
Computer Vision & Pattern Recognition

Spring 2025

Assignment 3

March 7, 2025

Problem 1 [5 points]

Let A be a grayscale image, B be the result of applying our histogram equalization (see slide 54 and the code in `05.50 equalization.py`, towards the end of the file) to A and C be the result of applying the same algorithm again to B . Show that $C = B$.

Problem 2 [5 points]

Modify the “histogram matching” code from the lecture (slide 57 and the code in `06.57 matching.py`) by pre-processing the source intensity for the (i, j) -th pixel as follows. Instead of evaluating the piecewise linear cumulative distribution function T_p at $r = (k + 0.5)/L$, where $k = A_{i,j} \in \{0, \dots, L - 1\} \subset \mathbb{Z}$ is the intensity of the (i, j) -th pixel in the source image, evaluate T_p at $r = (\bar{k} + 0.5)/L$, where $\bar{k} \in [0, L - 1] \subset \mathbb{R}$ is the *average* intensity of the (i, j) -th and all *neighbouring* pixels (3 at the corners, 5 at other boundary pixels, and 8 at interior pixels) that have an intensity k' similar to the intensity $k = A_{i,j}$ (no more than 2 intensity levels in difference, that is, $|k - k'| \leq 2$). Use your program to change the histogram of the “dog” image (`dog.pgm`) such that it matches the histogram of the “forest” image (`forest.pgm`).

Hand in your code, the result image, and a picture with the histogram and the discrete cumulative distribution function (the code for the latter is already given).

Solutions must be returned on March 18, 2025 via iCorsi