

Lab No. 10

A Demo on Image Processing

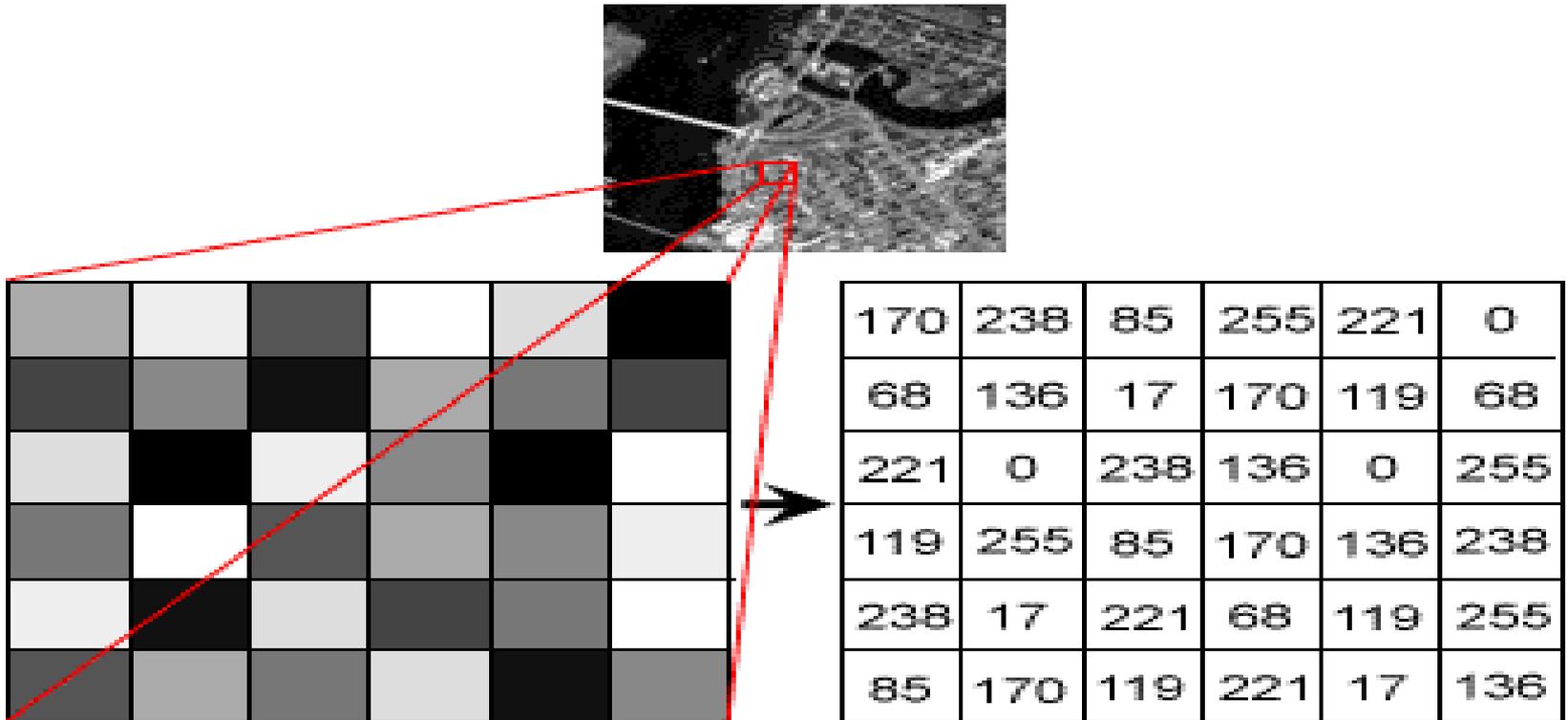
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What is a Digital Image?

A digital image is a numeric representation of a two-dimensional Image.

PIXEL:

The smallest controllable element of a picture represented on the screen.



Reading a Digital Image in MATLAB

- ▶ Images are read into MATLAB environment, using a function **imread**

```
f = imread('mypic.jpg');
```

*.This function takes a digital image from a computer directory and saves it in the variable 'f' in the form of a numerical array.



Some Useful Functions

- ▶ Typing **size** at the prompt gives the row and column dimensions of an image:

```
>> size(f)
```

```
ans =
```

```
1024 1024
```

- ▶ The **whos** function displays additional information about an array. For instance, the statement

```
>> whos f
```

gives

Name	Size	Bytes	Class	Attributes
f	1024x1024	1048576	uint8	



Displaying Images

- ▶ Images are displayed on the MATLAB desktop using function **imshow**, which has the basic syntax:

`imshow(f)`

*.This function loads and displays an image from the image array variable 'f'



The Image Tool

- ▶ The *Image Tool* in the Image Processing Toolbox provides a more interactive environment for viewing and navigating within images, displaying detailed information about pixel values, measuring distances, and other useful operations.

```
>> f = imread('mypic.tif');  
>> imtool(f)
```



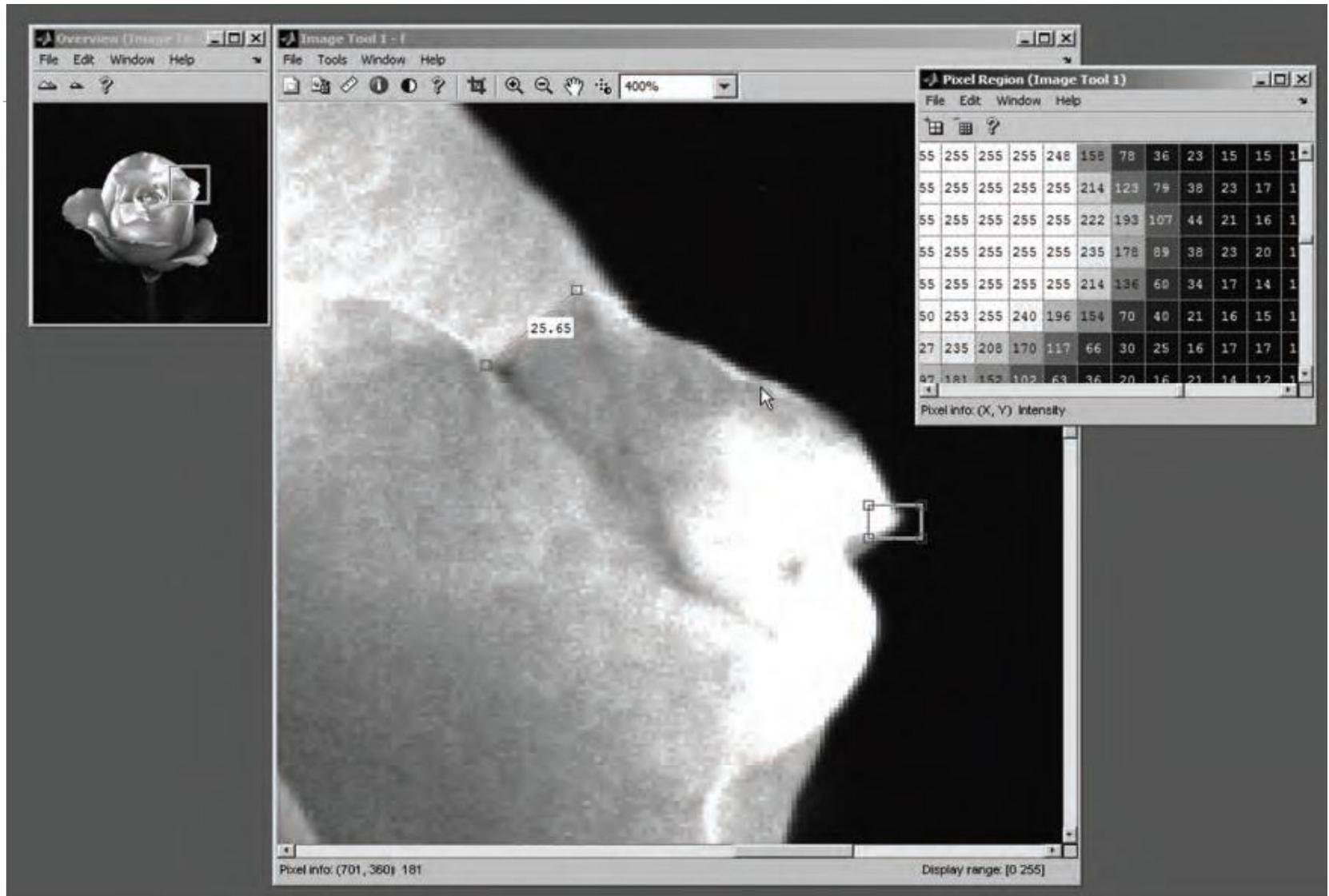


Figure. The Image Tool

Writing image

- ▶ Images are written to the Current Directory using function **imwrite**, which has the following basic syntax:

```
imwrite(f, 'filename')
```

Example:

```
>> imwrite(f, 'myphoto.tif')
```



Some of the image/graphics formats supported by imread and imwrite

Format Name	Description	Recognized Extensions
BMP [†]	Windows Bitmap	.bmp
CUR	Windows Cursor Resources	.cur
FITS [†]	Flexible Image Transport System	.fts, .fits
GIF	Graphics Interchange Format	.gif
HDF	Hierarchical Data Format	.hdf
ICO [†]	Windows Icon Resources	.ico
JPEG	Joint Photographic Experts Group	.jpg, .jpeg
JPEG 2000 [†]	Joint Photographic Experts Group	.jp2, .jpf, .jpx, j2c, j2k
PBM	Portable Bitmap	.pbm
PGM	Portable Graymap	.pgm
PNG	Portable Network Graphics	.png
PNM	Portable Any Map	.pnm
RAS	Sun Raster	.ras
TIFF	Tagged Image File Format	.tif, .tiff
XWD	X Window Dump	.xwd

[†]Supported by imread, but not by imwrite

Bit Depth

- ▶ The number of bits per pixel. Or the number of bits used to represent each color component in a pixel.

- ▶ For Example:

4 bits can have $2^4=16$ different color values.

And

8 bits can have $2^8=256$ different color values.



Digital Image Pixel Bit Depth

Bits per Pixel

1



2

4



16

8



256

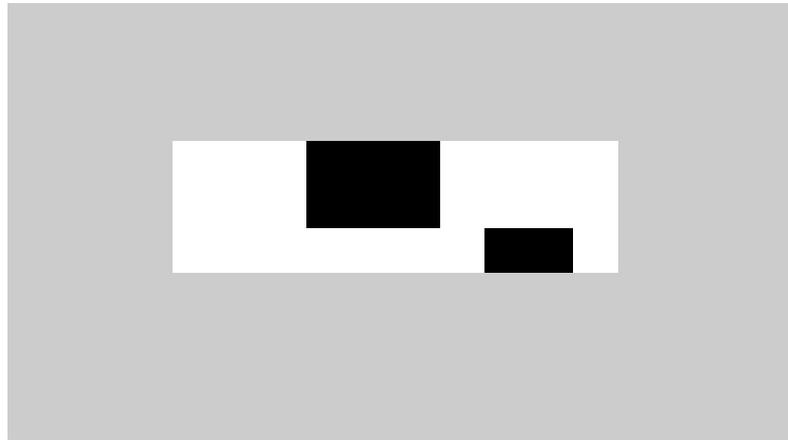
Brightness (Shades of Gray) Levels

Sprawls

From Bits to Image

- ▶ `>> a=[1 1 1 0 0 0 1 1 1 1; 1 1 1 0 0 0 1 1 1 1; 1 1 1 1 1 1 1 0 0 1]; %A 3x10
binary matrix`
- ▶ `>> imshow(a)`

Result:



Task

- ▶ Create the following Images using MATLAB

