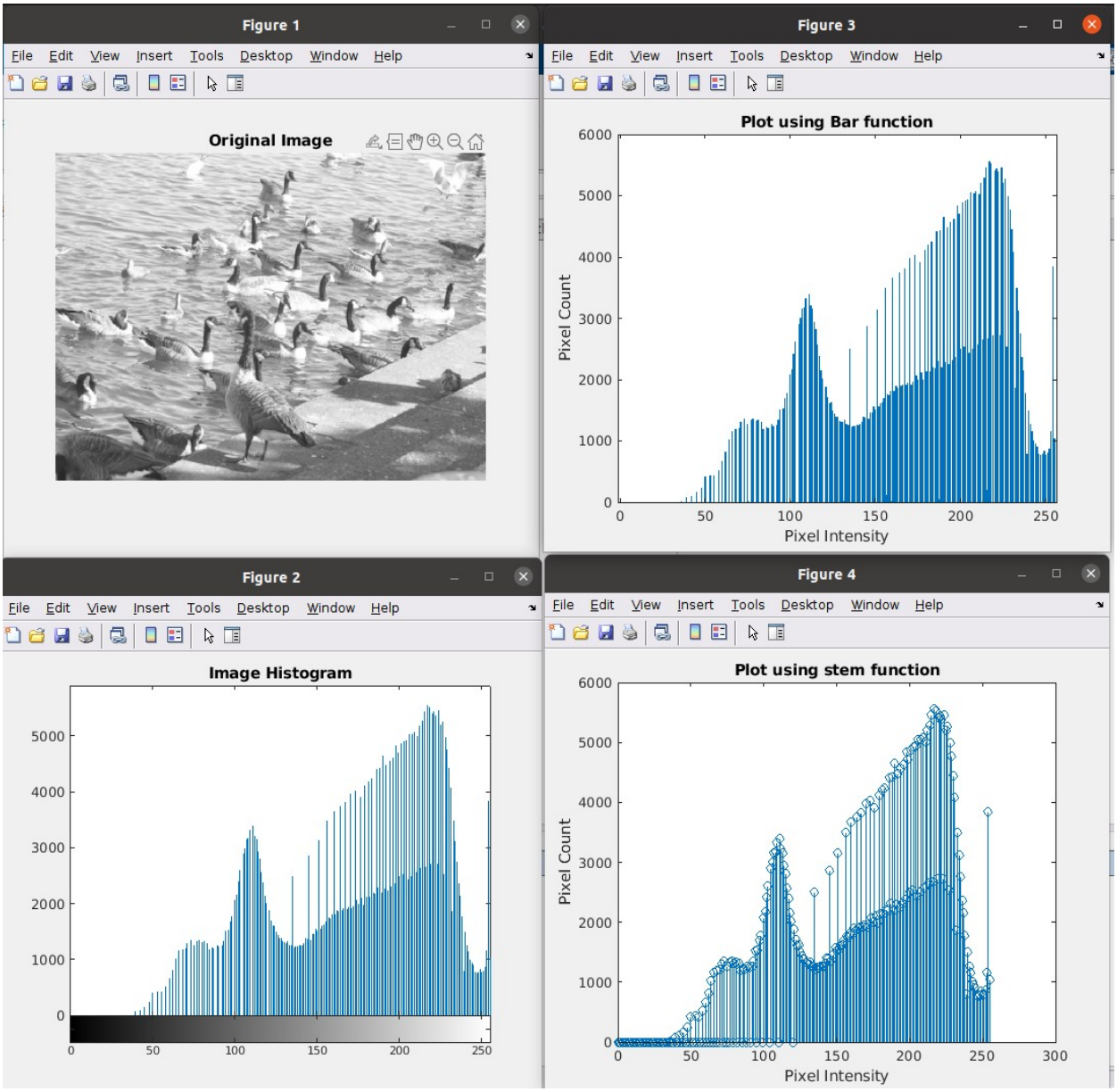


When Gamma value = 1.3 for unaltIm3.tif



Answer 3)

As we can see in the plot that locally expansive region is in the pixel value range from 30 to 120 approximately because we can see sudden gaps introduced in the histogram.
Where as locally contractive region is in the pixel value range from 130 to 255 approximately because we can see isolated peaks in the histogram.
Based of this information we can say that gamma value is lesss than 1.



Thank you !!!