Numerical Methods for Visual Computing
M. Möller, University of Siegen
Winter Semester 17/18

Weekly Exercises 9

To be discussed on Friday, 22.12.2017, 10:15-11:45, in room H-C 6336
Submission deadline: Tuesday, 19.12.2017, in the lecture

Theory

Exercise 1 (2 points)**.** Compute the gradient and the Hessian of the energy

$$E(a_1, a_2) = \frac{1}{2} \sum_{i=1}^{n} (a_1 \cos(a_2 x_i) - y_i)^2.$$

Programming

Exercise 2 (3 points)**.** Implement the Newton method to solve the minimization of $E(a_1, a_2)$ from the first exercise. How close to the true solution do you have to initialize for the Newton method to converge?

Exercise 3 (3 points)**.** Implement the gradient descent method to solve the minimization of $E(a_1, a_2)$ from the first exercise. Pick a reasonably small step size τ, e.g. $\tau = 0.01$. Does the method always converge? Does it always converge to a good solution?

For the programming exercises there is code including exemplary points x_i and y_i available on the course website.