

MSC: 37C05, 37M20, 37G35;

PACS: 05.45.-a, 02.30.Oz.

Deep learning algorithms for estimating Lyapunov exponents from observed time series in discrete dynamic systems.

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Received April 02, 2018

Abstract. This paper demonstrates possible uses of deep neural networks for estimating Lyapunov exponents in discrete dynamic systems from their observable trajectories in the extended state space. We have studied the functional mechanisms of using deep neural networks in said application. The proposed approach has been tested in simulations with different topologies and attractor complexities. The study shows that our analyzer can be used to investigate the structure of time series.

Keywords: Deep Learning, convolutional neural network, Lyapunov exponent, time series, stochastic financial mathematics.

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