Homework 4, 5/23/2025

10%

8.3 Consider an 8-pixel line of intensity data, {108, 139, 135, 244, 172, 173, 56, 99}. If it is uniformly quantized with 4-bit accuracy, compute the rms error and rms signal-to-noise ratios for the quantized data.

40%

8.9 Consider the simple 4×8, 8-bit image:

21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243

(a) Compute the entropy of the image.

(b) Compress the image using Huffman coding.

(c) Compute the compression achieved and the effectiveness of the Huffman coding.

(d)* Consider Huffman encoding pairs of pixels rather than individual pixels. That is, consider the image to be produced by the second extension of the zero-memory source that produced the original image. What is the entropy of the image when looked at as pairs of pixels?

(e) Consider coding the differences between adjacent pixels. What is the entropy of the new difference image? What does this tell us about compressing the image?

(f) Explain the entropy differences in (a), (d) and (e).

20%

8.25 How many computations are required to find the optimal motion vector of a macroblock of size 8×8 using the MAD optimality criterion, single pixel precision, and a maximum allowable displacement of 8 pixels? What would it become for ¼ pixel precision?

10%

8.26 What are the advantages of using B-frames for motion compensation?

20%

8.27* Draw the block diagram of the companion motion compensated video decoder for the encoder in Fig. 8.36.

Homework 4, 5/23/2025

作業**4**之繳交期限**: 6/2/2025 10:10AM**。

上述照片檔案與說明件之檔名需可辨識是哪題之繳交檔案。將所有檔案**zip**成一個檔案上傳到**E3**。上傳檔案之檔名需包含同學之學號與姓名，作業次。

如**: ip-**王曉明**-112222333444-HW4.zip**