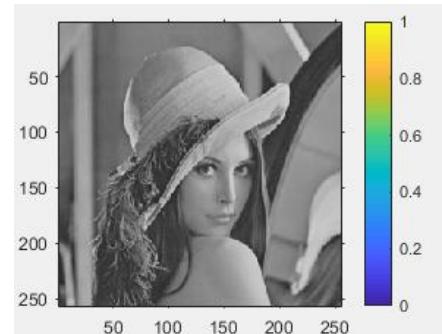


Traitements des images numériques

Première Partie : Manipulation d'image avec Matlab

1-

```
img = imread('LENA.bmp');
figure;
imshow(img)
axis on;
colorbar
```

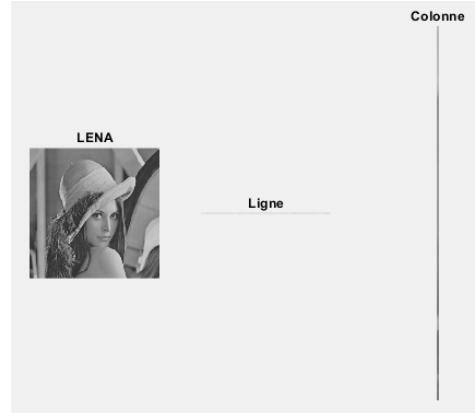


2-

```
imfinfo('LENA.bmp')
```

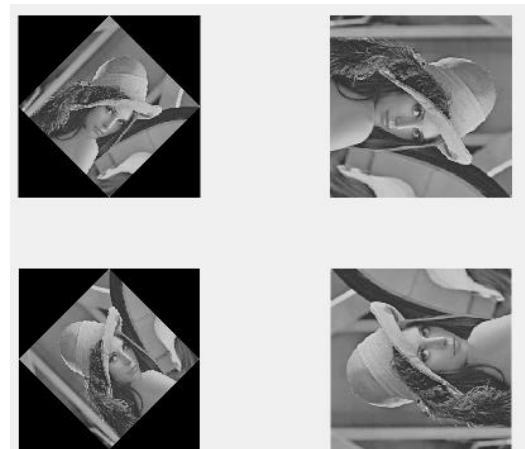
3-

```
close all;
ligne = img(1,:);
colonne = img(:,1);
imwrite(img, 'LENA.jpg');
figure(1);
subplot(1,3,1); imshow(img); title('LENA');
subplot(1,3,2); imshow(ligne); title('Ligne');
subplot(1,3,3); imshow(colonne); title('Colonne');
```

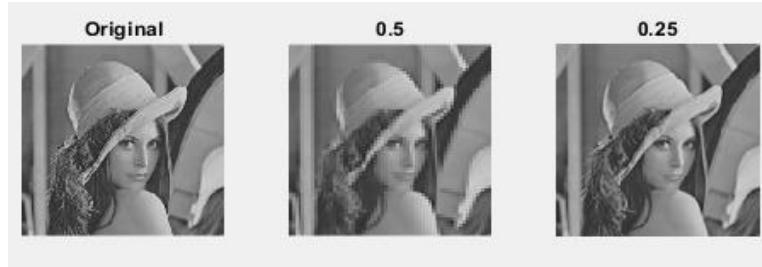


2.1. Transformations géométriques sur une images

```
img = imread('LENA.bmp');
im1 = imrotate(img,-45);
im2 = imrotate(img,-90);
im3 = imrotate(img,45);
im4 = imrotate(img,90);
figure(1);
subplot(2,2,1); imshow(im1);
subplot(2,2,2); imshow(im2);
subplot(2,2,3); imshow(im3);
subplot(2,2,4); imshow(im4);
```

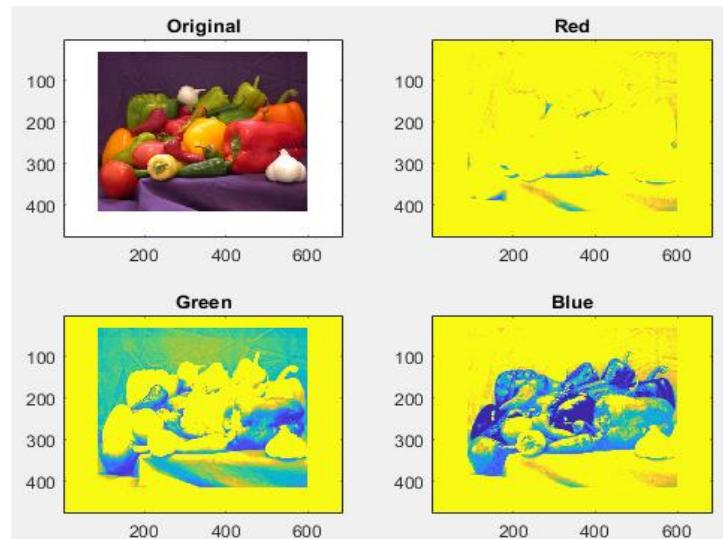


```
b = imresize(img,0.5);
c = imresize(img,0.25);
figure, imshow(img), figure, imshow(b), figure, imshow(c)
```



2.2. Séparation de Couleur

```
rgbImage = imread('food.png');
redChannel = rgbImage(:, :, 1);
greenChannel = rgbImage(:, :, 2);
blueChannel = rgbImage(:, :, 3);
figure;
subplot(2,2,1); image(rgbImage);title('Original');
subplot(2,2,2); image(redChannel);title('Red');
subplot(2,2,3); image(greenChannel);title('Green');
subplot(2,2,4); image(blueChannel);title('Blue');
```



```
grayImg = rgb2gray(rgbImage);
figure; imshow(grayImg);
```



2.3. Quantification d'une image

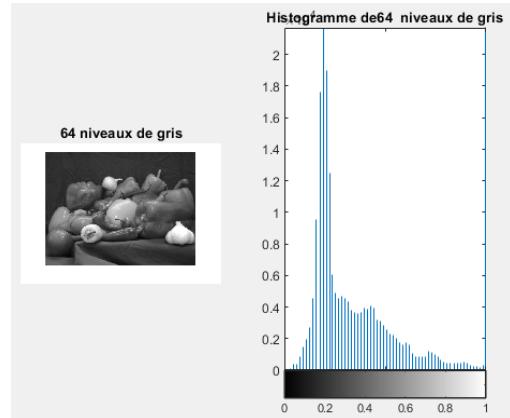
Vue que la fonction **imshow()** avec deux paramètres ne fonctionne pas, nous avons implémentés la quantification avec la fonction suivante :

```

img = imread('food.png');
n=64;
quantification(img,n);
function X = quantification(img,n)
X = rgb2gray(img);
I = double(X)/255;
d = 256/n;
figure(1);
X = floor(I*255/d) / (n-1);
subplot(1,2,1);imshow(X);title(strcat(num2str(n), ' niveaux de gris'));
subplot(1,2,2);imhist(X);title(strcat('Histogramme de ', num2str(n), ' niveaux de gris'));
end

```

Pour n=64 niveaux de gris nous avons obtenus l'histogramme suivant :



2.4. Sous-Echantillonnage d'une image :

Avec un facteur de 0.2 :

```

img = imread('lena.bmp');
b = imresize(img,0.2);
figure;
subplot(1,2,1); imshow(img); title('image original');
subplot(1,2,2); imshow(b); title('image après échantillonage');

```



2.5. Image indexée

```

load Clown;
X,map
help ind2rgb
rgbImg = ind2rgb(X, map);
imshow(rgbImg);
imwrite(rgbImg, 'clown.jpg')

```



3. Deuxième partie :

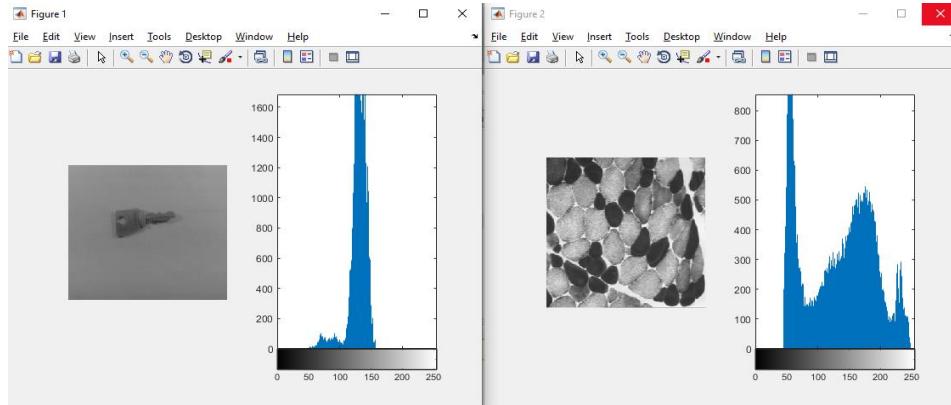
3.1 Histogramme d'une image

```

figure(1);
img1 = imread('clef.pcx');

```

```
subplot(1,2,1); imshow(img1);
subplot(1,2,2); imhist(img1);
figure(2);
img2 = imread('muscle.pcx');
subplot(1,2,1); imshow(img2);
subplot(1,2,2); imhist(img2);
```

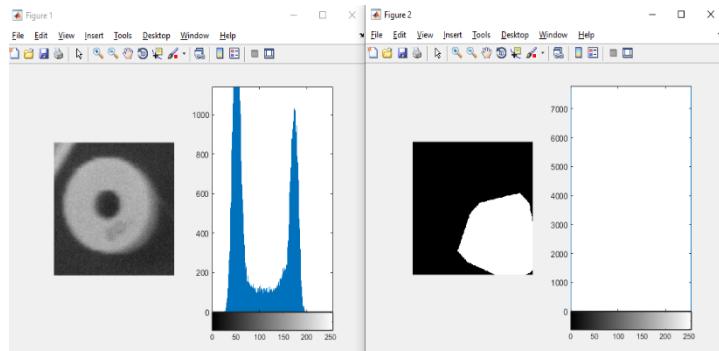


Les niveaux de gris dans l'image de la clé sont concentrés et comprise dans l'intervalle [50, 150], par contre les niveaux de gris dans l'image du muscle sont un peu dispersés dans l'intervalle [50, 250] et qui contient des objets foncés et des objets claires.

3.2 Addition et soustraction d'images

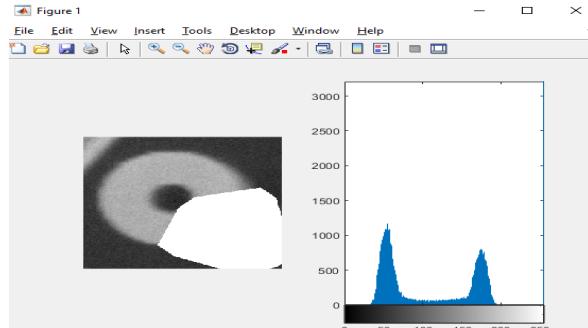
1 - 2.

```
figure(1);
img1 = imread('rondelle.pcx');
subplot(1,2,1); imshow(img1);
subplot(1,2,2); imhist(img1);
figure(2);
img2 = imread('spot.pcx');
subplot(1,2,1); imshow(img2);
subplot(1,2,2); imhist(img2);
```



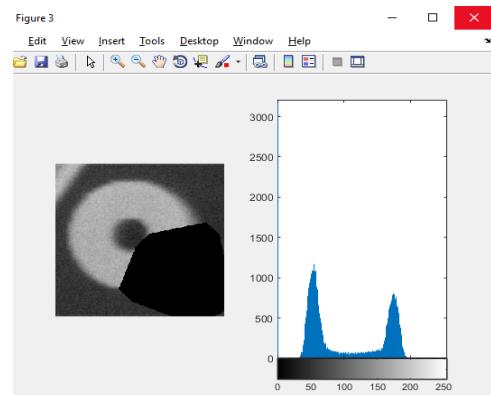
3.

```
img3 = img1 + img2;
close all;
figure
subplot(1,2,1); imshow(img3);
subplot(1,2,2); imhist(img3);
```



4.

```
img4 = img1 - img2;
close all;
figure(3);
subplot(1,2,1); imshow(img4);
subplot(1,2,2); imhist(img4);
```

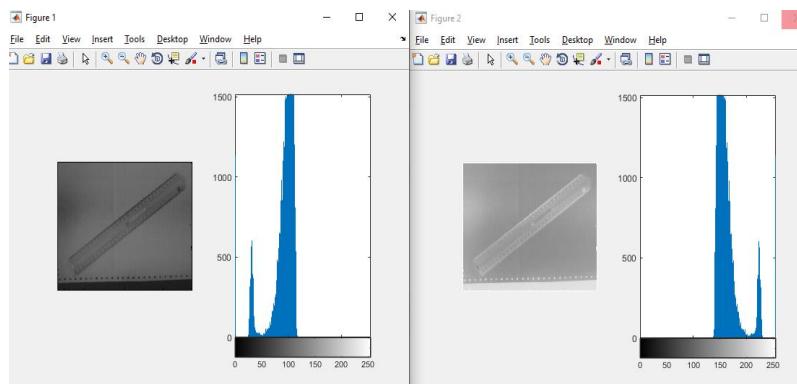


6. Oui, connaissant seulement les histogrammes des images opérande, il possible de prévoir l'histogramme de l'image que l'on obtiendra par une opération arithmétique sur ces images opérande.

3.3. Négatif d'une image

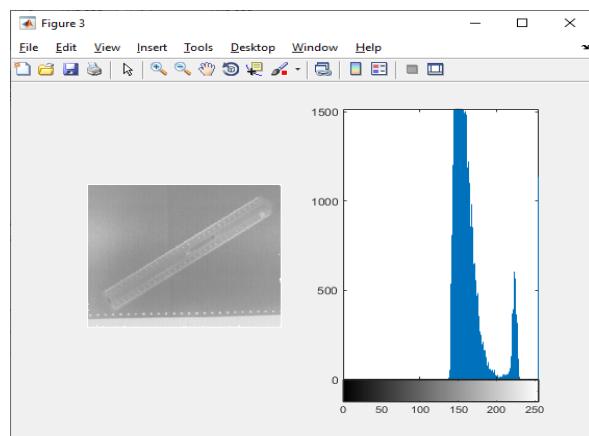
1.

```
img = imread('regle.pcx');
figure(1);
subplot(1,2,1); imshow(img);
subplot(1,2,2); imhist(img);
imgDup = img;
negative = 255 - imgDup;
figure(2);
subplot(1,2,1); imshow(negative);
subplot(1,2,2); imhist(negative);
```



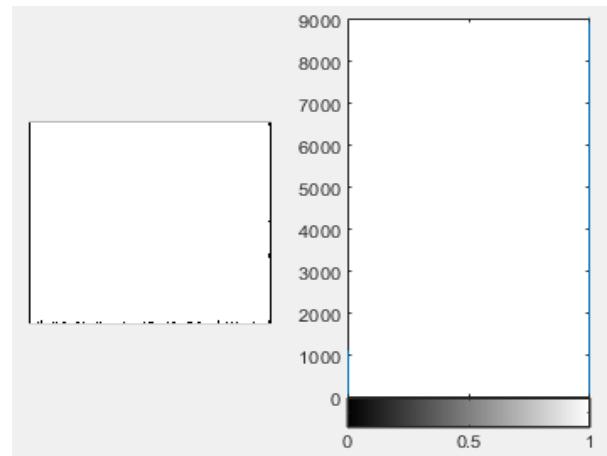
6.

```
gris = img;
gris(:) = 255;
imshow(gris);
res = gris - img;
figure(3);
subplot(1,2,1); imshow(res);
subplot(1,2,2); imhist(res);
```



9.

```
img = imread('REGLE.PCX');
imR = ((double(img)-0)/(255-0))*255;
figure;
subplot(1,2,1);imshow(imR);
subplot(1,2,2);imhist(imR);
```



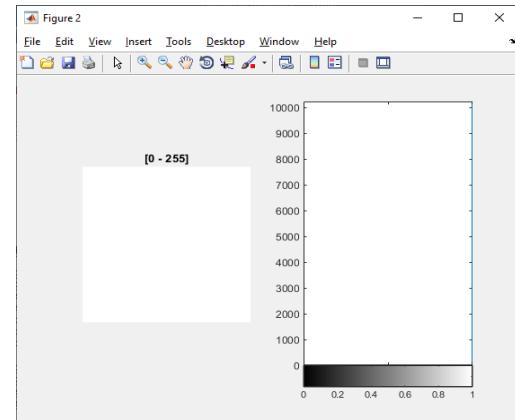
3.4. Recadrage d'histogramme

1.

```
img = imread('quito.pcx');
figure(1);
subplot(1,2,1);imshow(img);
subplot(1,2,2);imhist(img);
im1 = img;
im2 = img;
im3 = img;
```

4.

```
imR = ((double(img)-0)/(255-0))*255;
figure(2);
subplot(1,2,1); imshow(imR);
title('[0 - 255]');
subplot(1,2,2); imhist(imR);
```

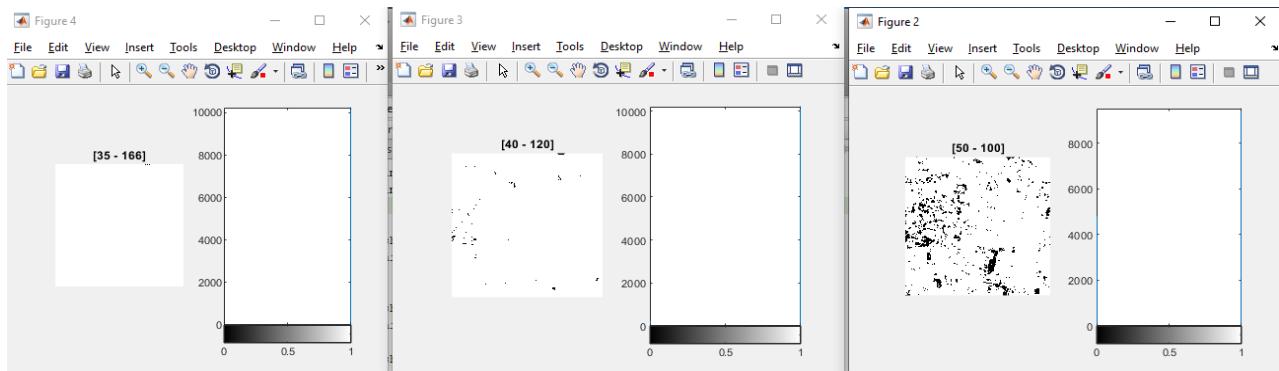


5.

```
imRec1 = ((double(im1)-50)/(100-50))*255;
imRec2 = ((double(im2)-40)/(120-40))*255;
imRec3 = ((double(im3)-35)/(166-35))*255;

figure(2);
subplot(1,2,1); imshow(imRec1); title('[50 - 100]');
subplot(1,2,2); imhist(imRec1);

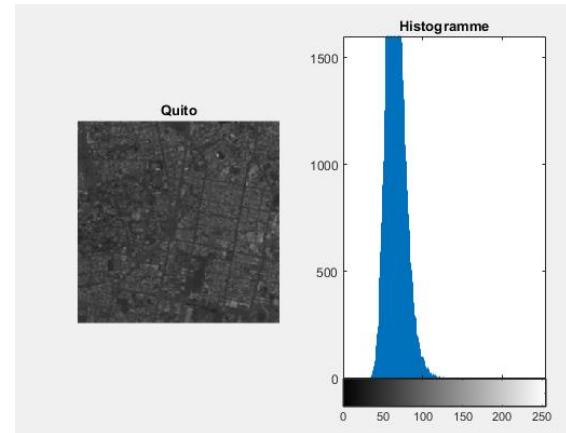
figure(3);
subplot(1,2,1); imshow(imRec2); title('[40 - 120]');
subplot(1,2,2); imhist(imRec2);
figure(4);
subplot(1,2,1); imshow(imRec3); title('[35 - 166]');
subplot(1,2,2); imhist(imRec3);
```



3.5. Égalisation d'histogramme

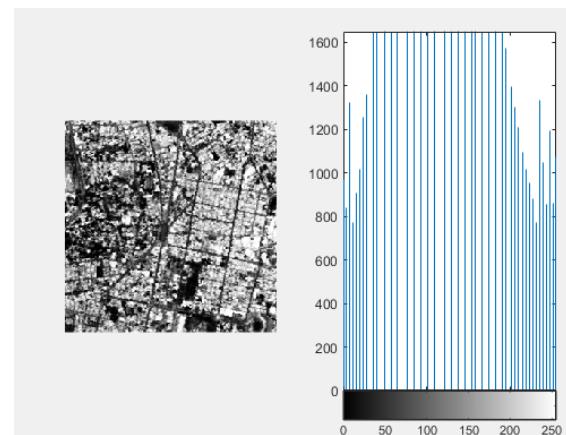
1-2-

```
img = imread('quito.pcx');
figure(1);
subplot(1,2,1); imshow(img);
title('Quito');
subplot(1,2,2); imhist(img);
title('Histogramme');
```



3-

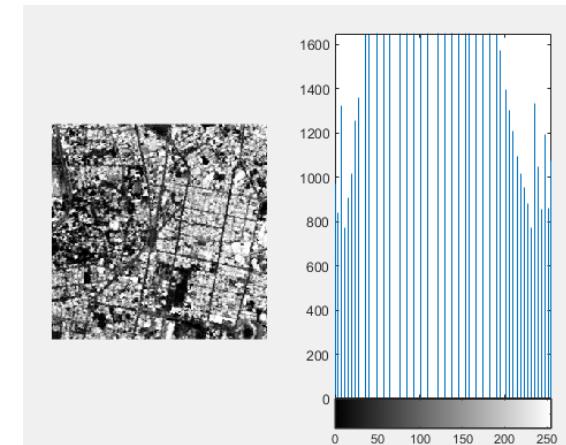
```
j = histeq(img);
figure(2);
subplot(1,2,1); imshow(j);
title('Quito');
subplot(1,2,2); imhist(j);
title('Histogramme');
```



4-

```
k = histeq(j);
figure(3);
subplot(1,2,1); imshow(k);
subplot(1,2,2); imhist(k);
```

On remarque que c'est à peu près que le même résultat que la première égalisation.



5-

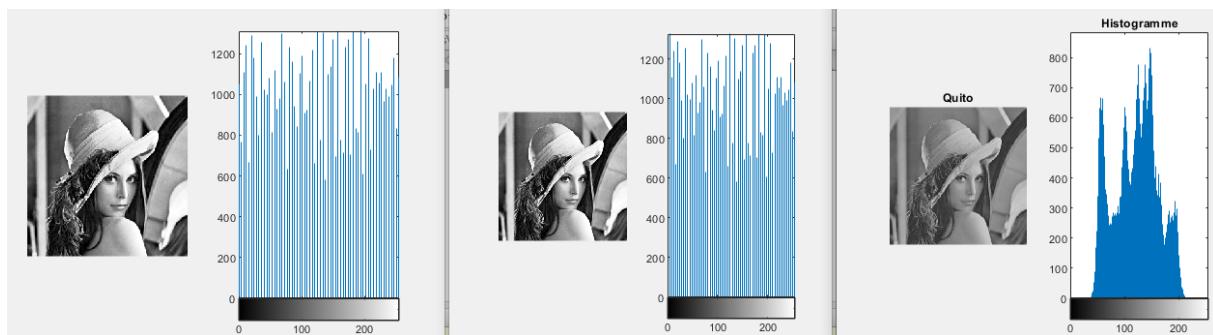
```

clc; close all; clear all;
img = imread('lena.pcx');
figure(1);
subplot(1,2,1); imshow(img); title('Quito');
subplot(1,2,2); imhist(img); title('Histogramme');

j = histeq(img);
figure(2);
subplot(1,2,1); imshow(j);
subplot(1,2,2); imhist(j);

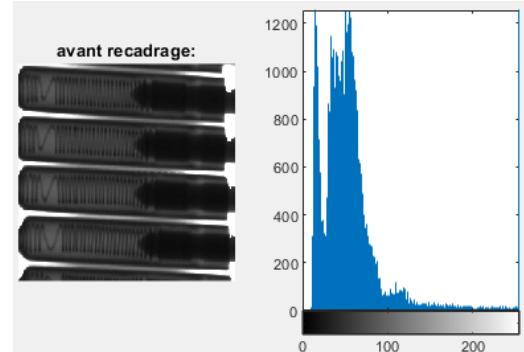
k = histeq(j);
figure(3);
subplot(1,2,1); imshow(k);
subplot(1,2,2); imhist(k);

```

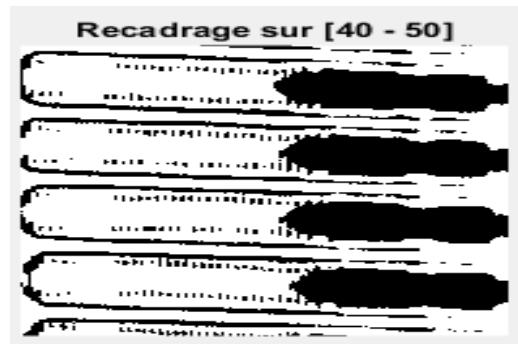


6-

```
%recadrage
img = imread('bougies.pcx');
figure(1);
subplot(1,2,1); imshow(img);
title('avant recadrage:');
subplot(1,2,2); imhist(img);
```



```
imR = ((double(img)-40)/(50-40))*255;
figure(2);
subplot(1,2,1); imshow(imR);
title('Recadrage sur [40 - 50]');
subplot(1,2,2); imhist(imR);
```



```
% log
gmax = 255;
[M,N]=size(imR);
for x=1:M
```

```
for y=1:N
    m = double(imR(x,y));
    z(x,y) = (gmax/(log10(double(1+gmax)))).*log10(1+m);
end
figure,imshow(z);
```

