MM2090 : Introduction to Scientific Computing

Apr-Jun-2021

Assignment – 6

Instructions for submission remain same as for first assignment. Don't forget to provide your name, roll number and assignment number on the first page of the PDF you are uploading. All the problems in this assignment should be done using octave. Make a zip of your stuff, name it with your roll number and assignment number (eg., ME20B001-assn6.zip) and upload on moodle.

[1] Load an image you took using your mobile camera. Look up kernel operations and apply those programmatically on your image to perform the following actions (a) increase brightness by 20% ie., , (b) increase contrast by 50%, (c) perform a gamma correction using gamma value of 1.2 (d) Invert the image ie., newvalue = 255 – oldvalue and (e) detect the edges in the image. Create a brief report with these images and the code snippets of what you did. Enclose the octave file as rollno.m file along. [6 marks]

Output required: The octave code, a report containing modified images and the operations that achieved those modifications. Your report should mention the sources you used to pick up the kernels for achieving those image modifications.

Application: Image manipulation is important for not only the entertainment industry but also for computer vision and automated operations in a plant. Such codes need to be fast and reliable if they should be applied on a live video.

[2] Consider a square array of 128 * 128 pixels in size. Randomly color the pixels as either black or white by visiting each pixel and generating a random number r between 0 and 1. If r < 0.5, assign the pixel a black color. If r >= 0.5, assign the pixel a white color. Perform the following operation repeatedly:

Generate two random integers (i,j) between 1 and 128; Visit the pixel at location (i,j) and look at what kind of immmediate neighbors it has (like or unlike). Swap its color with one of its immediate neighbors to increase the total number of like neighbors. After each N (say N = 100) steps, create an image from the array and store it as an image.

See how the pattern evolves as you keep making these operations over and over again. Comment on your observations. [7 marks].

Output required: The octave code, a report showing representative snapshots of the image.

Application: This process displays how segregation evolves in nature as well as in social circles. The two colors represent either two types of atoms or two opposing views among people. The swap indicates rearrangement of atoms or friends. The pattern evolution has deeper meaning about the interaction between atoms or the polarization among people.

--oo**oo--