THE UNIVERSITY OF CHICAGO | DEPARTMENT OF STATISTICS

Joint Colloquium with the Committee on Computational and Applied Mathematics (CCAM)

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MIT Mathematics

"Diffusion-based probabilistic flows and low distortion mappings"

THURSDAY, January 4, 2024, at 4:00 PM

Jones 303, 5747 S. Ellis Avenue

Abstract

A central question in the field of optimal transport studies optimization problems involving two measures on a common metric space, a source and a target. The goal is to find a mapping from the source to the target, in a way that minimizes distances. A remarkable fact discovered by Caffarelli is that, in some specific cases of interest, the optimal transport maps on a Euclidean metric space are Lipschitz. Lipschitz regularity is a desirable property because it allows for the transfer of analytic properties between measures. This perspective has proven to be widely influential, with applications extending beyond the field of optimal transport.

In this talk, we will further explore transport maps with low distortion. The key point which we shall highlight is that, for low distortion mappings, the optimality conditions mentioned above do not play a major role. Instead of minimizing distances, we will consider a general construction of transport maps based on probabilistic flows, and introduce a set of techniques to analyze their distortion. In particular, we will go beyond the Euclidean setting and consider Riemannian manifolds as well as infinite-dimensional spaces.

We shall also discuss the emerging connections between our construction and recent advances in algorithms for generative modeling.

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