Optimal Transport and Uncertainty

Report of Contributions

Contribution ID: **1**   Type: **not specified**

Euclidean Random Assignment Problems, old and new

Friday, 26 November 2021 14:30 (45 minutes)

An Euclidean Random Assignment Problem (ERAP in short) is as follows:

- there are two n-sets $\mathcal{B} = (B_i)_{i=1}^n$ (blue points) and $\mathcal{R} = (R_i)_{I=1}^n$ (red points) of i.i.d. random variables valued on a metric space (Ω, D) according to a prob. measure ν (disorder);

- for a permutation (or assignment) $\pi : \mathcal{B} \to \mathcal{R}$, there is an energy $\mathcal{H}(\pi) = \sum_{i=1}^n D(b_i, r_{\pi(i)})^p$, where $p \in \mathbb{R}$;

what can one say about the random variable $H_{\mathrm{opt}} = \min_\pi \mathcal{H}(\pi)$, depending on the choice of (Ω, D), on the disorder ν, and p?

ERAPs were pioneered in statistical physics by Mézard and Parisi in the '80s as toy models for finite-dimensional spin glasses; and any ERAP is Monge-Kantorovich optimal transport problem for the empirical measures of blue and red points, in which $W_p^p(\rho_\mathcal{B}, \rho_\mathcal{R}) = \frac{1}{n} H_{\mathrm{opt}}$, where W_p is p-Wasserstein distance.

Despite these connections, ERAPs have been exceedingly difficult to understand, and surprisingly few results have been proven to date.

In this talk I will review some selected ideas and results on ERAPs focusing on low dimensions of the underlying space Ω. If time allows, I will discuss current work in progress and touch upon a few research perspectives.

Presenter: Prof. D'ACHILLE, Matteo (Université Paris-Est Créteil)

Session Classification: main contributions

Contribution ID: **2**   Type: **not specified**

Optimal transport, wave functions and single electron densities

Friday, 26 November 2021 15:15 (45 minutes)

I will discuss some properties of the mapping from wave-functions to single particle densities. In particular I will show that in some case this mapping is open.
The tool will be the construction of special transport plans with given marginals. This partially answers an open question of E.H. Lieb. (From a joint work with Ugo Bindini).

Presenter: Prof. DE PASCALE, Luigi (Università degli Studi di Firenze)

Session Classification: main contributions

Contribution ID: **3**   Type: **not specified**

There is no invariant cyclically monotone Poisson matching in 2d

Friday, 26 November 2021 16:00 (45 minutes)

The optimal matching problem is a classical random variational problem that received interest in the last 30 years. We show that there exists no cyclically monotone invariant matching of two independent Poisson processes in the critical dimension $d = 2$. Our argument relies on a recent harmonic approximation theorem together with the two-dimensional local asymptotics for the bipartite matching problem, for which we provide a new self-contained proof based on martingale arguments.

Joint work with M. Huesmann (WWU Münster) and F. Otto (MPI Leipzig)

Presenter: Prof. MATTESINI, Francesco (University of Münster)

Session Classification: main contributions

Contribution ID: 4   Type: **not specified**

Optimal quantization strategies for vectorial signals

Friday, 26 November 2021 16:45 (45 minutes)

We will discuss and compare two approaches for quantization of vectorial signals on the input to a computational device: quantizing the whole signal and optimizing the input error, or quantizing separately the components
but optimizing the output error.

Primary author: Prof. STEPANOV, Eugene (Steklov Institute of Mathematics, St. Petersburg)

Presenter: Prof. STEPANOV, Eugene (Steklov Institute of Mathematics, St. Petersburg)

Session Classification: main contributions

Contribution ID: **5**   Type: **not specified**

Optimal transport methods in practical bilevel problems

Friday, 26 November 2021 17:30 (20 minutes)

Presenter: MALLOZZI, Lina (Università di Napoli Federico II)

Session Classification: round table

Contribution ID: **6**   Type: **not specified**

Locating segments via optimal transport

Friday, 26 November 2021 17:50 (20 minutes)

Presenter: GUARINO LO BIANCO, Serena (Università di Napoli Federico II)

Session Classification: round table

Contribution ID: **7**   Type: **not specified**

Random Optimal Transport and friends

Friday, 26 November 2021 18:10 (20 minutes)

Presenter: TREVISAN, Dario (Università di Pisa)

Session Classification: round table

Contribution ID: **8**   Type: **not specified**

Some questions on optimal planar clusters

Friday, 26 November 2021 18:30 (20 minutes)

Presenter: PAOLINI, Emanuele (University of Pisa)

Session Classification: round table