Prof. Albanesi - Digital content retrieval First Intermediate test 2018 – 1 hour

1) Describe SSIM metric and compare it to the PSNR measure

2) Clarify the difference among full reference, reduced reference, and no reference objective image quality evaluation

3) Write and explain the formula for the computation of the entropy for a grey level, 8 bits for pixels, image of NXN pixels.

4) Draw the block diagram of a Wavelet decomposition of a 1 D audio signal of 256 samples using three levels of decomposition.

5) Draw the reduction steps for the Huffman coding for an alphabet of 4 symbols a1, a2, a3, a4 with the following probability $P(a_j)$ (for j=1,2…4) of occurring in the coded string:
$P(a_1) = 0.3$; $P(a_2) = 0.2$; $P(a_3) = 0.4$; $P(a_4) = 0.1$; ;
Write the coding of the following string:

$a_4a_3\ a_1\ a_3\ a_3$

6) Compare the arithmetic coding to the Huffman coding: which are the analogies and the differences?

7) The Wavelet decomposition of a discrete signal:

- Implies the hypothesis of a stationary signal
- Does not imply the hypothesis of a stationary signal
- Implies the hypothesis of limited entropy
- Implies the hypothesis of continuity

8) Which of the following statements are true for the Haar Transform

- It is the simplest example of Wavelet transform
- Its digital filters have a length of two
- It is affected by block distortion
- The coefficient of the filters are integer numbers
- None of the previous ones

9) Which is the main drawback of the Wavelet–packet decomposition?

- It cannot be a lossless decomposition
- Its high computational complexity, due to the search of optimum decomposition
- It is not invertible
- It cannot be a lossy decomposition
- None of the previous ones