

THE UNIVERSITY



OF HONG KONG

Department of Mathematics

JOINT FRANCE/HONG KONG IMAGE PROCESSING SEMINAR

2 November 2002 (Saturday)

9:30 am - 12:30 pm

517 Meng Wah Complex, HKU

9:30 – 10:20

Dr. Pierre Kornprobst
INRIA, Odyssee Lab, France

About some variational problem in image processing

10:20 – 11:00

Dr. Siu Pang Yung
Department of Mathematics, The University of Hong Kong

Discrete periodic wavelet filters of trigonometric vanishing moments

11:00 – 11:10

Coffee Break

11:10 – 11:50

Dr. Mila Nikolova
ENST, France

Comparison of the main forms of half-quadratic regularization

11:50 – 12:30

Dr. Michael K. Ng
Department of Mathematics, The University of Hong Kong

High-resolution image reconstruction and color imaging

Supported by the France/Hong Kong Joint Research Scheme

All are welcome

JOINT FRANCE/HONG KONG IMAGE PROCESSING SEMINAR

Dr. Pierre Kornprobst
INRIA, Odyssee Lab, France
About some variational problem in image processing

Abstract

In this talk three classical subjects from image processing will be formalized in the variational framework.

- (1) Image restoration. We will present a survey in this domain, distinguishing convex and non-convex regularizers. The notion of duality will also be introduced.
 - (2) Optical flow which is motion estimation in a sequence of images. We will show that the theoretical study of the minimization problem leads to difficult notions such as lower semicontinuous relaxation.
 - (3) Sequence segmentation. The separation of the moving objects from the background will be obtained by minimizing an energy apparently non convex and degenerated. Still we will show that the problem is well posed and show some results to illustrate the approach.
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Dr. Siu Pang Yung
Department of Mathematics, The University of Hong Kong
Discrete Periodic Wavelet Filters of Trigonometric Vanishing Moments

Abstract

When applying a wavelet transformation to a signal, it can be viewed as analysing the signal via its Taylor expansion. In this talk, we shall design wavelet filters that analyse signals via their trigonometric series. A key step is to replace the classical vanishing moment condition by a new trigonometric vanishing moment condition. We shall discuss the existence of these new pieces of wavelet filters. Their performances in signal compressions will be examined.

Dr. Mila Nikolova
ENST, France
Comparison of the main forms of half-quadratic regularization

Abstract

We consider the reconstruction of images by minimizing regularized cost-functions. To accelerate the computation of the estimate, two forms of half-quadratic regularization, multiplicative and additive, are often used. We compare both theoretically and experimentally the the speed of convergence relevant to these two forms. We show that the multiplicative form gives rise to a better rate of convergence since it needs less iterations. In many cases, however, the cost-per-iteration involved in the additive form can be very cheap, thus leading to a smaller computation time. The obtained expressions allow to evaluate the expected speed for different cost-functions. At last, we propose a very speed method for the minimization of cost-functions involving Huber regularization.

Dr. Michael K. Ng
Department of Mathematics, The University of Hong Kong
High-resolution image reconstruction and color imaging

Abstract

In this talk, we consider restoring a single color image from two degraded frames of the same scene by a RGB sensor and a luminance sensor. The RGB-to-YIQ transformation, the classical Tikhonov regularization and the Neumann boundary condition are used in the restoration process. Regularization based on generalized cross-validation function with multisensors is also employed to obtain the high-quality restored image. The resulting method is shown to provide improved restoration over other restoration methods.