Computer Vision
Exercise Sheet 10

Prof. Dr. Dr. Lars Schmidt-Thieme, Hanh Nguyen
Information Systems and Machine Learning Lab
University of Hildesheim

June 21, 2017
Submission until June 27, 14.00 via learnweb

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 histogram of 2×2 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) What 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)