

Analyse numérique

Mercredi 19 mai 2010 – Salle MAA112 – 16.15 h.

Prof. Michaël **UNSER** (Laboratoire d'imagerie biomédicale, EPFL) donnera un séminaire¹ intitulé :

“Beyond the digital divide : Ten good reasons for using splines”

Abstract

“Think analog, act digital” is a motto that is relevant to scientific computing and algorithm design in a variety of disciplines, including numerical analysis, image/signal processing, and computer graphics. Here, we will argue that cardinal splines constitute a theoretical and computational framework that is ideally matched to this philosophy, especially when the data is available on a uniform grid. We show that multidimensional spline interpolation or approximation can be performed most efficiently using recursive digital filtering techniques. We highlight a number of “optimal” aspects of splines (in particular, polynomial ones) and discuss fundamental relations with : (1) Shannon’s sampling theory, (2) linear system theory, (3) wavelet theory, (4) regularization theory, (5) estimation theory, and (6) stochastic processes (in particular, fractals). The practicality of the spline framework is illustrated with concrete image processing examples ; these include derivative-based feature extraction, high-quality rotation and scaling, and (rigid body or elastic) image registration.

Lausanne, le 26 avril 2010/JR/aa

1. Les séminaires qui ont lieu à la Section de Mathématiques sont annoncés sur Internet à l’adresse <http://www.epfl.ch/cgi-bin/memento/memento>.