

Introduction to Digital Image Processing using MATLAB

Topics Covered in this Presentation

- What is MATLAB?
- Where to get MATLAB and how to run
- Basic I/O □ Reading and writing images
- Accessing pixels and groups of pixels
- Resizing Images
- Rotating Images
- ...break for 10 minutes!

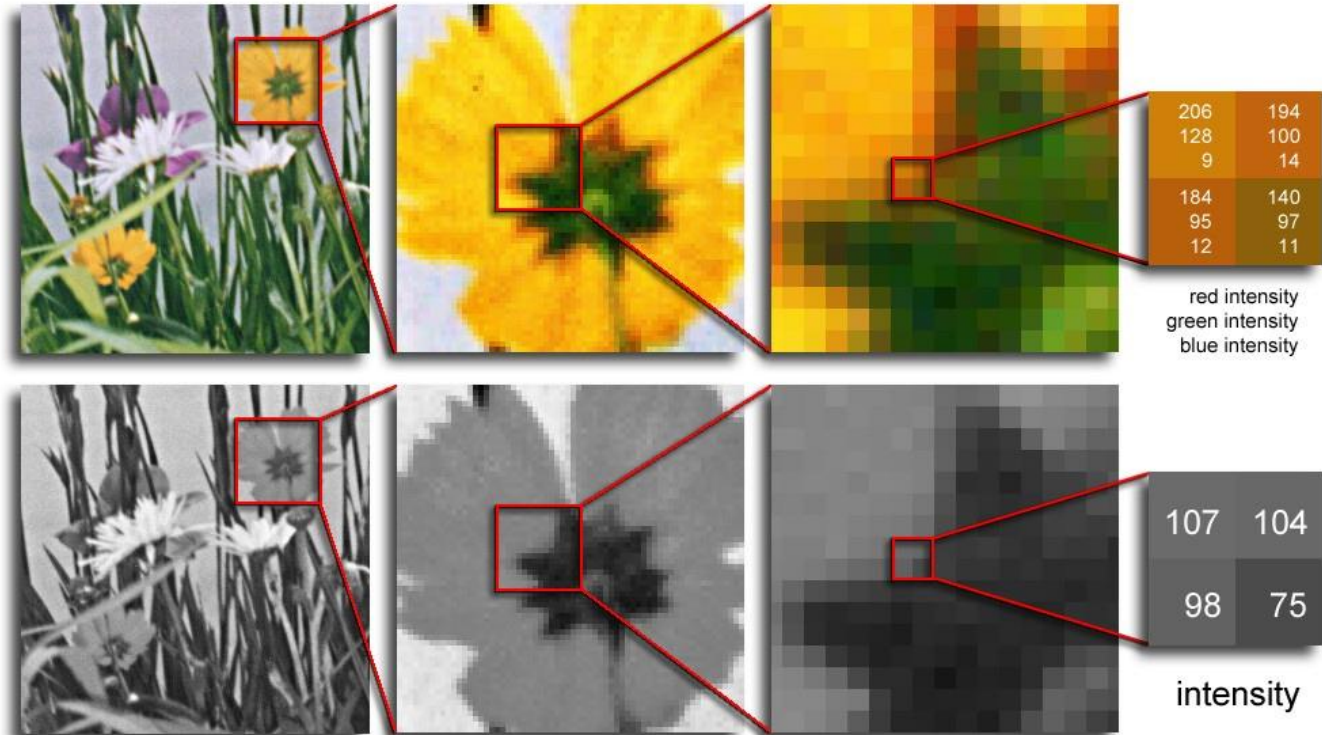
Intro to Digital Images

Digital Image

Color images have 3 values per pixel;
monochrome / grayscale images = 1
value/pixel.

a grid of squares,
each of which
contains a single
color

each square is
called a pixel (or
picture element)



R/W Images in MATLAB

- So we have an image file... how do I access the info?
- Open up MATLAB and change working directory to where image is stored
- Use the `imread()` function
 - `im = imread('name_of_image.ext')`
 - Example `im=imread('C:\Users\HP_pavilion\Desktop\Images\Head.jpeg')`
 - `imshow(im)`
 - Use single quotes, and type in the full name of the image with its extension (.bmp, .jpg, etc.)
 - `im` will contain a 2D matrix (rows x cols) of B&W values or a 3D matrix (rows x cols x 3) of colour values
 - Matrix corresponds to each pixel in the digital image for B & W, or a colour component of a pixel in colour

- How do I access a pixel in MATLAB ☐ B&W case?
 - `pix = im(row,col);`
 - example `pix=im(34,56)`
 - `row` & `col`: Row & column of the pixel to access
 - `pix` contains the intensityvalue
 - Access elements in an array by round braces, not square!
 - For you C buffs ☐ Indexing starts at 1, not 0!
- How do I access a pixel in MATLAB ☐ Colour case?
 - `pix = im(row,col,1);` ☐ Red colourvalue
 - `pix = im(row,col,2);` ☐ Green colourvalue
 - `pix = im(row,col,3);` ☐ Blue colourvalue
 - 3rd argument ☐ 3rd dimension of matrix
 - Only grabs one colour value at a time!

- How do I access a subset of the image?
 - How do I grab a portion of the image and store it into another variable?
- Do the following for monochromatic images:
`im2 = im(row1:row2, col1:col2) ;`
- Do the following for colour images:
`im2 = im(row1:row2, col1:col2, :) ;`
- This will grab a rectangular region between rows 1 and 2, and columns 1 and 2
- e.g., if I wanted to get rows 17 – 31, and columns 32 – 45 for colour, do: `im2 = im(17:31, 32:45) ;`

R/W Images in MATLAB – (8)

- When showing the red channel:
 - Darker pixels mean there isn't much red in that pixel
 - Lighter pixels mean there is a lot of red in that pixel
- Same applies for green and blue!
- How do I save images to disk? Use `imwrite()`
 - `imwrite(im, 'name_of_image.ext', 'EXT');`
 - `im` image to write to disk
 - `name_of_image.ext` Name of the image
 - `'EXT'` Extension of the file ('JPG', 'BMP', 'PNG', etc.)

