

# Digital video processing

Exam 20.12.2005

1. Explain briefly (max. 3 rows):
  - a) SECAM
  - b) Spatial frequency
  - c) Temporal aperture
  - d) Line crawling
  - e) Super-resolution imaging
  - f) PB picture (6 p)
  
2. Motion estimation:
  - a) Give short descriptions of at least four two-dimensional motion representations. (2 p)
  - b) Give principles of at least two criteria for motion estimation. (2 p)
  - c) Give principles of at least two methods for searching motion parameters. (2 p)
  
3. Independent probabilities of symbols A, B and C are  $p(i) = [0.24 \ 0.21 \ 0.55]$ , respectively. The conditional probabilities of the alphabet  $p(i | j)$  are shown below:

$p(i   j)$		i		
		A	B	C
j	A	0.5	0.4	0.1
	B	0.3	0.3	0.4
	C	0.1	0.1	0.8

- a) Create Huffman codes for the alphabet using the 1st order conditional coding. What is the bitrate achieved with these codes (bits/symbol)? (3 p)
  - b) What are the theoretical limits for the bitrate in a)? (2 p)
  - c) What are the theoretical limits for the bitrate using scalar Huffman coding? (1 p)
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4. What is meant by the term hybrid block-based codec? Draw a block diagram representing the functional parts of the encoder. Explain the task of each part and give an example of a typical method for each of them. (6 p)