Hong Kong Institute for Data Science
香港城市大學
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Online Seminar

CENTRE FOR SYSTEMS INFORMATICS ENGINEERING POSTDOC ASSOCIATES AND STUDENTS SEMINAR (CSIE PASS)

Applying and Dissecting LSTM Neural Networks and Regularized Learning for Dynamic Inferential Modeling

Mr Jicheng LI

Ph.D. Student, School of Data Science
City University of Hong Kong

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Seminar link: https://cityu.zoom.us/j/95299396909

Abstract

Deep learning models such as the long short-term memory (LSTM) network have been applied for dynamic inferential modeling. However, many studies apply LSTM as a black-box approach without examining the necessity and usefulness of the internal LSTM gates for inferential modeling. In this study, we use LSTM as a state space realization and compare it with linear state space modeling and statistical learning methods, including N4SID, partial least squares, the Lasso, and support vector regression. Two case studies on an industrial 660 MW boiler and a debutanizer column process indicate that LSTM underperforms all other methods. LSTM is shown to be capable of outperforming linear methods for a simulated reactor process with severely excited nonlinearity in the data. By dissecting the sub-components of a simple LSTM model, the effectiveness of the LSTM gates and nonlinear activation functions is scrutinized.

Biography

Mr Jicheng Li is currently a second-year Ph.D. student in the School of Data Science, City University of Hong Kong. He received his Master's degree in Data Science from the City University of Hong Kong in 2021, following a Bachelor's degree in Industrial Engineering from Ningbo University in 2020. His research interests include machine learning, industrial process modeling and monitoring.

The CSIE Postdoc Associates and Students Seminar series aims to invite and encourage young researchers in system theory, data science, and other related fields to deliver seminars on their research.

Enquiry: hkids@cityu.edu.hk