National Institute of Technology Calicut

Department of Electronics and Communication Engineering

EC 3093D DIGITAL SIGNAL PROCESSING LAB

Sixth Semester B Tech Electronics & Communication Engineering

Experiment 6:

Image Processing: Basic Operations, Filtering and De-noising

Note: All the experiments must be implemented in both Matlab and Python.

Image Processing

1. Read (load) an image from a specific folder, and perform the following set of operations:
   (a) Display the image
   (b) Find the size of the image
   (c) Resize the image
   (d) After resizing, give the new image a filename and save it in the same location where the original image is stored.

2. Read (load) a color (RGB) image and perform the following set of operations: (preferably use " lena.jpg", " onion.png")
   (a) Display the image
   (b) Find the size of the image
   (c) Show the individual R, G, B planes of the input RGB image.
   (d) Convert the RGB image into HSV/HSI color space and display the Hue, Saturation and Value (Intensity) planes.
   (e) Convert the input color image to gray-scale and display the gray-scale image's minimum and maximum pixel values.
   (f) Convert the above gray-scale image into a binary image and display the same.

3. Read an image and display a histogram of the image
   (Preferably, " rice.png" from Matlab).
   Perform the histogram equalization of the above image.

4. Read (load) an image and perform the following set of operations: (Preferably " cameraman.tif from Matlab)
   (a) Use an averaging filter of size 5×5 and display the output image.
   (b) Use an averaging filter of size 9×9 and display the output image.
   (c) Use an averaging filter of size 25×25 and display the output image.

   Write down your inference on the above three cases.

5. Apply a Laplacian filter to the " cameraman image" and display the results

6. Read " autumn.tif" image (Matlab), convert this input image into gray-scale and perform the following set of operations:
   (a) Add salt & pepper noise to the above image and display the output image.
   (b) Add Gaussian noise to the above image and display the output image.
   (c) Add Periodic noise to the above image and display the output image.
   (d) Add Speckle noise to the above image and display the output image.

7. Read " twins.png" image and perform the following set of operations:
   (a) Add salt & pepper noise, with noise density 0.2 to the above image and display the output image.
   (b) Use an average filter of size 5×5 on the above image and display the result.
   (c) Use a median filter of size 5×5 on the above image and display the results.

   Write down your inference on the above three cases.

8. Perform image segmentation for a gray-scale image, based on the concept of Thresholding and do the following:
   (For gray-scale image " coins.png" can be chosen.)

(a) Display the input image

(b) Display the binary mask

(c) Display the segmented image

(d) Perform all the above for a color (RGB) image (“ onion.png” from Matlab can be chosen).

Note:
Most of the images mentioned in the above questions are demo images, available in Matlab. You can also use other images that are commonly used in image processing applications. The same set of images can also be used for Python implementation

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