Convex Optimization for Computer Vision
Lecture: M. Möller
Exercises: H. Bauermeister
Summer Semester 2018

Universität Siegen
Department ETI
Visual Scene Analysis

Weekly Exercises 11
Room: HA-7116
Thursday, 19.07.2018, 16:15-17:45,
Submission deadline: Tuesday, 13.07.2018, 18:00

Programming: Denoising

Exercise 1 (12 Points). Implement the primal-dual hybrid gradient (PDHG) method for minimizing the following four denoising approaches

- $\min_u \frac{1}{2}\|u - f\|_2^2 + \alpha\|Du\|_2^2$

- $\min_u \frac{1}{2}\|u - f\|_2^2 + \alpha\|Du\|_1$

- $\min_u \|u - f\|_1 + \alpha\|Du\|_2^2$

- $\min_u \|u - f\|_1 + \alpha\|Du\|_1$

where D denotes the discretization of the image gradient (as usual). Load an image in matlab (e.g. `'peppers.png'`), and create two noisy versions - one using Gaussian noise (randn) and one using salt-and-pepper noise (help imnoise), and apply all of the above denoising approaches for 'reasonable' values of α for each method. Compare the results visually as well as in terms of their PSNR (help psnr).

Exercise 2 (4 Bonus Points). Revisit the optimization challenge and implement either a PDHG or an ADMM optimization method for the considered problem.