

IIVP Practice Experiments

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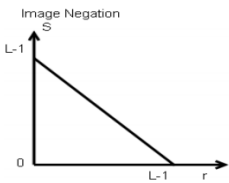
TAs: GC Jana



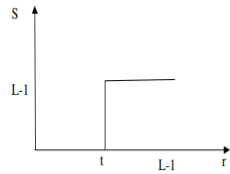

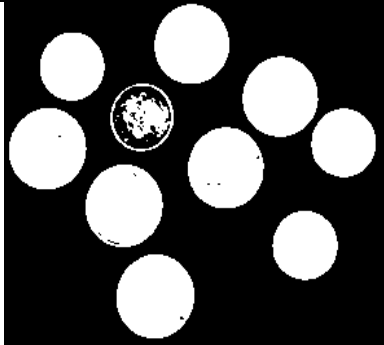
Instructions: Use MATLAB and/or Python and/or Octave tools for the following questions. Do not use the inbuilt functions unless mentioned in the question. If input image not give or specified then you can use Lenna image (popular picture use for image processing) as a sample image.

Topics Covered in the Lecture Session: Arithmetic operations, image negative, Thresholding of an Image, contrast stretching, bit plan slicing, zooming by interpolation and replication and resizing by the nearest neighbor concept.

Aim of this Lab Session: Arithmetic operations, image negative, Thresholding of an Image.

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Experiment No.1	Related image operations
Aim	Understand basic operation on images with programming
Tools and Library	You can use PIL (Python Image Library) for split and ndimage.shift for shifting
Question	(i) Load the given image and split it into three grayscale images that represent the intensities. (ii) Load the given image and perform the shifting operation by considering all RGB channel or axis one by one.
Tools and Library	You can use PIL (Python Image Library) for split and ndimage.shift for shifting
Hint:	If this function was applied to the first axis of the data, then it would shift it vertically. You can use the argument (0,0,1) to shift only the third channel
Input and possible Output Images	<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <p>Input image of Exp. 1</p> <p>Possible Output image of shifting operation</p> </div>
Experiment No. 2	Negation of an image
Aim	Understand image negative with programming.
Tools and Library	MATLAB, Python
Theory/Hint	<p>The negative of an image with gray levels in the range $[0, L-1]$ is obtained by using the negative transformation given by the expression $S = L - 1 - r$ (1)</p> <p>This is according to the transformation $S = T(r)$. In above transformation (1), the intensity of the output image decreases as the intensity of the input increases. The type of processing is particularly suited for enhancing white or gray detail embedded in dark regions of an image especially when black areas are dominants in site.</p> <div style="text-align: right;">  </div>

Algorithmic Steps:	<ol style="list-style-type: none"> 1. Read i/p image 2. Read maximum gray level pixel of i/p image 3. Replace input image by $(\text{maximum} - i/p) = o/p$ 4. Display o/p image 	
Question	Load given grayscale image and write a code to perform Negation operation over the input image.	
Input and possible output image	 <p>Input image of Exp.2</p>	 <p>Possible Output images after</p>
Experiment No. 3	Thresholding of an Image	
Aim	Understanding thresholding techniques over the image. More specifically we will try to understand how Thresholding separate out the object from the background.	
Tools and Library	MATLAB, Python	
Theory/Hint	<p>Thresholding is a simple process to separate the interested object from the background. It gives the binary image. The formula for achieving thresholding is as follows</p> $s = 0 \text{ if } r \leq t$ $s = L-1 \text{ if } r > t$ 	
Algorithmic Steps:	<ol style="list-style-type: none"> 1. Read an input image 2. Enter thresholding value t 3. If image pixel is less than t replace it by zero. 4. If image pixel is $> t$ replace it by 255 5. Display input image 6. Display threshold image 7. Write input image 8. Write threshold image 	
Question	Write a code to Load the given input image and perform the Thresholding concept over the input image. You need to consider both local & global thresholding approach.	
Input and possible output images	 <p>Input image of Exp.3</p>	 <p>Possible output of after Thresholding</p>