Bernoullis Tafelrunde

Math Students and PhDs Seminar

Thursday, 06 November 2025, 12:15 - 13:00
Seminar Room 05.001, Spiegelgasse 5

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Quantitative convergence for Wasserstein Gradient flows of Riesz energies

Abstract

Gradient flows in the Wasserstein space of probability measures have proven very useful for providing new interpretations of many parabolic partial differential equations in relation to Optimal Transport theory. Recently, it has been observed that this formalism can also be used to describe the learning dynamics of certain (continuous) two-layer neural networks. In a model case, this evolution corresponds to the Wasserstein gradient flow of the energy given by a negative Sobolev distance to a fixed target measure. The resulting active-scalar continuity equation shares several analogies with the vorticity formulation of the Euler equations for 2D fluids, while exhibiting markedly different qualitative long time behavior.

A natural question is to identify conditions under which the system converges to the target, possibly with an explicit rate of convergence. In joint work with Lénaïc Chizat, Maria Colombo, and Xavier Fernández-Real, we address this question from a PDE perspective, obtaining precise exponential or polynomial convergence rates under suitable smoothness assumptions.

In this seminar, we will introduce Wasserstein gradient flows of negative Sobolev discrepancies and describe the main ideas behind the aforementioned quantitative convergence results.

Scan before 05.10 at 18:00 to register for lunch