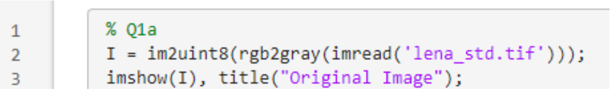
Homework 1 for **Kun**

Introduce to image process

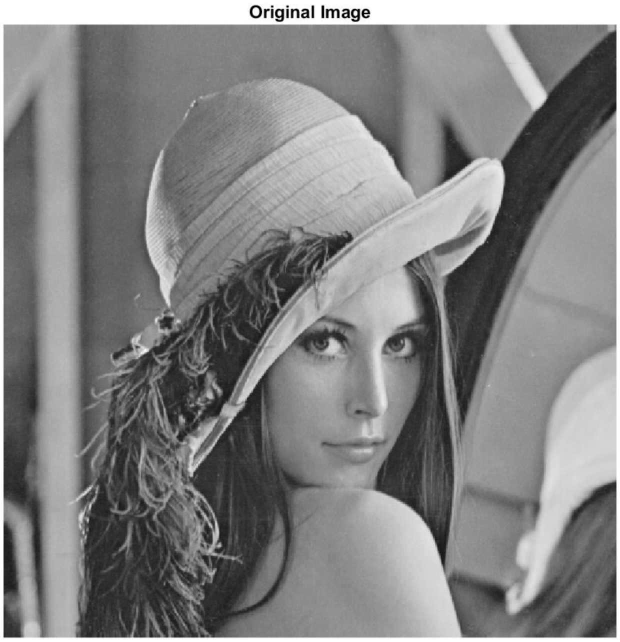
All codes are attached on the last page.

Q1a:



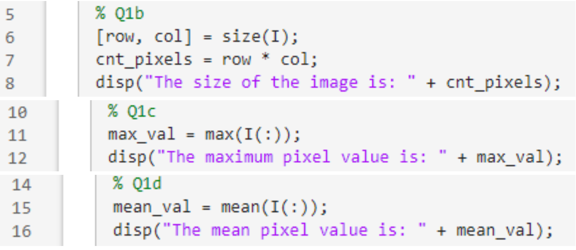
```
% Q1a
I = im2uint8(rgb2gray(imread('lena_std.tif')));
imshow(I), title("Original Image");
```

Res:



Original Image

Q1b & Q1c & Q1d:

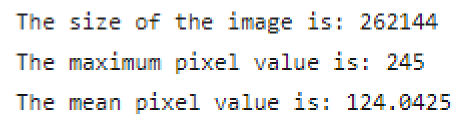


```
% Q1b
[row, col] = size(I);
cnt_pixels = row * col;
disp("The size of the image is: " + cnt_pixels);
```

```
 % Q1c
 max_val = max(I(:));
 disp("The maximum pixel value is: " + max_val);
```

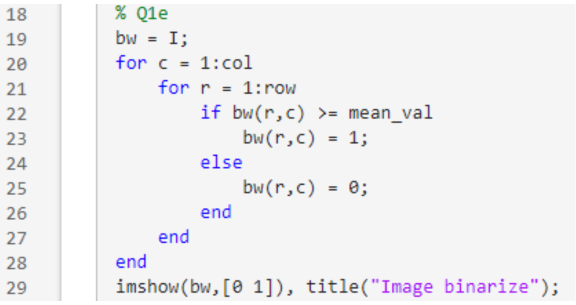
```
  % Q1d
  mean_val = mean(I(:));
  disp("The mean pixel value is: " + mean_val);
```

Res:



```
The size of the image is: 262144
The maximum pixel value is: 245
The mean pixel value is: 124.0425
```

Q1e:



```
% Q1e
bw = I;
for c = 1:col
    for r = 1:row
        if bw(r,c) >= mean_val
            bw(r,c) = 1;
        else
            bw(r,c) = 0;
        end
    end
end
imshow(bw,[0 1]), title("Image binarize");
```

Res:

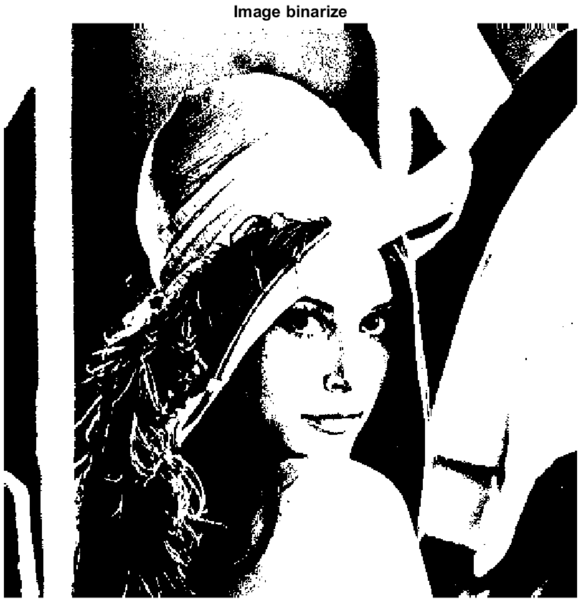
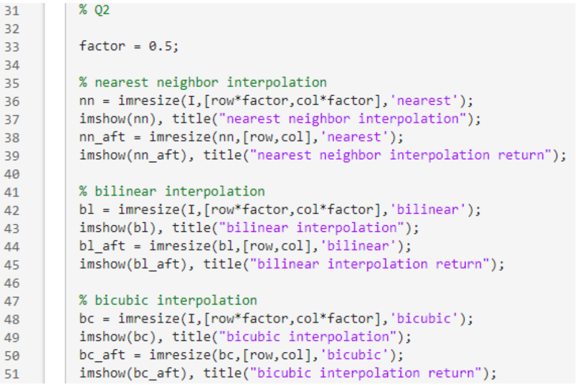


Image binarize

It is image binarize.

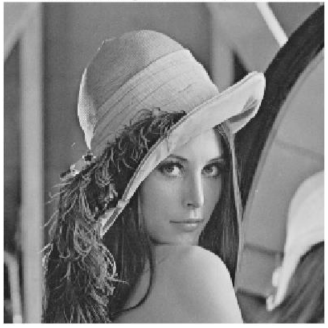
Q2:



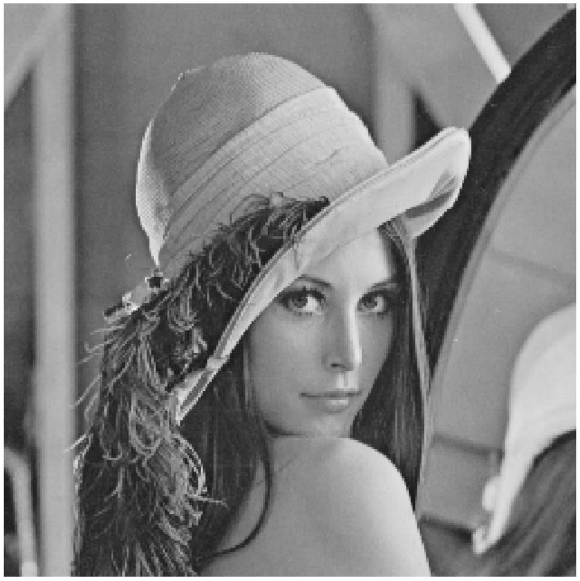
```
% Q2

factor = 0.5;

% nearest neighbor interpolation
nn = imresize(I,[row*factor,col*factor],'nearest');
imshow(nn), title("nearest neighbor interpolation");
nn_aft = imresize(nn,[row,col],'nearest');
imshow(nn_aft), title("nearest neighbor interpolation return");

% bilinear interpolation
bl = imresize(I,[row*factor,col*factor],'bilinear');
imshow(bl), title("bilinear interpolation");
bl_aft = imresize(bl,[row,col],'bilinear');
imshow(bl_aft), title("bilinear interpolation return");

% bicubic interpolation
bc = imresize(I,[row*factor,col*factor],'bicubic');
imshow(bc), title("bicubic interpolation");
bc_aft = imresize(bc,[row,col],'bicubic');
imshow(bc_aft), title("bicubic interpolation return");
```

Res:

Nearest neighbor interpolation:

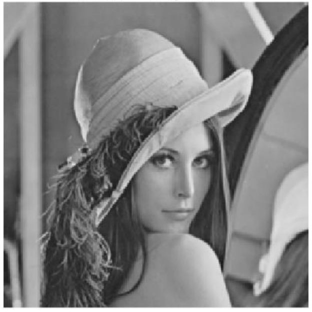


nearest neighbor interpolation

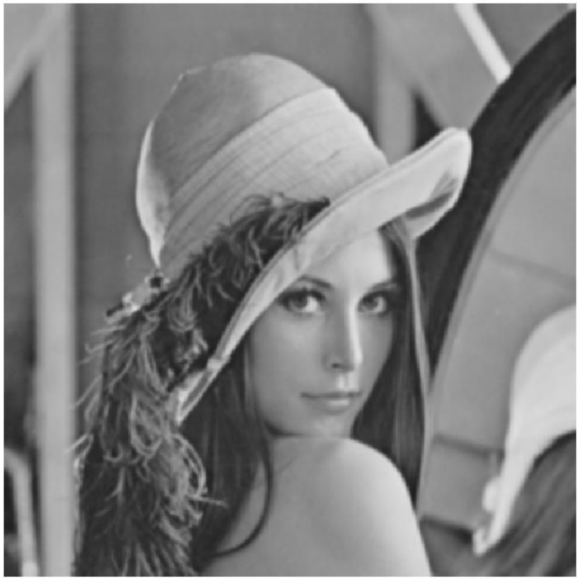


nearest neighbor interpolation return

Bilinear interpolation:



bilinear interpolation



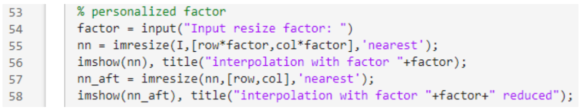
bilinear interpolation return

Bicubic interpolation:

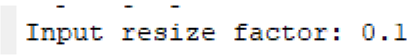
bicubic interpolation

bicubic interpolation return

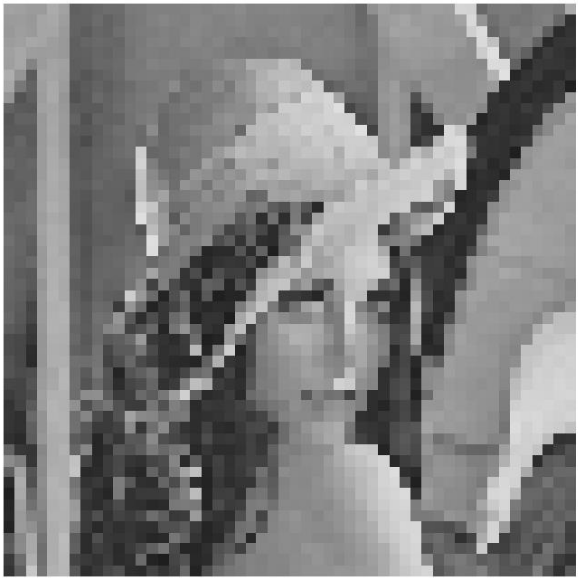
Customized factor:


```
% personalized factor
factor = input("Input resize factor: ")
nn = imresize(I,[row*factor,col*factor],'nearest');
imshow(nn), title("interpolation with factor "+factor);
nn_aft = imresize(nn,[row,col],'nearest');
imshow(nn_aft), title("interpolation with factor "+factor+" reduced");
```

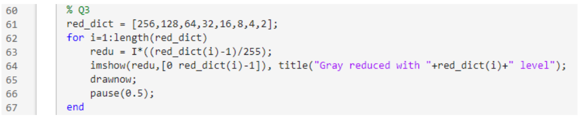
Res:


```
Input resize factor: 0.1
```

interpolation with factor 0.1

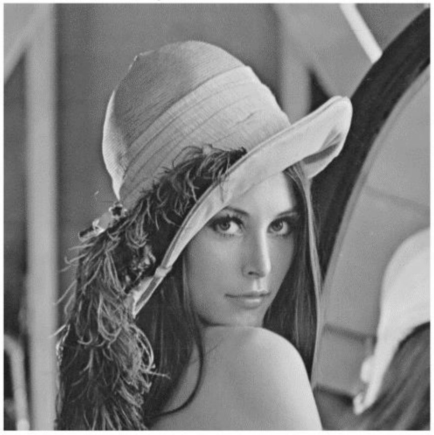

interpolation with factor 0.1 reduced

Q3:

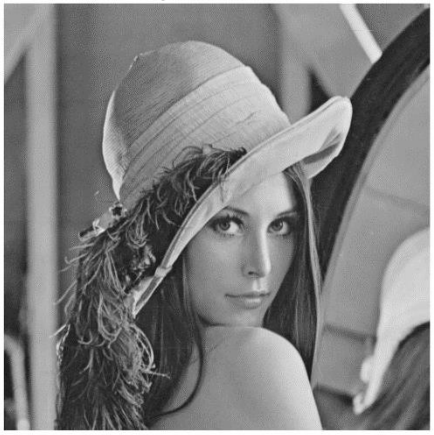

```
% Q3
red_dict = [256,128,64,32,16,8,4,2];
for i=1:length(red_dict)
    redu = I*((red_dict(i)-1)/255);
    imshow(redu,[0 red_dict(i)-1]), title("Gray reduced with "+red_dict(i)+" level");
    drawnow;
    pause(0.5);
end
```

Res:

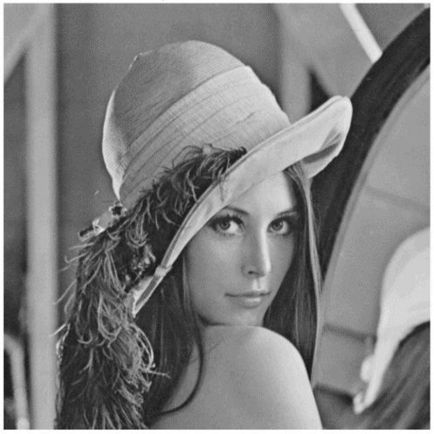
Gray reduced with 256 level



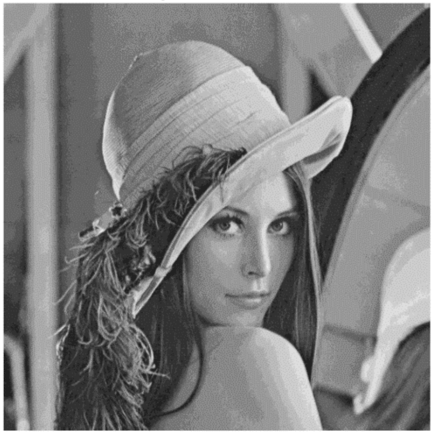
Gray reduced with 128 level



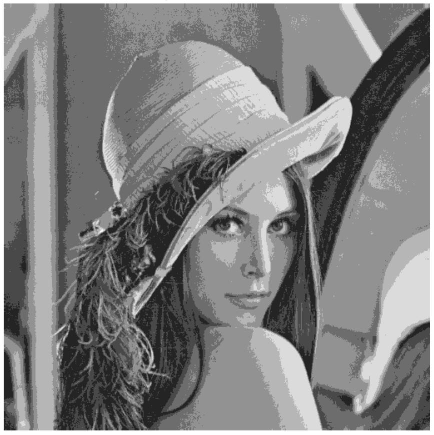
Gray reduced with 64 level



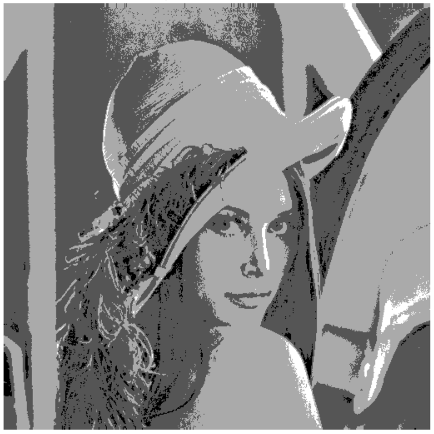
Gray reduced with 32 level



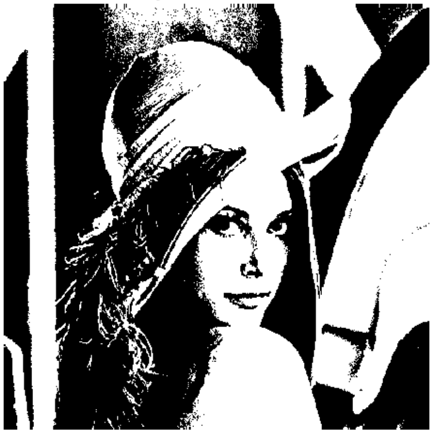
Gray reduced with 16 level



Gray reduced with 8 level

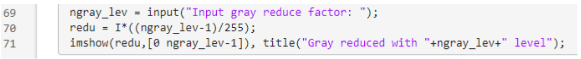


Gray reduced with 4 level



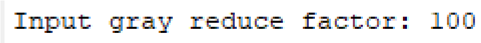
Gray reduced with 2 level

Customized Gray reduce factor:

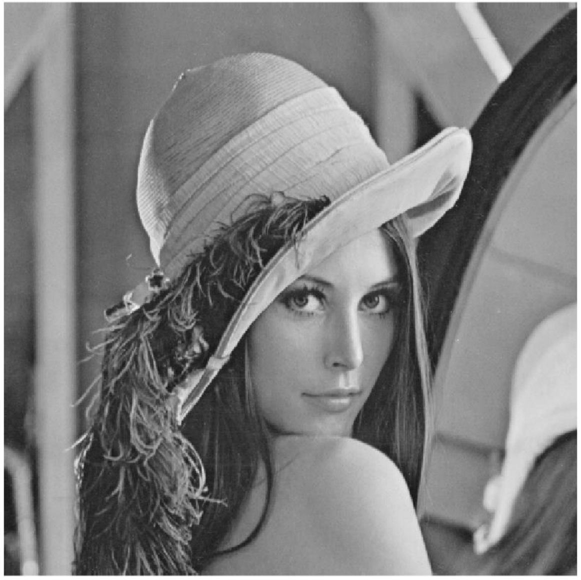


```
ngray_lev = input("Input gray reduce factor: ");
redu = I*((ngray_lev-1)/255);
imshow(redu,[0 ngray_lev-1]), title("Gray reduced with "+ngray_lev+" level");
```

Res:



```
Input gray reduce factor: 100
```



Gray reduced with 100 level

```
% Q1a
I = im2uint8(rgb2gray(imread('lena_std.tif')));
imshow(I), title("Original Image");


% Q1b
[row, col] = size(I);
cnt_pixels = row * col;
disp("The size of the image is: " + cnt_pixels);


% Q1c
max_val = max(I(:));
disp("The maximum pixel value is: " + max_val);


% Q1d
mean_val = mean(I(:));
disp("The mean pixel value is: " + mean_val);


% Q1e
bw = I;
for c = 1:col
    for r = 1:row
        if bw(r,c) >= mean_val
            bw(r,c) = 1;
        else
            bw(r,c) = 0;
        end
    end
end
imshow(bw,[0 1]), title("Image binarize");


% Q2


factor = 0.5;


% nearest neighbor interpolation
nn = imresize(I,[row*factor,col*factor],'nearest');
imshow(nn), title("nearest neighbor interpolation");
nn_aft = imresize(nn,[row,col],'nearest');
imshow(nn_aft), title("nearest neighbor interpolation return");


% bilinear interpolation
```

```
bl = imresize(I,[row*factor,col*factor],'bilinear');
imshow(bl), title("bilinear interpolation");
bl_aft = imresize(bl,[row,col],'bilinear');
imshow(bl_aft), title("bilinear interpolation return");


% bicubic interpolation
bc = imresize(I,[row*factor,col*factor],'bicubic');
imshow(bc), title("bicubic interpolation");
bc_aft = imresize(bc,[row,col],'bicubic');
imshow(bc_aft), title("bicubic interpolation return");


% personalized factor
factor = input("Input resize factor: ");
nn = imresize(I,[row*factor,col*factor],'nearest');
imshow(nn), title("interpolation with factor "+factor);
nn_aft = imresize(nn,[row,col],'nearest');
imshow(nn_aft), title("interpolation with factor "+factor+" reduced");


% Q3
red_dict = [256,128,64,32,16,8,4,2];
for i=1:length(red_dict)
    redu = I*((red_dict(i)-1)/255);
    imshow(redu,[0 red_dict(i)-1]), title("Gray reduced with "+red_dict(i)+"
level");
    drawnow;
    pause(0.5);
end


ngray_lev = input("Input gray reduce factor: ");
redu = I*((ngray_lev-1)/255);
imshow(redu,[0 ngray_lev-1]), title("Gray reduced with "+ngray_lev+" level");
```