

MATH SEMINAR RUTGERS-CAMDEN

12:45 – 1:45 PM, NOVEMBER 14TH, 2024

ARM-121



Harlin Lee

University of North Carolina at Chapel Hill

Title: Efficient Trajectory Inference in Wasserstein Space Using Consecutive Averaging and Optimal Transport

Abstract: Capturing data from dynamic processes through cross-sectional measurements is seen in many fields such as computational biology. Trajectory inference deals with the challenge of reconstructing continuous processes from such observations. In this work, we propose methods for B-spline approximation and interpolation of point clouds through consecutive averaging that is intrinsic to the Wasserstein space. Combining subdivision schemes with optimal transport-based geodesic, our methods carry out trajectory inference at a chosen level of precision and smoothness, and can automatically handle scenarios where particles undergo division over time. We rigorously evaluate our method by providing convergence guarantees and testing it on cell data characterized by bifurcations and merges, comparing its performance against state-of-the-art trajectory inference and interpolation methods. The results not only underscore the effectiveness of our method in inferring trajectories, but also highlight the benefit of performing interpolation and approximation that respect the inherent geometric properties of the data.

