Multimedia Systems Lecture 4

LECTURER

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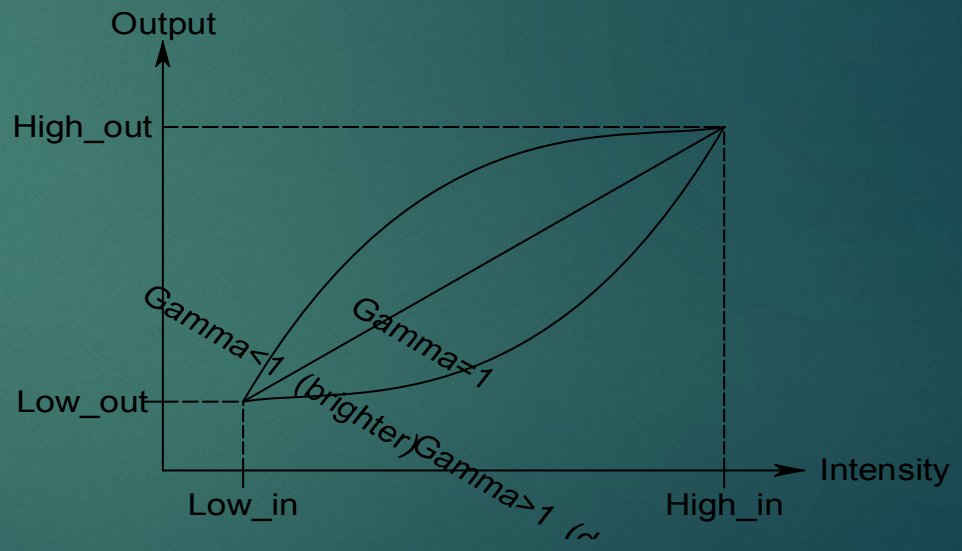
imwrite Function

- Write image to graphics file
- **Syntax**
  - *imwrite(A,filename,fmt)* writes the image A to the file specified by *filename* in the format specified by *fmt*
  - *imwrite(X,map,filename,fmt)* writes the indexed image in X and its associated colormap map to filename in the format specified by *fmt*
  - *imwrite(...,filename)* writes the image to filename
  - *imwrite(...,Param1,Val1,Param2,Val2...)* specifies parameters that control various characteristics of the output file. For example, if you are writing a JPEG file, you can specify the quality of the output image
- **Example**
  - A=imread('greens.jpg');
  - imwrite(A,'new_greens.jpg','Quality',25)
  - We choose the value of quality between 0 – 100
  - Compare between the two images in size.

Imadjust : gamma

- **Syntax**
  - J = imadjust(I,[low_in high_in],[low_out high_out],gamma)

- **Example**:
  - C=imread('circuit.tif');
  - imshow(C)
  - C_new=imadjust(C,[0 0.9],[],0.5);
  - imshow(C_new)



Thresholding

- To convert an image from gray scale to binary we need to find a threshold (T) where values bigger than that threshold are white, and the rest is black
- Steps:
  - Convert the image to a gray scale image if it is not a gray scale image.
  - The initial value of the T is calculated by
  - $$T = \frac{1}{2}(\min(L(:)) + \max(L(:)))$$
  - Depending on T value there are 2 sets of pixels
  - $$pixels = \begin{cases} G1 & f(x,y) \geq T \\ G2 & elsewhere \end{cases}$$
  - Calculate a new value of the threshold where
  - $$T_{new} = \frac{1}{2}(Average_{G1} + Average_{G2})$$
  - We repeat this operation until the difference between the last calculated thresholds is smaller than 0.2

Thresholding

- The next step is to give each pixel whose value is bigger than the threshold the value 1 (white) and the rest the value 0 (black)
- We can use the matlab function *graythresh to calculate the T* as it is shown in the following example.
  - gray_orginal=imread('cameraman.tif');
  - imshow(gray_orginal)
  - thresh=graythresh(gray_orginal);
  - binary=im2bw(gray_orginal,thresh);
  - imshow(binary)

Edge Detection

- Edge detection is an image processing technique for finding the boundaries of objects within images
- It works by detecting discontinuities in brightness
- Common edge detection algorithms include Sobel, Canny, Prewitt, Robert
- Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision.
- In an image, an edge is a curve that follows a path of rapid change in image intensity. Edges are often associated with the boundaries of objects in a scene. Edge detection is used to identify the edges in an image.
- To find edges, you can use the edge function. This function looks for places in the image where the intensity changes rapidly, using one of these two criteria:
  - Places where the first derivative of the intensity is larger in magnitude than some threshold
  - Places where the second derivative of the intensity has a zero crossing

Edge Detection

- I=imread(‘testpat1.tif ’);
- IEr = edge(I,‘roberts’);
- IEp = edge(I,‘prewitt’);
- IEs = edge(I,‘sobel’);
- IEc = edge(I,‘canny’);
- subplot(2,3,1), imshow(I); title(‘Original image’);
- subplot(2,3,2), imshow(IEr); title('modified image using Roberts filter');
- subplot(2,3,3), imshow(IEp); title('modified image using prewitt filter');
- subplot(2,3,4), imshow(IEs); title('modified image using sobol filter');
- subplot(2,3,5), imshow(IEc); title('modified image using canny filter');

THE END
GOOD LUCK