IIVP Lab Practice Experiments

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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.
You are advised to implement/work on this following problem before the mid Sem lab exam.

Aim of this Lab Session: *Image Segmentation, Color image Processing, and Morphological Image Processing.*

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1. Write you own image processing related program that loads a specified color image (***input1.PNG***) and applies histogram equalization to the R, G, and B channels separately. Implement a second program/function that converts the specified input image into the HSI color space and applies histogram equalization on the intensity (I) channel and again convert into RGB. Show input image and processed image side by side for both cases.
2. Write you own image processing related program to perform morphological image operations-erosion, dilation, opening & closing over the Binary (***input3.bmp*** & ***input4.bmp***) and Gray Scaled image (***input2.gif***).
   Note: For Gray Scaled image you can use thresholding to produce Binary image.
   Problem statement:

   Morphological operations: including erosion, dilation, opening, closing and Users can arbitrarily choose one of the morphological operations.
   Structuring Element (SE):
   - SE size: users can dynamically change the SE size through moving the slider.
   - SE type: there are 3 types of SE which are implemented in the program, including diamond, square and octagon. Users can dynamically change SE type through the pop-up menu.
   - User-defined SE: users can arbitrarily change the SE through pressing the mouse button. When users press the specific radio button, MorphPic will show the corresponding resultant morphological operations on the original picture.

3. The image of the optical telegraph (***input5.bmp***) contains six black rectangles in size 11 x 11 pixels. Use the idea of your solution for question-2 and the method of the Hit-or-Miss transform to find the center coordinates of these rectangles. You are not allowed to use the inbuild function.
4. Write your own image processing related program to illustrate "Thickening" and "Skeletons". Use the images ***input3.bmp*** & ***input4.bmp***
5. As an Image Processing expert, you are asked to create the raw material for a map of an island. Your source is this photography (***input6.bmp***) and you are expected to write your own image processing program that gives an image of the border between land and water. The coastline should be a black line on white background. Both the sea and the land should be as white as possible. Deliver the processed image, a description of how you did the job and the code.
6. When old documents are scanned it is sometimes difficult to read the text. Is it possible to use "Global" or "Adaptive" Thresholding to increase the contrast between text and background? write your own image processing related program for the same and show the output using given input image (***input6.bmp***). Discuss the effect of thresholding on the image below. What steps can be taken to further increase image quality. Illustrate with histograms and images. Describe what kind of experiments you have done!

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