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Title: The Framework of Learning in the Model space and its applications

Abstract:

Traditional machine learning for temporal data, such as time series, relies on the representation of data space. With the recent big data era, "learning in the model space" has been proposed to provide more robust and compact representation than the data space and to provide the potential more explanation of the approach. The core idea of "learning in the model space" is to use dynamic models fitted on parts of the data as more stable and parsimonious representations of the data. Learning is then performed directly in the model space instead of the original data space.

By transferring the data space into model space, the complete data set is represented by a relatively small numbers of models. The dynamic model space is a functional space with these local models as points in that space. The novel theory and algorithm in the model space can improve the generalization ability of machine learning algorithms. In addition, the learning in the model space could open the "black box" of machine learning algorithms and brings more explanations to both the data and learning models.

In this talk we will present a unified view of dynamic systems as non-autonomous input-driven systems. In addition, we will focus on the three core questions in the model space for temporal data, including the generation of model space, the measure metric of the model space and the learning algorithms in the dynamic model space. The talk introduces the theory and algorithms on generation of model space and the presentation ability and classification ability in the model space, the metric based on functional analysis in the model space, and the online learning algorithm in the model space. In this talk, we will also demonstrate how to use dynamic systems to represent nonlinear multi-input multi-output (MIMO) system.

Bio:

Huanhuan Chen received the BSc degree from the University of Science and Technology of China (USTC), Hefei, China, in 2004, and the PhD degree in computer science from the University of Birmingham, Birmingham, United Kingdom, in 2008. He is currently a full professor in the School of Computer Science and Technology, USTC. His research interests include neural networks, Bayesian inference, and evolutionary computation. He received the 2015 International Neural Network Society Young Investigator Award, the 2012 IEEE Computational Intelligence Society Outstanding PhD Dissertation Award, the 2009 IEEE Transactions on Neural Networks Outstanding Paper Award (bestowed in 2012), and the 2009 British Computer Society Distinguished Dissertations Award. He is an associate editor of the IEEE Transactions on Neural Networks and Learning Systems, and the IEEE Transactions on Emerging Topics in Computational Intelligence. He is a senior member of the IEEE.