ESTIN

Pattern recognition for image analysis

S5 2024-2025

LAB ° 05

Exercise 1

a. Apply the wavelet transform to an image (to compute the **approximation coefficients matrix** and **details coefficients matrices**). Use the function pywt.dwt2 , or pywt.wavedec2 to obtain the approximation coefficients for levels 1, 2, 3, 4, and 5 for a 5-scale Haar wavelet decomposition of the image.
   - ❖ Label the various detail and approximation coefficients that make up the transform and indicate their scales.

b. For each resulting decomposition, set the approximation coefficients to zero and perform wavelet reconstruction (back up to level 0). Use the functions pywt.idwt2 or pywt.waverec2.

c. Repeat the process in (b) but zero the horizontal detail coefficients instead.

d. Repeat the process in (b) but zero the vertical detail coefficients instead.

e. Repeat the process in (b) but zero both the horizontal and vertical detail coefficients.

Exercise 2

a) Write a python program to create a grayscale image, of size 256*256 where each 16*16 block contains the same color.

b) Write a function to calculate the frequencies of each color.

c) Write a function which uses the frequencies calculated in question (b) to compute the entropy of this image.

d) Consider the following coding: s={22255555533666} is coded as {20050000030600}. Compress the image with this code.

e) Compute the new entropy. Comment the result.

f) Compress this image(in d) using Run-length coding.