Abstracts of contributed talks

Mokhtar Z. Alaya

Screenkhorn: Screening Sinkhorn Algorithm for Regularized Optimal Transport

Due to many recent applications of optimal transport (OT) in different machine learning tasks, statistics, computer vision, among other applications, it is an important problem to develop scalable algorithms for approximating OT. In this talk, I will discuss an approach based on proposing a pre-processing step in which we hope to identify dual variables with small optimal value. We then set such variables to a threshold value, and compute the Sinkhorn divergence by only optimizing over the remaining variables via a constrained L-BFGS-B algorithm. The proposed screening approach leads to a more scalable algorithm, called Screenkhorn, that it does not affect the value of the Sinkhorn divergence. We illustrate the efficiency of Screenkhorn on complex tasks such as dimensionality reduction and domain adaptation involving regularized OT.

This is a joint work with Maxime Bérar, Gilles Gasso, Alain Rakotomamonjy (LITIS Lab EA4108, University of Rouen Normandy).

Francesca Bartolucci

Wavefront set resolution in shearlet analysis and the Radon transform

In [1] we proved that the unitary affine Radon transform intertwines the shearlet representation with the quasi-regular representation of the shearlet group $\mathbb{S}$ on $L^2(\Xi, \mathrm{d}\xi)$, where Ξ is the transitive $\mathbb{S}$-space $\mathbb{R} \times \mathbb{R}$ and $\mathrm{d}\xi$ is the Lebesgue measure. This intertwining result yields a formula for the shearlet coefficients that involves a 1D-wavelet transform applied to the affine Radon transform of the signal followed by a 1D-convolution, clarifying the link between the shearlet transform and the wavelet transform. Indeed it shows that the shearlet transform is nothing but the combination of a 1D-wavelet transform, from which the shearlet transform inherits microlocal properties and the affine Radon transform, from which it gets directional sensitivity, thereby opening a new approach based on the Radon transform to prove that the shearlet transform resolves the wavefront set of distributions.

[1] F. Bartolucci, F. De Mari, E. De Vito, F. Odone: "The Radon Transform Intertwines Wavelets and Shearlets",

Applied and Computational Harmonic Analysis, 2018.

Alessandro Monguzzi

Spaces of Entire Functions in $\mathbb{C}^{n+1}$

A renowned space of entire functions of one complex variable is the Paley–Wiener space P W A , that is, the space of entire functions of exponential type A whose restriction to the real line is square integrable. In this talk I will present a generalization of P W A in several complex variables. In particular, I will consider entire functions which satisfy a suitable exponential growth condition and whose restriction to the boundary of the Siegel half-space satisfy some integrability conditions. The boundary of the Siegel half-space can be identified with the Heisenberg group; therefore harmonic analysis techniques are available to study this new Paley–Wiener type space. I will provide a Paley–Wiener type characterization and a sampling result. This is a joint work with Marco Peloso and Maura Salvatori.

Giovanni Pistone

Kantorovich distance on a weighted graph

The computation of the Kantorovich distance (or 1-Wasserstein distance) may be a hard problem in the case of general metric spaces. In this paper, we derive a simple closed form for the path metric associated with a tree. When the ground distance is defined by an arbitrary graph, we show that the Kantorovich distance is the minimum of the distances on the spanning trees. The extension of our method to arbitrary ℓ_1-embeddable metrics is also discussed. Joint with Luigi Montrucchio (Collegio Carlo Alberto, Torino).