POLITECNICO DI TORINO

Dipartimento di Scienze Matematiche "G. L. Lagrange"

DISMA ECCELLENZA 2018·2022

A late morning on INFORMATION GEOMETRY

Friday 6th December, 2019

Aula Buzano - DISMA

PROGRAM

- 11.00-11.30 Luigi Montrucchio and Giovanni Pistone *"Kantorovich distance on a finite metric space"* (1)

  11.30-11.40 discussion

- 11.40-12.10 Jesse Van Oostrum *"Bures-Wasserstein geometry for optimal transport and quantum information"* (2)

  12.10-12.20 discussion

- 12.20-12.50 Goffredo Chirco *"Bregman-Lagrangian Formalism on the non-parametric Statistical Bundle"* (3)

  12.50-13.00 discussion

- 13.00-14.30 Lunch

- 14.30-16.30 Round table (*auletta consulenze - DISMA*)

For further information please contact the organizers
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(1) **Luigi Montrucchio and Giovanni Pistone**
"Kantorovich distance on a finite metric space"
ABSTRACT: Kantorovich distance (or 1-Wasserstein distance) on the probability simplex of a finite metric space is the value of a Linear Programming problem for which a closed-form expression is known in some cases. When the ground distance is defined by a graph, a few examples have already been studied. In the present talk after re-deriving, with different tools, the result for trees, we prove that, for an arbitrary weighted graph, the K-distance is the minimum of the K-distances over all the spanning trees associated with the graph. We work in the dual LP-problem by using Arens-Eells norm associated with the metric space. Finally, we introduce new norms which are naturally related to ℓ_1-embeddable distances and allows for a partial extension of our results to this new setting.

(2) **Jesse Van Oostrum**
"Bures-Wasserstein geometry for optimal transport and quantum information"
ABSTRACT: The Bures Wasserstein distance is a distance function arising naturally in both optimal transport and quantum information theory. The geometrical properties of this distance are investigated using an extension of a classical geometrical construction by Rao.

(3) **Goffredo Chirco**
"Bregman-Lagrangian Formalism on the non-parametric Statistical Bundle"
ABSTRACT: I will discuss some preliminary results on the derivation of a variational approach to accelerated methods for optimization, in the context of non-parametric information geometry. A Bregman-Lagrangian system is defined on the maximal exponential manifold, where it provides a generative framework for second-order accelerated natural gradient dynamics on the affine geometry of the manifold. A dictionary between Lagrangian mechanics and information geometry is explored, with a focus on the symplectic structure of the statistical bundle for the exponential model. The research aims at the definition of a geometric framework for the adaptation of the variational optimization algorithms to the training of deep and convolutional neural network, with emphasis on accelerated methods, such as Nesterov's accelerated gradient.