EN2550 2018: Assignment 01

February 16, 2021

Please note that you must implement the key Python functions and scripts on your own. If you copy from the Internet or others, you will not get the learning experience intended through this assignment.

1. Carry out the following operations on an image of your choice: [4 marks]

   (a) Histogram computation.

   (b) Histogram equalization. Show the histogram before and after.

   (c) Intensity transformations. Show the transformation function as well.

   (d) Gamma correction. State γ.

   (e) Gaussian smoothing. State kernel size and σ.

   (f) Unsharp masking.

   (g) Median filtering. State kernel size.

   (h) Bilateral filtering. Explain the theory of this as well.

2. Count the rice grains in the rice image (given). Show the components (after connected-component analysis) using a color map. [2 marks]

3. Write a program to zoom images by a given factor in (0,10]. You must use a function to zoom the image, which can handle [2 marks]

   (a) nearest-neighbor, and

   (b) bilinear interpolation.

   I have included four images, two large originals, and there zoomed-out versions. Test you algorithm by computing the sum of squared difference (SSD) when you scale-up the given small images by a factor of 4 by comparing with the original images.

Upload a six-page report named as your_index_a01.pdf. The report must include important parts of code, image results, and comparison of results . The interpretation of results and the discussion are important in the report. Extra-page penalty is 2 marks per page.