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Scalable distributed control and learning of networked dynamical systems.

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Abstract

As Recent radical evolution in distributed sensing, computation, communication, and actuation has fostered the emergence of cyber-physical network systems. Regardless of the specific application, one central goal is to shape the network's collective behavior through the design of admissible local decision-making algorithms. This is nontrivial due to various challenges such as local connectivity, system complexity and uncertainty, limited information structure, and the complex intertwined physics and human interactions. In this talk, I will present our recent progress in formally advancing the systematic design of distributed coordination in network systems via harnessing special properties of the underlying problems and systems. In particular, we will present three examples and discuss three types of properties, i) how to exploit network structure to ensure the performance of the local controllers; ii) how to use the information and communication to develop distributed learning rules; iii) how to use domain-specific properties to further improve the efficiency of the distributed control and learning algorithms. We will also discuss challenges and issues arising from these solutions.

Bio

Na Li is a Winokur Family Professor of Electrical Engineering and Applied Mathematics at Harvard University. She received her Bachelor's degree in Mathematics from Zhejiang University in 2007 and Ph.D. degree in Control and Dynamical systems from California Institute of Technology in 2013. She was a postdoctoral associate at the Massachusetts Institute of Technology 2013-2014. She has held a variety of short-term visiting appointments including the Simons Institute for the Theory of Computing, MIT, and Google Brain. Her research lies in the control, learning, and optimization of networked systems, including theory development, algorithm design, and applications to real-world cyber-physical societal system. She has been an associate editor for IEEE Transactions on Automatic Control, Systems & Control Letters, IEEE Control Systems Letters.