IEEE PES Subcommittee on Big Data & Analytics for Power Systems
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IEEE BDA Tutorial Series: Big Data & Analytics for Power Systems

Spatio-Temporal Learning for Enhanced Situational Awareness of the Power Grid

Prof. Hao Zhu
The University of Texas at Austin

10:00 am-11:30 am, Wednesday, Nov. 18, 2020, Pacific Time
(7:00 pm - 8:30 pm, Wednesday, Nov. 18, 2020, Central European Time)
(2:00 am – 3:30 am, Thursday, Nov. 19, 2020, China Standard Time)

Abstract: The electricity delivery systems are witnessing pressing needs to transform the operational paradigms to embrace new grid architecture and energy resources. At the bulk interconnection scale, the decreasing level of inertia makes it increasingly important to analyze the grid's dynamic responses. At the local distribution level, the integration of highly variable distributed energy resources (DERs) further reduces the level of observability of residential loads. To address these challenges, this talk will present spatio-temporal learning approaches that harness the high-rate, high-accuracy synchrophasor data available for monitoring both transmission and distribution grids. First, a statistical analysis approach is developed based on cross-correlation to study the propagation of oscillations in wide-area interconnections. Second, a subspace learning approach is introduced to reveal the characteristics of DERs such as rooftop solar and electrical vehicles connected to distribution feeder. These learning approaches can enhance the situational awareness of the physical assets for improving the security and resilience of power grid infrastructure.

Bio: Hao Zhu is currently an Assistant Professor of Electrical and Computer Engineering (ECE) at The University of Texas at Austin. She received the B.S. degree from Tsinghua University in 2006, and the M.Sc. and Ph.D. degrees from the University of Minnesota in 2009 and 2012, all in electrical engineering. From 2012 to 2017, she was a Postdoctoral Research Associate and then an Assistant Professor of ECE at the University of Illinois at Urbana-Champaign. Her research focus is on developing innovative algorithmic solutions for problems related to learning and optimization for future energy systems. Her current interests include physics-aware and risk-aware machine learning for power systems, and the design of energy management system that accounts for the cyber-physical coupling. She is a recipient of the NSF CAREER Award and the Siebel Energy Institute Seed Grant Award. She is also the faculty advisor for three Best Student Papers awarded at the North American Power Symposium. She is currently a member of the IEEE Power & Energy Society (PES) Long Range Planning (LRP) Committee.

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