Image Processing - Lab02

Aim: Perform arithmetic and logical operation on image and enhance image by log transformation and power law transformation.

Arithmetic Operation:

We can perform add, subtract, multiply operation on image by simply as we do with numeric values.

Suppose we have image im1 and im2 then following operation can be done.

- Addition: im3 = im1 + im2
- Subtraction: im3 = im1 – im2
- Multiplication: im3 = im1. *im2

Logical Operation:

We can perform and, or, not operation on image by using inbuilt function.

Suppose we have image im1 and im2 then following operation can be done.

- And: and (im1, im2)
- Or: or (im1, im2)
- Not: not (im1)

Log transformation:

- s = c(1+log(r))
  where c = constant, r=input image, s=output image

Power law transformation:

- s = c*r^gamma
  where c=constant, r=input image, s =output image, gamma = constant

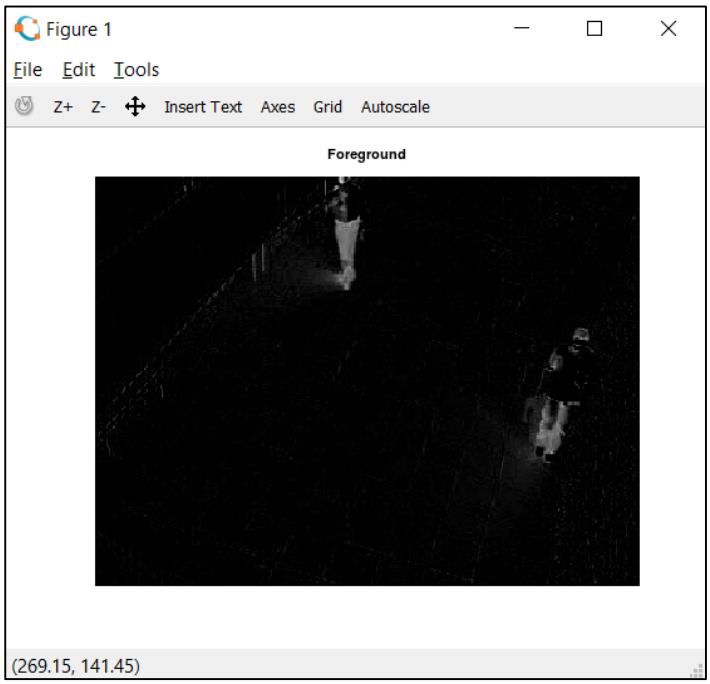
Assignment

1). In a surveillance system, two frames of the captured videos are given as image '1.jpg' and '2.jpg' Apply image subtraction to locate the foreground.

Code:

```
#In a survaillance system, two frames of the captured videos are given as image
#'1.jpg' and '2.jpg' Apply image subtraction to locate the foreground.

im1 = imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/1.jpg");
im2 = imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/2.jpg");

foreground = im1 - im2;
imshow(foreground);
title("Foreground");
```

Output:

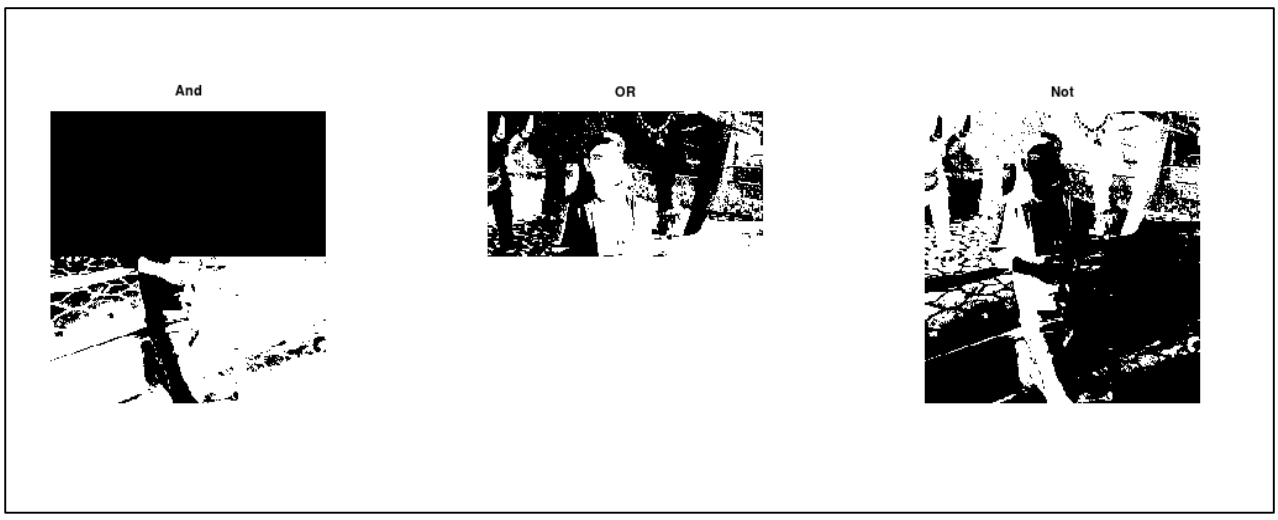


2). Take your own **black and white** photo. Resize it to 256x256. Also consider given image 3.jpg. Demonstrate the logical operations like 'and', 'or', 'not' using these two images. Justify the results.

Code:

```
#Take your own black and white photo. Resize it to 256x256. Also consider given
#image 3.jpg. Demonstrate the logical operations like 'and', 'or', 'not' using these
#two images . Justify the results.

bw_im = imread('E:/Sem-7/Git-submission/Image_Processing/Lab1/my_image.jpg');
bw_im = im2bw(bw_im);
bw_im_resized = imresize(bw_im,[256,256]);

s_im = imread('E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/3.jpg');

#1). And Operation
and_im = and(bw_im_resized,s_im);
subplot(1,3,1)
imshow(and_im);
title("And")

#2). OR Operation
or_im = or(bw_im_resized,s_im);
subplot(1,3,2)
imshow(or_im);
title("OR")

#1). Not Operation
not_im = not(bw_im_resized);
subplot(1,3,3)
imshow(not_im);
title("Not")
```

Output:

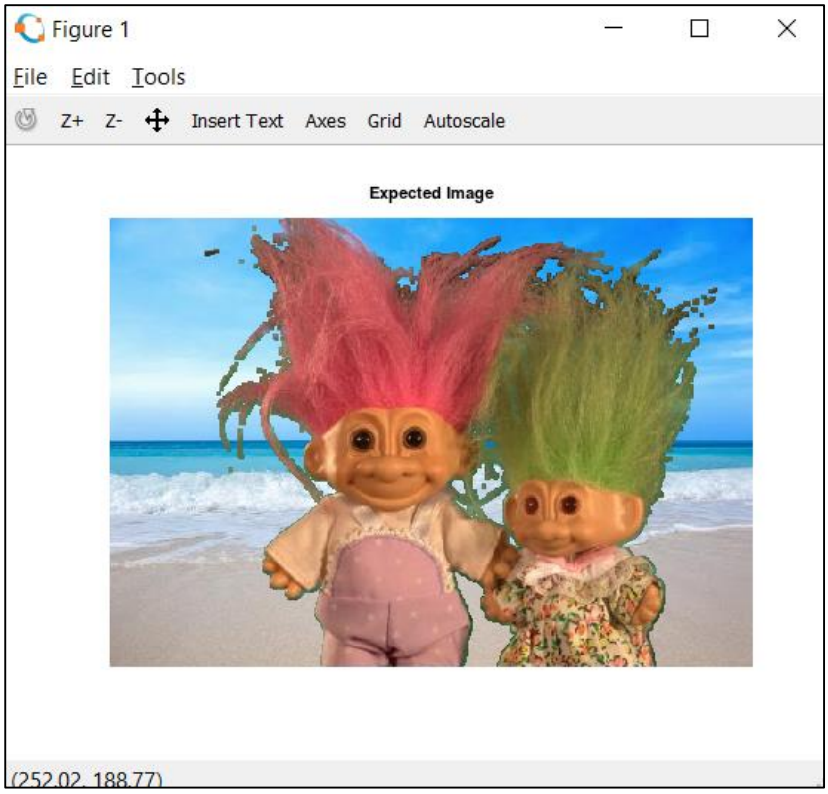


3). Consider image 4.jpg, 5.jpg and 6.jpg as input and apply arithmetic operations on input image to generate 7.jpg as output image.

Code:

```
#Consider image 4.jpg, 5.jpg and 6.jpg as input and apply arithmatic operations on
#input image to generate 7.jpg as output image.

img1 = imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/4.jpg");
img2 = imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/5.jpg");
img3 = imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/6.jpg");

img2 = im2bw(img2);
img2_resized = imresize(img2,[357,512]);
img2_reverse = not(img2_resized);
imshow(img2_reverse.*img3 + img2_resized.*img1);
title("Expected Image");
```

Output:

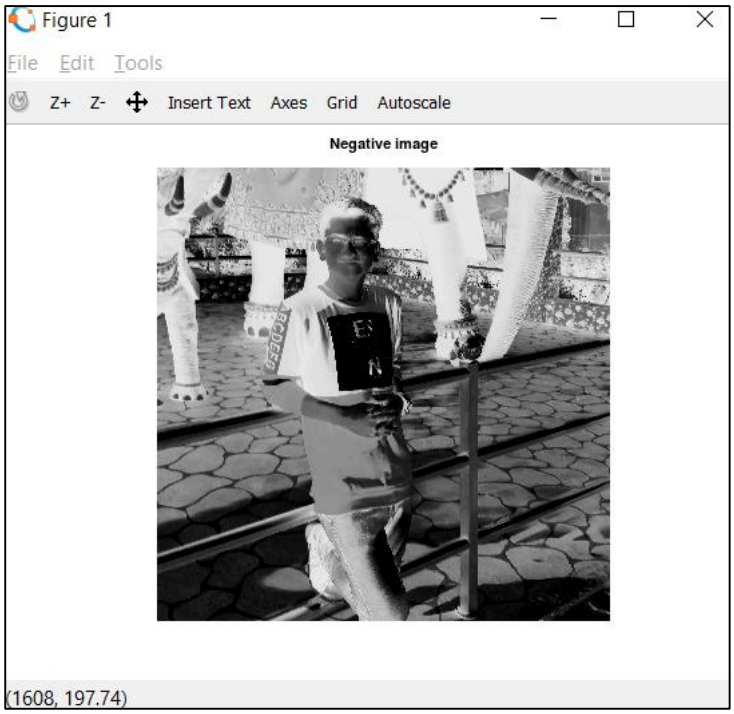


4). Take your own **grayscale** photo and apply 'negative' transformation.

Code:

```
#Take your own grayscale photo and apply 'negative' transformation.

im_gray = imread('E:/Sem-7/Git-submission/Image_Processing/Lab1/my_gray_scale.jpg');
negative_im = 255-im_gray;
imshow(negative_im);
title("Negative image");
```

Output:

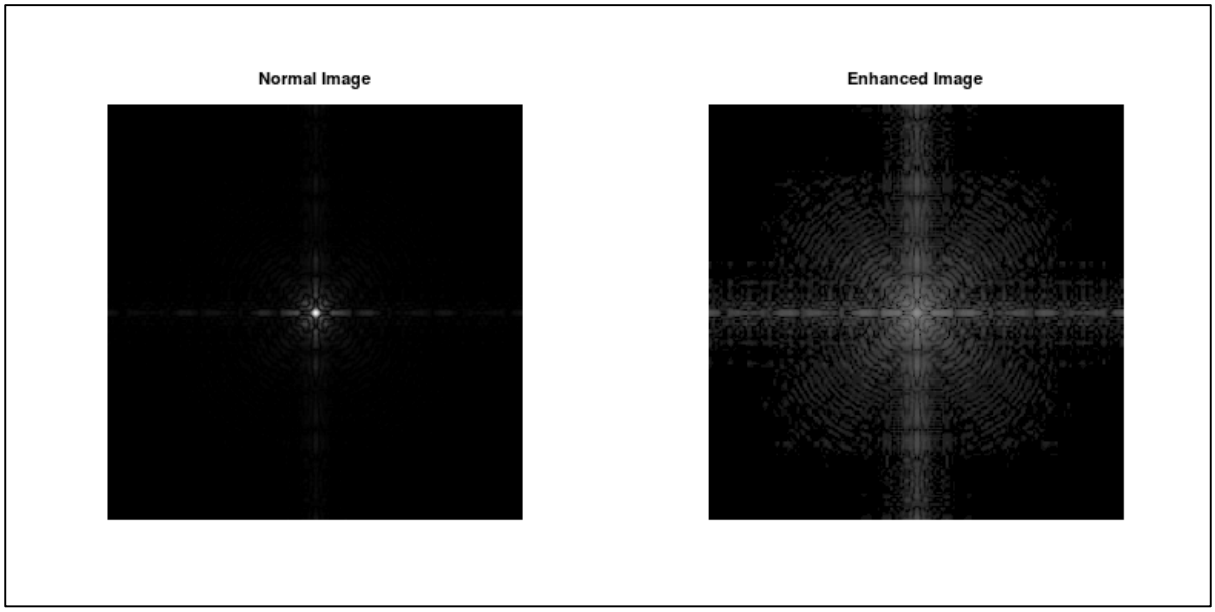


5). Consider image 8.jpg. Enhance the image by applying the log transformation.

Code:

```
#Consider image 8.jpg. Enhance the image by applying the log transformation.

r =imread("E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/8.jpg");
subplot(1,2,1);
imshow(r);
title("Normal Image");

c=0.1;
s = c*(log(1+r));
subplot(1,2,2);
imshow(s);
title("Enhanced Image");
```

Output:

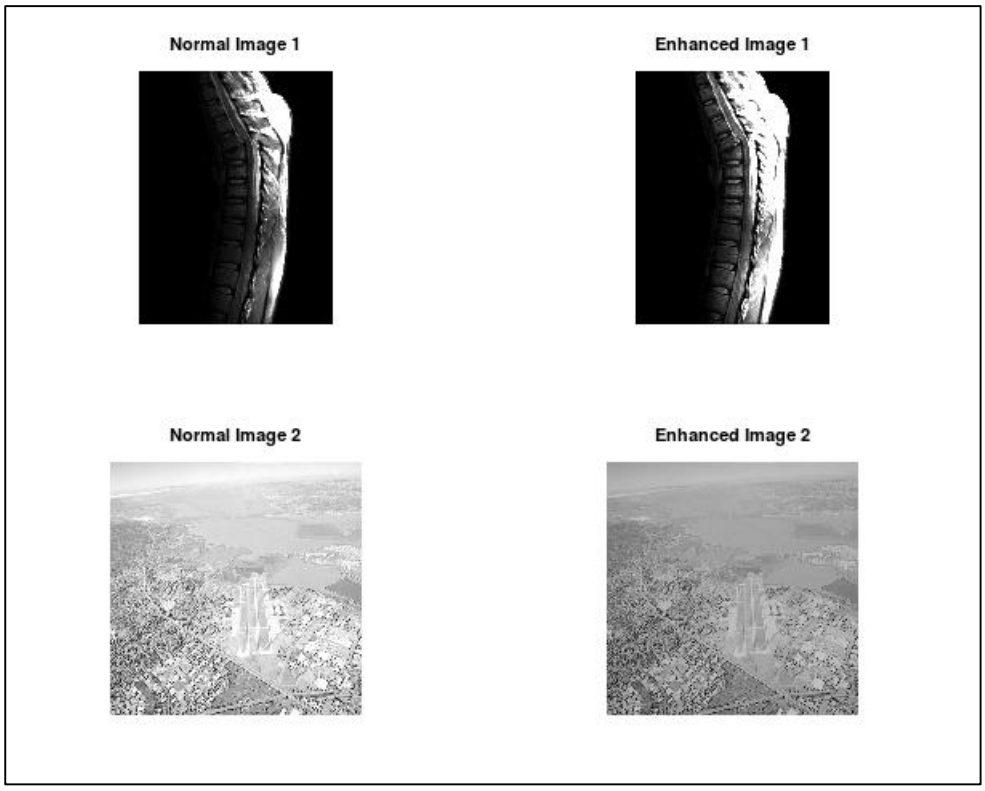


6). Consider image 9.jpg and 10.jpg and enhance them with power law transformation.

Code:

```
#Consider image 9.jpg and 10.jpg and enhance them with power law
#transformation.

r1 = imread('E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/9.jpg'
r2 = imread('E:/Sem-7/IP/LAB2/Lab_2_exercise_images/Lab_2_exercise_images/10.jpg

#image1
subplot(2,2,1);
imshow(r1);
title("Normal Image 1");
subplot(2,2,2);
c=uint8(1);
s1 = c*r1.^1.20;
imshow(s1);
title("Enhanced Image 1");

#image2
subplot(2,2,3);
imshow(r2);
title("Normal Image 2");
subplot(2,2,4);
c=uint8(1);
s2 = c*r2.^0.95;
imshow(s2);
title("Enhanced Image 2");
```

Output:

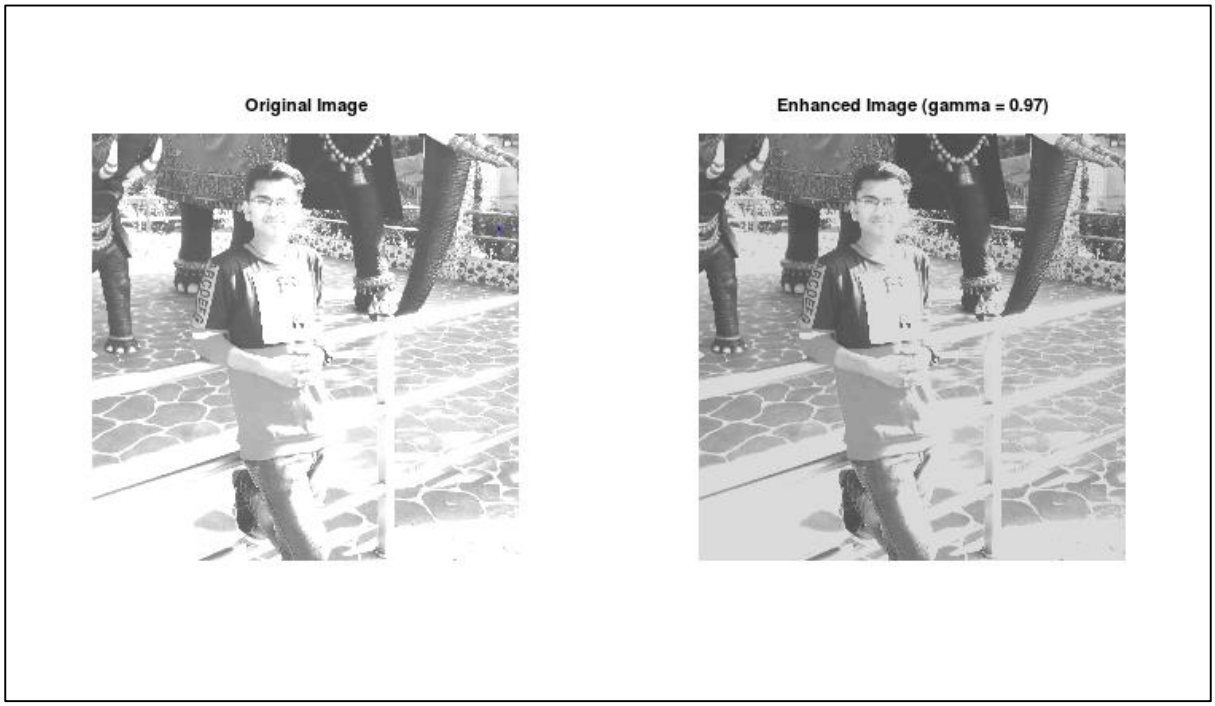


7). Consider your **over exposed photo (that you generated for assignment 1)** and enhance it by power law transformation. Specify the value of gamma which is suitable for this enhancement.

Code:

```
#Consider your over exposed photo(that you generated for assignment 1)and
#enhance it by power law transformation. Specify the value of gamma which is
#suitable for this enhancement.

r = imread('E:/Sem-7/Git-submission/Image_Processing/Lab1/my_over_exposed_image.jpg');
subplot(1,2,1);
imshow(r);
title('Original Image');

c = 1;
gamma = 0.97;
s = c*(r.^gamma);
subplot(1,2,2);
imshow(s);
title('Enhanced Image (gamma = 0.97)');
```

Output:



8). Consider your **under exposed photo (that you generated for assignment 1)** and enhance it by power law transformation. Specify the value of gamma which is suitable for this enhancement.

Code:

```
#Consider your under exposed photo (that you generated for assignment 1) and
#enhance it by power law transformation. Specify the value of gamma which is
#suitable for this enhancement.

r = imread('E:/Sem-7/Git-submission/Image_Processing/Lab1/my_under_exposed_image.jpg');
subplot(1,2,1);
imshow(r);
title('Original Image');

c = 1;
gamma = 1.05;
s = c*(r.^gamma);
subplot(1,2,2);
imshow(s);
title('Enhanced Image (gamma = 1.05)' );
```

Output: