

Exercise Sheet Image Processing 1

(18 Points)

Submission: 06.05.14, 10:00 in the morning

Exercise 1 Digital Images (13 Points)

Assume that we create a black and white movie of length 5 seconds. We take 30 pictures per second. Each picture has 640x480 pixels. The photosensors of our camera are able to detect light with a wavelength between 380 nm and 710 nm. The number of grey levels is 256.

- a) Describe the theoretical timeline of one of the images composing the mentioned video. Your description should include following concepts: Perspective Projection, Digitalization, Quantization, and a description of the final "product" in the PC memory. (4 Points)
- b) How large is the required amount of memory to save our video, if we do not use any compression? (3 Points)
- c) How does the memory footprint of our video change, if i) the red sensors stop to work, ii) we reduce the number of grey levels to 16. Is the quality in both cases increased or decreased? (3 Points)
- d) Suppose, we store colors using three coordinates. The smallest value is 0, the largest values is 255. Which color is represented by the triple (255,255,255) when applying the RGB, CMY or HSV coding? (3 Points)

Exercise 2 Interpolation (5 Points)

- a) Construct for the following 3x4 image a reduced 3x3 image using i) nearest neighbor interpolation with possible intensity values 0,1, ii) bi-linear interpolation with possible intensity values 0,1, and iii) bi-linear interpolation with possible intensity values 0, 0.33, 0.67, 1 (5 Points)

0	1	0
1	1	1
0	1	0
1	1	1

Table 1: Image to Interpolate

Tutorial How To

Please submit your answers to `schatten@ismll.de` with object: "Bildverarbeitung Übung XX Familienname".

Each document should be in formal language and nicely formatted, reporting also the original question and the total points assigned for the question.

Generally statements without explanation are not well accepted: 3 points assumes at least three sentences. Copying answers from the scripts is not allowed.