

A dynamical systems view to deep learning: contractivity and structure preservation

Friday, 5 April 2024 09:00 (1 hour)

The (discrete) optimal control point of view to neural networks offers an interpretation of deep learning from a dynamical systems and numerical analysis perspective and opens the way to mathematical insight. In this talk we discuss topics of structure preservation and their use in deep learning. Some deep neural networks can be designed to have desirable properties such as invertibility and group equivariance or can be adapted to problems of manifold value data. Contractivity is identified as a desirable property for stability and robustness of neural networks. We discuss classical results of contractivity of numerical ODE integrators, applications to neural networks and recent extensions to Riemannian manifolds.

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