

LAB 2

AIM: Implement basic intensity transformation functions: -

- Image Negatives
- Log Transformations
- Power-Law (Gamma) Transformations
- Contrast Stretching (Piecewise Linear transformation)

1. Take your own grayscale photo and apply negative transformation.

```
lab1.m x lab2.m x +
1      a = imread("tiger.jpg");
2      a=rgb2gray(a);
3      a=double(a);
4      s=size(a);
5      subplot(2,2,1);
6      for i=1:1:s(1,1)
7          for j=1:1:s(1,2)
8              b(i,j)=255-a(i,j);
9          end
10     end
11     |
12     imshow(mat2gray(a));
13     figure,imshow(mat2gray(b));
```

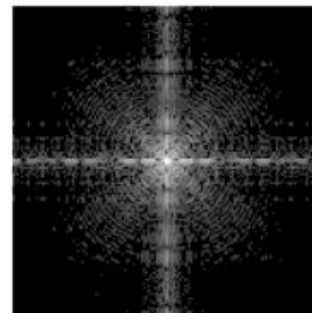
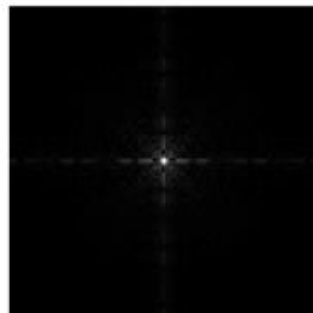
Figure 1 x Figure 2 x +



2. Consider image `ex_log.tif`. Enhance the image by applying log transformation.

```
lab1.m x lab2.m x lab21.m x lab22.m x +
1      a=imread('ex_log.tif');
2      a=double(a);
3      s=size(a);
4      c=10;
5      subplot(2,2,1);
6      imshow(mat2gray(a));
7      for i=1:1:s(1,1)
8          for j=1:1:s(1,2)
9              b(i,j)=c*log(1+a(i,j));
10         end
11     end
12
13     subplot(2,2,2)
14     imshow(mat2gray(b));
```

Figure 1 x +



3. Consider images `ex_power1.tif` and `ex_power2.tif` and enhance them with power law transformation.

```
lab1.m x lab2.m x lab21.m x lab22.m x +
1      a=imread('ex_power1.tif');
2      a=double(a);
3      s=size(a);
4      c=1;
5      gamma=0.4;
6      subplot(2,2,1);
7      imshow(mat2gray(a));
8      for i=1:1:s(1,1)
9          for j=1:1:s(1,2)
10             b(i,j)=c*a(i,j)^gamma;
11         end
12     end
13
14     subplot(2,2,2)
15     imshow(mat2gray(b));
```

Figure 1 × +



```
lab1.m × lab2.m × lab21.m × lab22.m × untitled3 × +
1      a=imread('ex_power2.tif');
2      a=double(a);
3      s=size(a);
4      c=1;
5      gamma=4;
6      subplot(2,2,1);
7      imshow(mat2gray(a));
8      for i=1:1:s(1,1)
9          for j=1:1:s(1,2)
10             b(i,j)=c*a(i,j)^gamma;
11          end
12      end
13
14      subplot(2,2,2)
15      imshow(mat2gray(b));
```

Figure 1 × +



4. 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.

```
lab1.m x lab2.m x lab21.m x lab22.m x lab23.m x
1      a = imread("tiger.jpg");
2      a=rgb2gray(a);
3      a=double(a);
4      s=size(a);
5      subplot(2,2,1);
6      imshow(mat2gray(a));
7
8      for i=1:s(1,1)
9          for j=1:s(1,2)
10             b(i,j)=255-a(i,j);
11          end
12      end
13
14      gamma=0.8;
15      c=1;
16      for i=1:s(1,1)
17          for j=1:s(1,2)
18             d(i,j)=c*b(i,j)^gamma;
19          end
20      end
21      subplot(2,2,2);
22      imshow(mat2gray(d));
```

Figure 1 x +



5. 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.

```
lab1.m x lab2.m x lab21.m x lab22.m x lab23.m x
1      a = imread("tiger.jpg");
2      subplot(1,3,1),imshow(a);
3
4      a=a-60;
5      subplot(1,3,2), imshow(a);
6      a=double(a);
7      c=0.1;
8      gamma=0.5;
9      b=c*(a.^gamma);
10     subplot(1,3,3),imshow(mat2gray(b));
```



6. Contrast Stretching (Example) : A 3 x 3 8 bits/pixel image is given by

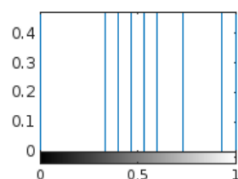
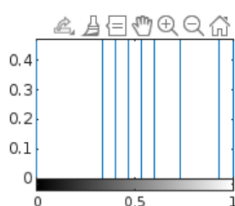
7	12	8
16	9	6
10	15	1

Apply contrast stretch to the image so that the new image has a dynamic range of [0, 255]. Also show the output image. Sketch the transformation you used for contrast stretching.

```
clear all;
A=[7 12 8;16 9 6;10 15 1];
rmin=min(min(A));
rmax=max(max(A));
Imax=255;
Imin=0;
S=size(A);

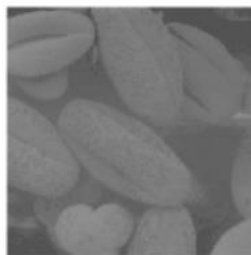
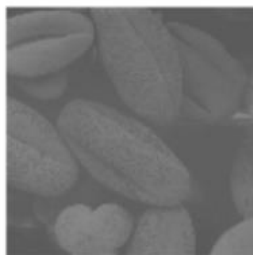
for i=1:S(1,1)
    for j=1:S(1,2)
        B(i,j)=( (Imax-Imin)*(A(i,j)-rmin)/(rmax-rmin))+Imin;
    end
end

subplot(2,2,1), imshow(mat2gray(A));
subplot(2,2,2), imshow(mat2gray(B));
subplot(2,2,3), imhist(mat2gray(A));
subplot(2,2,4), imhist(mat2gray(B));
```



7. Do contrast stretching for the image ex_contrast.tif. Obtain contrast stretched image from low contrast image and apply thresholding.

```
img = imread('ex_contrast.tif');
[m, n] = size(img);
r1 = input('Enter r1: ');
r2 = input('Enter r2: ');
s1 = input('Enter s1: ');
s2 = input('Enter s2: ');
% Slopes
s = img;
alpha = s1 / r1;
beta = (s2 - s1) / (r2 - r1);
gamma = (255 - s2) / (255 - r2);
for i = 1 : m
    for j = 1 : n
        if img(i, j) < r1
            s(i, j) = alpha * img(i, j);
        elseif img(i, j) < r2
            s(i, j) = beta * (img(i, j) - r1) + s1;
        else
            s(i, j) = gamma * (img(i, j) - r2) + s2;
        end
    end
end
subplot(1, 3, 1), imshow(img), impixelinfo;
subplot(1, 3, 2), imshow(s), impixelinfo;
subplot(1, 3, 3), imshow(s > r2), impixelinfo;
```



8. Take any photo of yours –

a. convert it to gray scale,

b. create a function that would decrease the contrast of this image.

c. enhance the contrast of that image using piecewise linear operation for contrast stretching.

```
lab1.m x lab2.m x lab21.m x lab22.m x lab23.m x lab24.m x
1 a = imread("tiger.jpg");
2 a=im2gray(a);
3 s=size(a);
4 b=a-100;
5
6 a1=imadjust(b,[0 0.125],[0 0.25]);
7 a2=imadjust(b,[0.125 0.5],[0.25 0.75]);
8 a3=imadjust(b,[0.5 1],[0.75 1]);
9
10 subplot(2,2,1),imshow(mat2gray(b));
11 subplot(2,2,2),imshow(mat2gray(a1));
12 subplot(2,2,3),imshow(mat2gray(a2));
13 subplot(2,2,4),imshow(mat2gray(a3));
14
Figure 1 x +
```

