UNIVERSIDADE NOVA DE LISBOA
Faculdade de Ciências e Tecnologia
Departamento de Informática

TESTE

Disciplina: **Computação Multimédia**
1º Teste

10 de Abril de 2014

1) Consider a file with a video stream with 25 frames per second playback rate and a stereo audio stream. If each frame consists of 320x240 pixels of 24 bit colors depth and the audio is sampled at 8000 Hz with 16 bit sampling. Calculate the space required to store the above file for five minutes.

2) Consider the image below where the occurrences of pixel differences is typical of the set of images as a whole. The goal is to compress this 2 bits/pixel images with a lossless compression method.

3 3 3 2
2 3 3 3
3 2 2 2
2 1 1 0

   a) What is the degree of compression achievable by forming differences (DPCM) between adjacent pixels (assuming horizontal raster scan) and then Huffman coding these differences.

   b) Run length encoding (RLE), assuming two pixels to represent the pixel value and two pixels to represent the run length.

3) The following two tables can be used in the JPEG quantization step. Which of the tables results in a better quality picture? And which of the tables results in a coded image that takes up less space? Please justify your answer.

I

16	12	14	14	18	24	49	72
11	12	13	17	22	35	64	92
10	14	16	22	37	55	78	95
16	19	24	29	56	64	87	98
24	26	40	51	68	81	103	112
40	58	57	87	109	104	121	100
51	60	69	80	103	113	120	103
61	55	56	62	77	92	101	99

II

10	8	9	9	11	15	30	44
7	8	8	11	14	21	39	56
6	9	10	14	23	33	47	57
10	12	15	18	34	39	53	59
15	16	24	31	41	49	62	68
24	35	35	53	66	63	73	60
31	36	42	48	62	68	72	62
37	33	34	38	47	56	61	60

4) Consider the following block resulting from the DCT followed by quantization of a block of 8x8 pixels. What is the encoding of the AC components using the lossless compression method used in this situation in JPEG?

336	-1	0	0	0	0	0	0
-5	1	0	-1	0	0	0	0
-3	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

5) The conversion from RGB to YUV is a usual step in the JPEG compression. Additionally, different resolutions maybe used for the Y, U and V components. For example, in an RGB image with 640x480 pixels the Y component may have 640 x 480, the U component 160 x 120 and the V component 160 x 120. What is the reason for these changes in the input of the JPEG encoding?

6) Assume that an MPEG encoder detected a best match between a block in a P or B frame with a block in an I frame. What kind of information will be encoded in this situation? Please justify your answer.