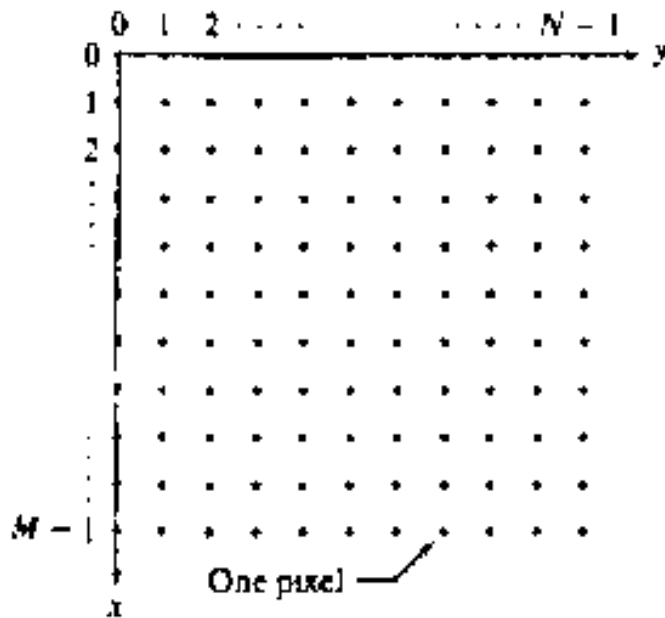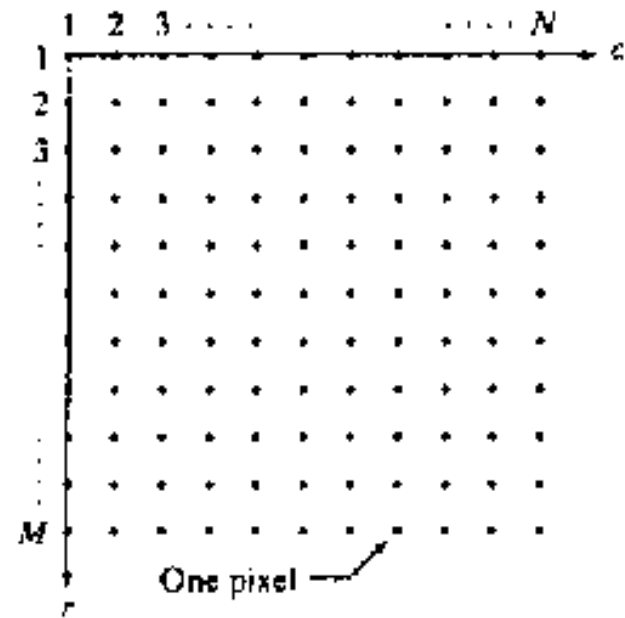# Lecture Three
Multimedia Systems

Images – Introduction

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Digital Image Representation:

Coordinates Convention used in many image Processing books

Coordinates Convention used in MATLAB Image Processing Tool (IPT)

Reading Images:

Images are read into the Matlab environment using the function *imread*, whose syntax is:

$$I=imread('filename')$$

Example:

```
I = imread('pout.tif');
```

Function *size* gives the row (r) and column (c) dimensions of an image
[r,c]=size(I)

Whos Function:

The *whos* function displays additional information about an array

Example:

Whos I

Note:

Find the minimum and maximum values of the image I using min and max!

Displaying Image

Images are displayed on Matlab desktop using the function *imshow* whose basic syntax is:

$$imshow(I);$$

Impixelinfo function:

Function *impixelinfo* is used frequently to display the intensity values of individual pixels interactively. This function displays the cursor overlaid on an image. As the cursor is moved over the image with the mouse, the coordinates of the cursor position and the corresponding intensity values are shown on a display that appears below the figure window.

Image Formats:

The file name must include a recognized file format extension.

Format Name	Description	Recognized Extensions
TIFF	Tagged Image File Format	.tif, .tiff
JPEG	Joint Photographic Experts Group	.jpg, .jpeg
GIF	Graphics Interchange Format[†]	.gif
BMP	Windows Bitmap	.bmp
PNG	Portable Network Graphics	.png
XWD	X Window Dump	.xwd

.gif is supported in *imread* but not in *imwrite*

Writing Images:

Images are written to disk using function *imwrite* which has the following basic syntax:

$$Imwrite(I, 'filename')$$

Example:

imwrite(I,'x.tif');

Writing **JPEG** images:

More general imwrite syntax applicable only to JPEG images

$$\text{imwrite(I, 'filename.jpg', 'quality', q);}$$

q is an integer between 0 and 100 (the lower the number the higher the degradation due to JPEG compression)

Compression Ratio:

Compression ratio=image size before compression/ image size after compression

Exercise:

Write a MATLAB-code to:

➤ Read an image (cameraman.tif)?

➤ What is the storage space for this image?

➤ Check your answer by using function (**whos**)?

➤ Find the minimum and maximum values of the Image?

➤ Display the image? (Don't close the window).

➤ What is the intensity value of the pixel located at (10,10)? Check your answer ..

➤ Write the image to the disk by name ('pouting.tif')?

Finding more information about Images:

imfinfo(filename);

What will this function return??

Analysis Relation between Quality and Compression Ratio:

1. Display the image (**'pout.tif'**)?
2. Write the image to the disk for q=50, 25, 15, 5, 0 ?
3. Find the compression ratio for each value of q?
4. Plot the curve which shows the relation between quality and compression ratio?

<p style="color:red; text-align:center;">Comment on the resulting curve</p>

Let's Start Step by Step

Analysis Relation between Quality and Compression Ratio – Step 1:

1. Display the image (**'pout.tif'**)? -- Easily by just one command.

2. Write the image to the disk for q=50, 25, 15, 5, 0 ?

So we have many *qualities*

What kind of formats we will choose to write image ('pout.tif') ??

How many images we will write to the hard disk ??

Can you show them on one figure to see the output??

Analysis Relation between Quality and Compression Ratio – Step 2:

3. Find the compression ratio for each value of q?

Can you determine the function that gives us the FileSize ?

But we need to take (FileSize) for each Image !!

And we have 5 images , then HOW ??

Analysis Relation between Quality and Compression Ratio – Step 2:

Steps :

1. Use **for** loop.
2. You can take size of the file on hard disk from **imfinfo** function by take the name of the variable then put (.) then FileSize.

   Example:
   k = imfinfo('filename');
   fileSize = k.FileSize;

3. Then, calculate the compression ratio and save values according to a vector?

Analysis Relation between Quality and Compression Ratio – Step 3:

4. Plot the curve which shows the relation between quality and compression ratio?

Easily by using *plot* function

Title must be
'Relation between Quality and Compression Ratio'

Differentiate the coordinates names
X → Quality.
Y → Compression Ratio.

Comment on result:

Relation between Quality and Compression Ratio