<table>
<tr><th rowspan="2">cases</th><th>doc_1</th><th>doc_2</th><th>decision</th><th>id</th></tr>
<tr><td>

authors	• Kim, Changho • Tang, Yu-Hang • Zhu, Yuanran
title	Learning Stochastic Dynamics with Statistics-Informed Neural Network
publication_date	2022-09-02 00:00:00
source	SupportedSources.CORE
journal	
volume	
doi	None
urls	• http://arxiv.org/abs/2202.12278
id	id4818969229927099937
abstract	We introduce a machine-learning framework named statistics-informed neural network (SINN) for learning stochastic dynamics from data. This new architecture was theoretically inspired by a universal approximation theorem for stochastic systems, which we introduce in this paper, and the projection-operator formalism for stochastic modeling. We devise mechanisms for training the neural network model to reproduce the correct \emph{statistical} behavior of a target stochastic process. Numerical simulation results demonstrate that a well-trained SINN can reliably approximate both Markovian and non-Markovian stochastic dynamics. We demonstrate the applicability of SINN to coarse-graining problems and the modeling of transition dynamics. Furthermore, we show that the obtained reduced-order model can be trained on temporally coarse-grained data and hence is well suited for rare-event simulations
versions	

</td><td>

authors	• Yuanran Zhu • Yu-Hang Tang • Changho Kim
title	Learning Stochastic Dynamics with Statistics-Informed Neural Network
publication_date	2022-11-21 00:00:00
source	SupportedSources.INTERNET_ARCHIVE
journal	
volume	
doi	
urls	• https://web.archive.org/web/20221124104232/https://arxiv.org/pdf/2202.12278v3.pdf
id	id2480588013119820193
abstract	We introduce a machine-learning framework named statistics-informed neural network (SINN) for learning stochastic dynamics from data. This new architecture was theoretically inspired by a universal approximation theorem for stochastic systems, which we introduce in this paper, and the projection-operator formalism for stochastic modeling. We devise mechanisms for training the neural network model to reproduce the correct statistical behavior of a target stochastic process. Numerical simulation results demonstrate that a well-trained SINN can reliably approximate both Markovian and non-Markovian stochastic dynamics. We demonstrate the applicability of SINN to coarse-graining problems and the modeling of transition dynamics. Furthermore, we show that the obtained reduced-order model can be trained on temporally coarse-grained data and hence is well suited for rare-event simulations.
versions	

</td><td>DUPLICATES</td><td>199</td></tr>
</table>