

Basic Image Processing with MATLAB Programming

This live script includes information on how to read images, what the read images contain, and simple image manipulation.

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First, clear the workspace and start new.

```
close all  
clearvars  
clc
```

Load an image

Use the 'imread' command to load up images.

```
% Read images using imread. Change the path for your own images.
```

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

```
% What does the following line do?
```

```
I(1:5, 1:5, 1)
```

```
ans = 5x5 uint8 matrix  
62 63 63 65 66  
63 61 59 64 63  
65 63 63 66 66  
63 67 67 63 64  
63 62 64 65 66
```

```
I(1:5, 1:5, 2)
```

```
ans = 5x5 uint8 matrix  
29 31 34 30 27  
31 31 32 30 28  
29 30 31 30 31  
29 29 31 31 31  
31 32 33 30 31
```

```
I(1:5, 1:5, 3)
```

```
ans = 5x5 uint8 matrix  
64 64 64 60 59  
62 64 64 60 59  
60 62 63 61 61  
62 63 63 60 62  
62 63 62 61 61
```

You can see that an image is nothing more than a 3-dimensional matrix of pixel colour intensities. The 1st dimension is the number of rows (height), the 2nd dimension is the number of columns (width) and the 3rd dimension is the colour channel (Red/Green/Blue or RGB).

Each pixel has an RGB colour intensity from 0-255, with 0 being black and 255 being completely bright.

Display the image

```
imshow(I)
```



Brightening/darkening Images

Since an image is just a matrix of numbers, we can manipulate it mathematically. Note that higher numerical values indicates brighter pixels, and lower numbers are darker pixels.

```
I_bright = I*1.25; % ~25% brighter  
imshow(I_bright)
```



```
I_dark = I*0.75; % ~25% darker  
imshow(I_dark)
```



Resizing images

```
I_resized = imresize(I,[100 100]); %resize to 100x100  
imshow(I_resized)
```



Selecting portions of an image is like selecting rows and columns of a matrix:

```
topQuarter = I(1:end/2,1:end/2, :); % What is the ':' doing at the end here?  
imshow(topQuarter)
```



Convert to Grayscale

The image you see as is, is colored. The color information is encoded as a RGB triplet - the first 'channel' includes the Red information, second includes Green, and third has Blue. Sometimes, you may want to compress all that information into a single channel, and look at the objects in a grayscale format. Here's how you do it:

```
Igray = rgb2gray(I);  
imshow(Igray)
```



Segmenting an image

Segmentation is a process of separating parts of interest in an image -

In a grayscale image, if we set all dark values, say over 100 to 255 and all dark value (below 100) to 0, we can get a binary boundary separating the light part of the image from the dark part.

```
Iseg = Igray;  
Iseg(Iseg>=100) = 255; % retain bright parts  
Iseg(Iseg<100) = 0;    % remove dark parts  
  
imshow(Iseg)
```



We can do this for the colour image as well - leading to some strange results. Can you explain the strangeness?

```
Iseg = I;  
Iseg(Iseg>=100) = 255; % retain bright parts  
Iseg(Iseg<100) = 0;    % remove dark parts  
  
imshow(Iseg)
```

