



HCMC University of Technology and Education

Faculty of Electrical & Electronic Engineering

IMAGE PROCESSING

Chapter 2:

Fundamentals



Problems related to writing programs using Matlab

EX 1.4: Change size of image

```
clear all;  
f=imread('peppers.png');  
f_gs=rgb2gray(f);  
f_256=imresize(f,0.5);  
f_128=imresize(f_gs,[128 128]);
```

Imresize function allows to resize image by specifying the size of the output image [*width height*] (the example above is [128,128]) or coefficient ratio (0.5). *Imresize* function can be used with the input image is black-white and color images.

black-white images:

```
size(f_128)  
ans =  
    128    128
```

color images:

```
size(f_256)  
ans =  
    256    256     3
```

```
clear all;  
f=imread('peppers.png');  
f_gs=rgb2gray(f);  
f_256=imresize(f,0.5);  
f_128=imresize(f_gs,[128 128]);  
[M N]=size(f_128)  
figure;  
imshow(f)  
figure;  
imshow(f_gs)  
figure;  
imshow(f_256)  
figure;  
imshow(f_128)
```

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```
clear all;
f=imread('peppers.png');
fg=rgb2gray(f);
fi=rgb2ind(f,256);
fb=im2bw(f);
subplot(2,2,1)
imshow(f)
xlabel('(a)')
subplot(2,2,2)
imshow(fg)
xlabel('(b)')
subplot(2,2,3)
imshow(fi)
xlabel('(c)')
subplot(2,2,4)
imshow(fb)
xlabel('(d)')
```

EX 1.4: Imwrite function to save images into different formats such as tif, gif, jpg, bmp...

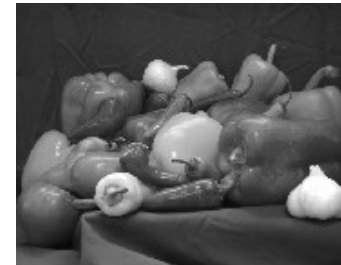
```
clear all;  
f=imread('peppers.png');  
imwrite(f,'pepper_gray.tif','tif');  
imwrite(f,'pepper_gray.png','png');  
imwrite(f,'pepper_gray.jpg','jpg','Quality',50);
```

EX 2.1: Convert the RGB color image into the grayscale type, binary and index images

```
f=imread('peppers.png');  
fg=rgb2gray(f);  
fi=rgb2ind(f,256);  
fb=im2bw(f);  
subplot(2,2,1)  
imshow(f)  
xlabel('(a)')  
subplot(2,2,2)  
imshow(fg)  
xlabel('(b)')  
subplot(2,2,3)  
imshow(fi)  
xlabel('(c)')  
subplot(2,2,4)  
imshow(fb)  
xlabel('(d)')
```



(a)



(b)



(c)



(d)

Figure 2.3. The different types of images: (a) color image; (b) gray image; (c) index gray; (d) Binary Image

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EX 2.2: Changing image resolution

```
f=imread('cameraman.tif');  
f128=imresize(f, [128 128]);  
f64=imresize(f, [64 64]);  
f32=imresize(f, [32 32]);  
subplot(2,2,1)  
imshow(f)  
xlabel('(a)')  
subplot(2,2,2)  
imshow(f128,'InitialMagnification','fit')  
xlabel('(b)')  
subplot(2,2,3)  
imshow(f64,'InitialMagnification','fit')  
xlabel('(c)')  
subplot(2,2,4)  
imshow(f32,'InitialMagnification','fit')  
xlabel('(d)')
```

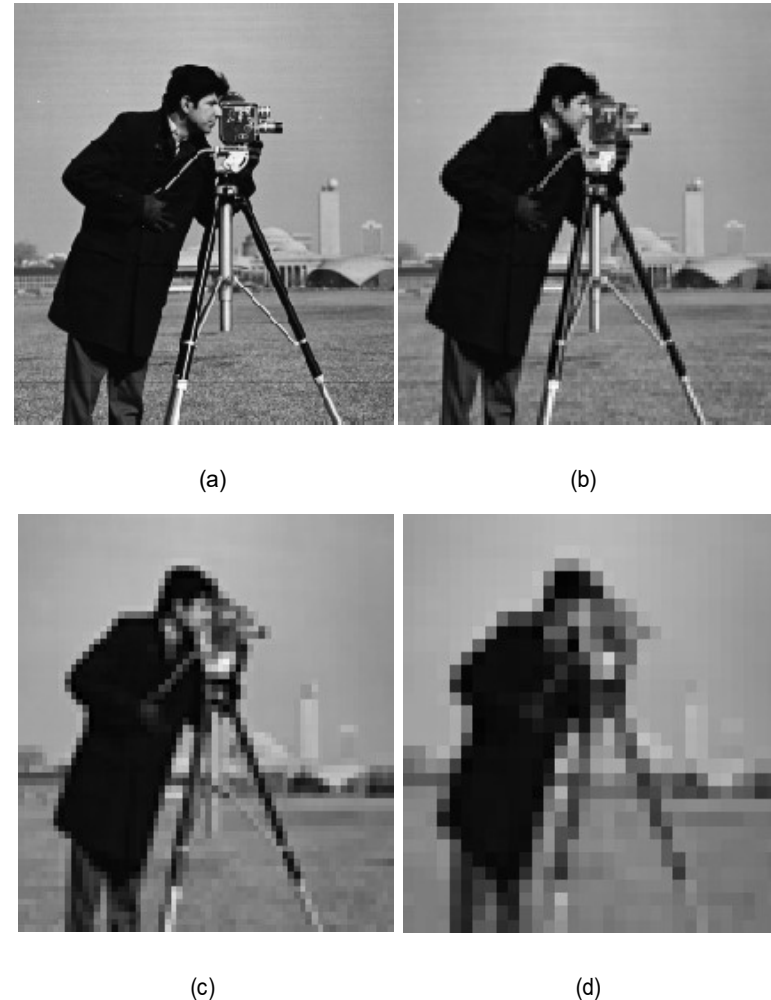


Figure 2.4. Images with different resolutions:
(a) 256x256; (b) 128x128; (c) 64x64; (d) 32x32

Practice to MATLAB

Ex 1.1: Read and display image.

```
f=imread('peppers.png');
```

```
Info_f=imfinfo('peppers.png');
```

Ngõ ra của hàm imfinfo cho phép truy vấn thông tin của ảnh. Với ảnh peppers.png, kết quả hiển thị tại cửa sổ

Command Window:

Info_I =

Filename: [1x65 char]

FileModDate: [1x20 char]

FileSize: 287677

Format: 'png'

FormatVersion: []

Width: 512

Height: 384

BitDepth: 24

ColorType: [1x9 char]

FormatSignature: [1x8 double]

Colormap: []

Histogram: []

InterlaceType: 'none'

Transparency: 'none'

SimpleTransparencyData: []

BackgroundColor: []

RenderingIntent: []

Chromaticities: []

Gamma: []

XResolution: []

YResolution: []

ResolutionUnit: []

XOffset: []

YOffset: []

OffsetUnit: []

SignificantBits: []

ImageModTime: [1x26 char]

Title: []

Author: []

Description: [1x13 char]

Copyright: [1x29 char]

CreationTime: []

Software: []

Disclaimer: []

Warning: []

Source: []

Comment: []

OtherText: []

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Ex 1.1: display image

```
A=imread('rice.png');  
B=imread('cameraman.tif');  
C=imread('trees.tif');  
figure;  
subplot(1,3,1)  
imshow(A)  
subplot(1,3,2)  
imshow(B)  
subplot(1,3,3)  
imshow(C)
```



Rice



Cameraman



Trees

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EX 1.3: Save an image matrix into a graphic file in Window

```
clear all;  
f=imread('peppers.png');  
f_gs=rgb2gray(f);  
imwrite(f_gs,'pepper_gray.png','png');
```

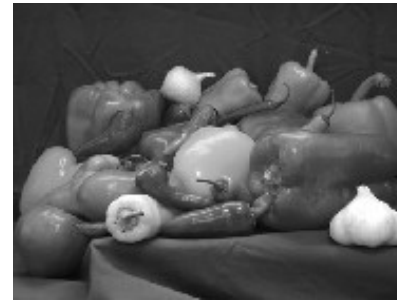
EX 1.4: Imwrite function to save images into different formats such as tif, gif, jpg, bmp...

```
imwrite(f_gs,'pepper_gray.tif','tif');  
imwrite(f_gs,'pepper_gray.png','png');  
imwrite(f_gs,'pepper_gray.jpg','jpg','Quality',50);
```

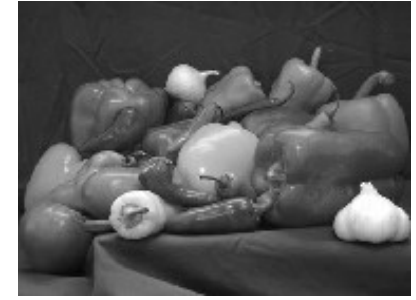
Infor =

```
Filename: [1x51 char]  
FileModDate: [1x20 char]  
FileSize: 7237  
Format: 'jpg'  
FormatVersion: "  
Width: 512  
Height: 384  
BitDepth: 8  
ColorType: 'grayscale'  
FormatSignature: "  
NumberOfSamples: 1  
CodingMethod: 'Huffman'  
CodingProcess: 'Sequential'  
Comment: {}
```

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(a)



(b)



(c)



(d)

Figure 1.7. Results save images in JPEG format according to different compression ratios: (a) 80%; (b) 60%; (c) 40% and (d) 20%

Check compression ratios for the above images;

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The End