

Exercise Sheet Computer Vision 8

Submission: 07.07

(20 Points)

Exercise 1 Gradient orientation (14 Points)

- a) What is a histogram? How is it used for computer vision purposes?
(3 Points)
- b) Given the following matrix compute the average gradient direction and the gradient direction histograms of 2x2 patches. (Hint: gradients equal to zero should be approximated and be equal to 1, gradient direction $\theta = \arctan(dy/dx)$)

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 255 & 255 & 255 & 255 \\ 255 & 255 & 255 & 255 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

(8 Points)

- c) Why is it important to compute the gradient direction of a patch? (3 Points)

Exercise 2 Sift detection (6 Points)

- a) Write and comment the pseudo code for the first two phases of SIFT features detection:
- Scale octave computation
 - Local non-maxima suppression

(6 Points)