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Talk



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Giacomo Meanti

Inria Grenoble



Efficient Kernel Learning of the Koopman Operator for Dynamical Systems

Koopman operators are a mathematical framework which helps to predict and analyze complex dynamical systems. In this talk I will present three non-parametric estimators of the Koopman operator, which can be shown to provably converge to the true solution from finite empirical observations of the system's time evolution. Scaling these approaches to long trajectories is a computational challenge that we tackle using random projections (sketching). With experiments on large-scale molecular dynamics datasets, we show that the sketched estimators scale very easily while maintaining accurate predictions.

Meanti, Chatalic*, Kostic, Novelli, Pontil, Rosasco, Estimating Koopman operators with sketching to provably learn large scale dynamical systems, NeurIPS 2023 (<https://arxiv.org/abs/2306.04520>)*

Giacomo Meanti is a Postdoctoral Researcher at Inria Grenoble (Thoth team), France, since 2024. Before that, he has been a Postdoctoral Researcher at the Istituto Italiano di Tecnologia, in the IIT @ MIT lab with Lorenzo Rosasco. He holds a PhD from the University of Genova (at the MaLga group), where he developed the Falkon library, the state of the art solver for approximate kernel ridge regression (training on the 1B point Taxi dataset in 1 hour). He is interested in developing efficient algorithms for shallow learning: in particular kernel models but also neural radiance fields (NeRFs). More recently, he is focusing on algorithmic challenges in the natural sciences, applying fast kernel methods to molecular dynamics and atomistic energy estimation.

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starting at 10:00AM

Vandal Lab, Covivio - Corso Ferrucci 112
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