

Abstract Submitted
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Simulation of noisy dynamical system by Deep Learning KYONG-MIN YEO, IBM T J Watson Res Ctr — Deep learning has attracted huge attention due to its powerful representation capability. However, most of the studies on deep learning have been focused on visual analytics or language modeling and the capability of the deep learning in modeling dynamical systems is not well understood. In this study, we use a recurrent neural network to model noisy nonlinear dynamical systems. In particular, we use a long short-term memory (LSTM) network, which constructs internal nonlinear dynamics systems. We propose a cross-entropy loss with spatial ridge regularization to learn a non-stationary conditional probability distribution from a noisy nonlinear dynamical system. A Monte Carlo procedure to perform time-marching simulations by using the LSTM is presented. The behavior of the LSTM is studied by using noisy, forced Van der Pol oscillator and Ikeda equation.

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