

ECE431 Homework 9 z-Transform

Due in 431 mobi file cabinet in WisCEL, 3pm Nov. 9.

9.1 Digital Watermarking. The MATLAB file `camerawm.mat` contains an image y of the camera man that we have used in a previous homework assignment, however, this image differs slightly. There is a secret digital “watermark” embedded in the image. The image pixels are represented by integers between 0 and 255 (i.e., 8 bit binary representation). The watermark is inserted by altering the least significant bit (LSB) of each pixel to a predetermined pattern.

(a) Determine a method for extracting the LSB of each pixel and display the LSBs as an image to observe the secret watermark, which is otherwise invisible.

(b) The watermark may be viewed as a quantization “noise”, and more complex watermarks may be inserted by using more than the LSB. Plot the image at different levels of quantization (8 bits, 6 bits, 4 bits, and 2 bits) to identify the quantization step size at which the image quality degrades to your eye.

9.2 OS 3.30

9.3 OS 3.31

9.4 OS 5.29