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Speaker: Dr. Ali H. Sayed
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Topic: Adaptive Networks



Abstract

Distributed networks linking sensors and actuators will form the backbone of future data communication and control networks. Applications will range from sensor networks to precision agriculture, environment monitoring, disaster relief management, smart spaces, target localization, as well as medical applications. In all these cases, the distribution of the nodes in the field yields spatial diversity, which should be exploited alongside the temporal dimension in order to enhance the robustness of the processing tasks and improve the probability of signal and event detection. Distributed processing techniques allow for the efficient extraction of temporal and spatial information from data collected at such distributed nodes by relying on local cooperation and data processing.

This talk describes recent developments in distributed processing over adaptive networks. The presentation covers adaptive algorithms that allow neighboring nodes to communicate with each other. At each node, estimates exchanged with neighboring nodes are fused and promptly fed into the local adaptation rules. In this way, an adaptive network is obtained where the structure as a whole is able to respond in real-time to the temporal and spatial variations in the statistical profile of the data. Different adaptation or learning rules at the nodes, allied with different cooperation protocols, give rise to adaptive networks of various complexities and potential. The ideas are illustrated by considering algorithms of the least-mean-squares type, although more general adaptation rules are also possible including least-squares rules and Kalman-type rules. Both incremental and diffusion collaboration strategies are considered.

Biography

Ali H. Sayed is Professor and Chairman of Electrical Engineering at UCLA where he directs the Adaptive Systems Laboratory (www.ee.ucla.edu/asl). He has published widely in the areas of adaptive filtering, estimation theory, and signal processing for communications with over 300 articles and 5 books. He is the author of the textbooks *Fundamentals of Adaptive Filtering* (Wiley, NJ, 2003), and *Adaptive Filters* (Wiley, NJ, 2008). He is a Fellow of IEEE and has served as Editor-in-Chief of the *IEEE Transactions on Signal Processing* (2003-2005) and the *EURASIP J. Advances in Signal Processing* (2006-2007). His research has received several recognitions including the 1996 IEEE D. G. Fink Prize, a 2002 Best Paper Award from the IEEE Signal Processing Society, the 2003 Kuwait Prize, the 2005 Terman Award, a 2005 Young

Author Best Paper Award from the IEEE Signal Processing Society, and two Best Student Paper Awards at international meetings (1999,2001). He served as a Distinguished Lecturer of the IEEE Signal Processing Society during 2005. He has been a member of the Publications (2003-2005), Awards (2005), and Conference (2007-present) Boards of the IEEE Signal Processing Society. He served as General Chairman of ICASSP 2008, a member of the Board of Governors (2007-2008) of the IEEE Signal Processing Society, and is now serving as Vice-President (Publications) of the same society.