Power Systems Engineering Research Center

Integration of Large Data Sets for Improved Decision-Making in Bulk Power Systems: Two Case Studies

Le Xie
Department Electrical and Computer Engineering
Texas A&M University
Le.xie@tamu.edu

PSERC Public Webinar
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2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)

Description: The electricity grid is transforming itself from a hierarchical, passive, and sparsely-sensed engineering system towards a flat, active, and ubiquitously-sensed cyber-physical system. The emerging data from synchrophasors, renewables, and smart meters offers opportunities as well as scientific challenges to dynamically learn and adaptively control the grid. This talk offers two case studies that leverage the *spatio-temporal* correlations of the streaming data to improve the decision-making in bulk power systems.

The first case study uses local and neighboring renewable generation data to improve the renewable forecast in the near term (i.e., hours-ahead). Compared with conventional temporal-only statistical forecast models, spatio-temporal models allow the system operator to have more accurate near-term forecasts of wind and photovoltaic generation, which, in turn, reduce the cost of real-time economic dispatch. The second case study presents the spatio-temporal analytics of synchrophasor data. High-dimensional synchrophasor data could be reduced to a much lower-dimensional subspace. The change of the subspace is leveraged for early detection of anomalies such as inter-area oscillations. This talk concludes with several open research questions on data analytics that would benefit from industry-academia collaboration.

Biography: Le Xie is an Associate Professor in the Department of Electrical and Computer Engineering at Texas A&M University. He received B.E. in Electrical Engineering from Tsinghua University in 2004, S.M. in Engineering Sciences from Harvard in 2005, and Ph.D. in Electrical and Computer Engineering from Carnegie Mellon in 2009. His industry experience includes internships at ISO-New England and Edison Mission Energy Marketing and Trading. His research interest includes modeling and control of large-scale systems, grid integration of clean energy resources, and electricity markets.

Dr. Xie received the U.S. National Science Foundation *CAREER Award*, and the Oak Ridge Ralph E. Powe Junior Faculty Enhancement Award. He is an Editor of *IEEE Transactions on Smart Grid*, and the founding chair of IEEE Power and Energy Society Subcommittee "Big Data & Analytics for Power Systems". His students and he received the Best Paper awards at North American Power Symposium and IEEE SmartGridComm 2012.

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PSERC's Webinar Coordinator: Tom Overbye, University of Illinois at Urbana-Champaign, overbye@illinois.edu

Professor Overbye welcomes your feedback on PSERC webinars and suggestions for future ones.