

Einladung

Würzburger Mathematisches Kolloquium

Julius-Maximilians-Universität Würzburg • Institut für Mathematik

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Universität Regensburg

Interfaces and Free Boundaries Arise in Big Data: The Large-Data Limit of the MBO Scheme for Data Clustering

Dienstag, 05. November 2024 • 14:15 Uhr

Seminarraum SE41 • Humboldt-Bau (Emil-Fischer-Straße 41, 97074 Würzburg)

Der Vortrag wird auch als Zoom-Meeting übertragen: go.uni-wue.de/ifmcolloquium-zoom

Abstract. The MBO scheme is an efficient algorithm for data clustering, the task of partitioning a given dataset into several meaningful clusters. In this talk, I will present the first rigorous analysis of this scheme in the large-data limit and recent progress on how the structure of the resulting geometric evolution equation informs the development of new algorithms and their efficiency analysis.

The starting point for our analysis is that each iteration of the MBO scheme corresponds to one step of implicit gradient descent for a heat excess energy on the similarity graph of the dataset. It is then natural to think that outcomes of the MBO scheme are (local) minimizers of this energy. We prove that the algorithm is consistent in the sense that these (local) minimizers converge to (local) minimizers of a suitably weighted optimal partition problem.

I will also describe how new geometric insights allow us to derive an efficient semi-supervised version of the scheme in which the sizes of classes are prescribed or constrained. Curiously, for this new scheme, the gradient-flow structure of the underlying geometric flow yields improved complexity estimates.

This talk encompasses joint work with Jona Lelmi (UCLA) and Fabius Krämer (U Regensburg).



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