



Experiment No. (3)

Digital Image Resizing and Spatial Resolution

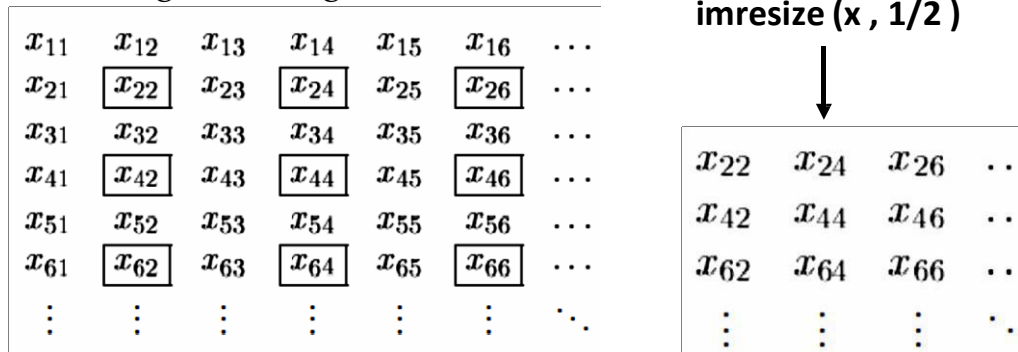
Aim:

This experiment illustrates the application of image shrinking and enlarging. It also demonstrates the implementation of effective image resolution.

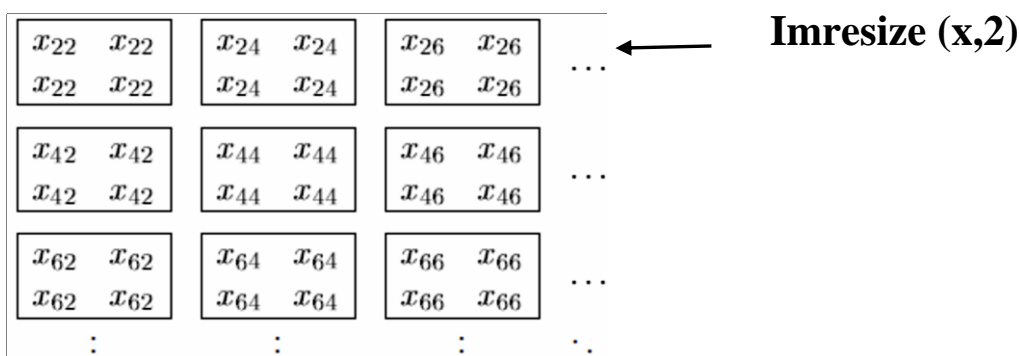
Theory:

Image resizing can be achieved by changing the dimensions of the image using two operations, ***shrinking and enlarging***. The effective resolution will effect as it represents the amount of accuracy or the true pixel values.

- Image Shrinking:



- Image Enlarging:





- *Effective Resolution*

Spatial resolution is the density of pixels over the image: the greater the spatial resolution, the more pixels are used to display the image. It can be obtained by changing the parameters of `imresize` as follow `imresize(imresize(x,1/n),n)`, where `x` is any image, and `n` is the parameter that control the amount of resolution. See table 2.1 below

Command	Effective resolution
<code>imresize(imresize(x,1/4),4);</code>	64×64
<code>imresize(imresize(x,1/8),8);</code>	32×32
<code>imresize(imresize(x,1/16),16);</code>	16×16
<code>imresize(imresize(x,1/32),32);</code>	8×8

Table 2.1 Same image size with different effective resolution

Example:

To double the size of greens image, this can be done by the following MATLAB code

```
x=imread('greens.jpg ');
z=rgb2gray(x);           % Convert color image to grayscale;
[r c]= size(z);          % Find the size of image
a=1;
for i=1: r               % Repeat the rows of image
    zz(a,:)=z(i,:);
    zz(a+1,:)=z(i,:);
    a=a+2;
end
b=1;
for i=1:c                % Repeat the columns of image
    zz1(:,b)=zz(:,i);
    zz1(:,b+1)=zz(:,i);
    b=b+2;
end
imshow(zz1);
```

Image shrinking is done by taking out every other row and every other column, thus leaving only those matrix elements whose row and column indices are even. The Matlab code for this, `imresize(z,1/2)`



Requirments:

- 1- Write a MATLAB code to halve the size of “ **3ind.tif** ” image by factor 2 using for-loop statement only.
- 2- Write a MATLAB code to halve, then double the size of “ **3rgb.jpg** ” image by factor of 4 using for-loop statement only.

Hint: you may need to resize each color plane individually

- 3- Is it possible to shrink or double an image size by odd factor?