

Department of Biomedical Engineering

Seminar Series

Feedback-Feedforward Control Approach to Distributed Optimization

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Date:	November 30, 2018 (Friday)
Time:	3:00pm - 4:00pm
Venue:	B6619 BME/MNE/SEEM Conference Room, Yeung Kin Man Academic Building

Abstract

This talk is focused on distributed optimization problems in which a number of agents are to seek the global optimum of a sum of cost functions through only local information sharing. The problem has attracted a lot of interests in recent years due to its wide applications. In this talk, by treating the Laplacian operator under a weight-balanced and strongly connected network as a pseudo projector, we tackle the distributed optimization problem from a feedback-feedforward control viewpoint. The proposed control framework allows us to design

distributed optimization algorithms and analyze their convergence using existing control techniques, which simplifies greatly the algorithm analysis. The pointwise convergence of the proposed algorithms to a common optimum for L-smooth costs is established. We also analyze and compare the convergence rate of proportional-integral (PI) and proportional-feedforward (PF) controllers for a class of quadratic costs, and demonstrate that the PF controller achieves faster convergence with a proper choice of control gains.

Biography

Lihua Xie received the B.E. and M.E. degrees in electrical engineering from Nanjing University of Science and Technology in 1983 and 1986, respectively, and the Ph.D. degree in electrical engineering from the University of Newcastle, Australia, in 1992. He was with the Department of Automatic Control, Nanjing University of Science and Technology from 1986 to 1989. Since 1992, he has been with the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, where he is currently a professor and the Director, Delta-NTU Corporate Lab for Cyber-Physical Systems. He served as the Head of Division of Control and Instrumentation from July 2011 to June 2014.

His current research interests include networked control, multi-agent systems, sensor networks, compressive sensing, localization, and unmanned systems. He is currently an Editor-in-Chief of Unmanned Systems and Associate Editor, IEEE Transactions on Network Control Systems. He has served as Editor for IET Book Series in Control and Associate Editor for Automatica, IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, IEEE Transactions on Circuit and Systems-II, etc. Dr Xie is Fellow of IEEE, Fellow of IFAC, and an elected member of the Board of Governors of IEEE Control System Society (2016-2018).

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All are Welcome!

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