

From Distributed Optimization to In-Network Data Processing in Wireless Ad-Hoc and Sensor Networks

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Abstract:

In this talk, the speaker will begin with a brief overview of distributed optimization theory, including convex optimization problems for which distributed, iterative solution techniques exist and converge. As for wireless ad-hoc and sensor networks, it is well known that each link capacity in these networks depends on the transmission power of other links. In addition, the quality of multimedia services supported by these networks cannot be represented by a concave function of the amount of allocated bandwidth. These factors unfortunately make the resource allocation problem for the wireless networks become a non-convex optimization problem. New distributed solution techniques will be presented to solve these problems and numerical examples will also be provided.

As the second part of this talk, the speaker considers the in-network data processing in wireless sensor networks where data are aggregated (fused) along the way they are transferred toward the end user. It will be shown that finding the optimal solution for the distributed processing problem is NP-hard, but for specific parameter settings, the problem can lead to a distributed framework for the global optimal solution. Future work on integrating data or signal processing techniques with the distributed solution framework will be discussed.

Bio



Kin K. Leung received his B.S. degree from the Chinese University of Hong Kong in 1980, and his M.S. and Ph.D. degrees from University of California, Los Angeles, in 1982 and 1985, respectively. He joined AT&T Bell Labs in New Jersey in 1986 and worked at its successor companies, AT&T Labs and Bell Labs of Lucent Technologies, until 2004. Since then, he has been the Tanaka Chair Professor in the Electrical and Electronic Engineering (EEE), and Computing Departments at Imperial College in London. He serves as the Head of Communications and Signal Processing Group

in the EEE Department at Imperial. His research focuses on networking, protocols, optimization and modeling issues of wireless broadband, sensor and ad-hoc networks. He also works on multi-antenna systems and cross-layer optimization of these networks.

He received the Distinguished Member of Technical Staff Award from AT&T Bell Labs in 1994, and was a co-recipient of the 1997 Lanchester Prize Honorable Mention Award. **He was elected as an IEEE Fellow in 2001.** He received the Royal Society Wolfson Research Merits Award from 2004 to 2009 and **became a member of Academia Europaea in 2012**. He has published 260+ papers and received 45+ U.S. patents. Along with his co-authors, he also received a number of best paper awards at major conferences, including the IEEE PIMRC 2012 and ICDCS 2013. He serves as a member (2009-11) and the chairman (2012-15) of the IEEE Fellow Evaluation Committee for Communications Society. He was a guest editor for the IEEE JSAC, IEEE Wireless Communications and the MONET journal, and as an editor for the JSAC: Wireless Series, IEEE Transactions on Wireless Communications and IEEE Transactions on Communications. Currently, he is an editor for the ACM Computing Survey and International Journal on Sensor Networks.