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

Data-Driven Calibration of Electric Power Distribution System Models

Dr. Matthew Reno and Mr. Logan Blakely Sandia National Laboratories



11:00 am-12:30 pm, Wednesday, Sep. 30, 2020, Pacific Time (8:00 pm - 9:30 pm, Wednesday, Sep. 30, 2020, Central European Summer Time) (2:00 am - 3:30 am, Thursday, Oct. 1, 2020, China Standard Time)

Abstract: Grid-edge sensing devices, including advanced metering infrastructure (AMI) devices, have enabled the development of a myriad of novel algorithms focused on calibrating distribution system models. Distribution system analysis tools are often severely limited in their effectiveness by the accuracy of the model details and parameters of the grid. This presentation will focus on using grid measurements and Big Data to provide more accurate feeder model phasing information, parameter estimation, better spatial and temporal load models, and to detect the presence of distributed energy resources (DER). Synthetic data is used to rigorously test algorithms under known conditions, and utility data is used to test the algorithms on actual U.S. utility distribution system models with field measurement data from SCADA, AMI, and other sources. We will also discuss strategies for managing issues found in utility data, such as missing data and measurement noise, as well as incorporating physical or domain knowledge into algorithms and algorithm development.

Bio: Matthew Reno is a Principal Member of Technical Staff in the Electric Power Systems Research Department at Sandia National Laboratories. His research focuses on distribution system modeling and analysis with Big Data and high penetrations of PV. Matthew leads several projects that are applying cutting edge machine learning algorithms to power system problems. He received his Ph.D. in electrical engineering from Georgia Institute of Technology.

Logan Blakely is a Member of Technical Staff in the Electric Power Research Department at Sandia National Laboratories. His research focus is in machine learning applied to power systems challenges, particularly in the intersection of merging physics domain knowledge with machine learning techniques. This research area combines advances in machine learning and data analytics, the recent available of large quantities of new types of data, along with the reliability and interpretability of physics-based approaches.

Link: https://asu.zoom.us/j/5513218843