Seminar
Department of Mathematics

Proximity Algorithms for Image Models: L1/TV Denoising

by

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Abstract

This talk presents a novel framework for the study of the L1/TV image denoising model which is the sum of a data fidelity term measured by the $\ell^1$-norm and the total-variation regularization term. Both terms are non-differentiable that imposes algorithmic difficulty for solving this model. The difficulty is overcome by using proximity operators and viewing total-variation as the composition of a convex function with the first order difference operator. A characterization of the solutions to the model is given in terms of the proximity operators of the $\ell^1$-norm and $\ell^2$-norm which have explicit expressions. The characterization naturally leads to a fixed-point algorithm for computing a solution of the model. After carefully investigating the proposed fixed-point algorithm, we derive a new iterative algorithm which associates with a fixed-point equation of a particular operator. The fixed-point of this derived fixed-point problem is the solution of a smoothed L1/TV image model in which the convex function defining the total-variation is replaced by its Moreau envelope. We extend the above two models to the case where partial information of the underlying image is available. The corresponding characterizations and fixed-point algorithms are developed as well.

Date : 13 January 2011 (Thursday)
Time : 4:30 – 5:30 pm
Venue : Y5-202, Yellow Zone, Level 5
       Academic Building
       City University of Hong Kong

** All are welcome **