学术报告通知

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Abstract:
The goal of the privacy-preserving average consensus (PPAC) is to guarantee the privacy of initial state and asymptotic consensus on the exact average of the initial value. This goal is achieved by an existing PPAC algorithm by adding and subtracting variance decaying and zero-sum random noises to the consensus process. However, there is lack of theoretical analysis to quantify the degree of the privacy protection. In this work, we analyze the privacy of the PPAC algorithm in the sense of the maximum disclosure probability that the other nodes can infer one node' s initial state within a given small interval. We first propose a new privacy definition, named (ϵ,σ)-privacy, to depict the maximum disclosure probability. Then, we prove that PPAC is an (ϵ,σ)-privacy algorithm, and obtain the closed-form expression of the relationship between ϵ and σ. We also prove that the added noises with uniform distribution is optimal for the PPAC algorithm to achieve the highest (ϵ,σ)-privacy. Finally, we prove that the disclosure probability will converge to one when all information used in consensus process is available, i.e., the privacy is compromised. Simulations are conducted to verify the results.

Bio:
Jianping He (M' 15) received the Ph.D. degree in control science and engineering from Zhejiang University, Hangzhou, China, in 2013. He is currently an Associate Research Fellow with the Department of Electrical and Computer Engineering, University of Victoria, Victoria, BC, Canada. His current research interests include the control and optimization of cyber-physical systems, the scheduling and optimization in VANETs and social networks, and the investment decision in financial market and electricity market. Dr. He serves as an Associate Editor for the KSII Transactions on Internet and Information Systems. He is also a Guest Editor of the International Journal of Robust and Nonlinear Control, Neurocomputing, and the International Journal of Distributed Senor Networks. He is the winner of Outstanding Thesis Award, Chinese Association of Automation, 2015.