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Leveraging Machine Learning for Boosting Performance of Power Systems Optimization Problems

Abstract: With the growing scale and complexity of modern power grids, available data could provide useful information and insights into the underlying power grid, and machine learning methods could be valuable to help understand and reveal the relationship of system parameters and optimal operations, finally addressing optimal operation problems in a more efficient and accurate way. In this talk, we will discuss three examples to marriage the data-driven and machine learning methods to power systems optimization problems for improving the computational performance, including: (i) a data-driven approach by leveraging historically solved unit commitment (UC) instances to promptly solve new UC problems; (ii) a closed-loop predict-and-optimize framework for deriving better forecasts that could lead to an enhanced UC solution quality; and (iii) an adaptive dynamic programming-based approach for conducting effective optimal schedules of energy-limited resources within a limited time horizon while considering their potential future values.

Biography: Lei Wu is a professor at Stevens Institute of Technology, and before that was a professor at Clarkson University. His current research involves optimization and statistical analysis applied to power system operations and electricity markets, the public policy and technical issues associated with electricity transmission and distribution under market restructuring, the economic implications of the integration of renewables, and the co-optimization of critical interdependent infrastructures. He is the recipient of the NSF CAREER Award in 2013, the IBM Smarter Planet Faculty Innovation Award in 2011, and the 2020 Jess H. Davis Memorial Award for Research Excellence at Stevens. He has a demonstrated track record in completing research and development projects funded by agencies such as the DOE and NSF, including funds from DOE, NSF, NYSERDA on the design and development of community microgrids and distributed renewable resource integration, and on the operational flexibility of hydro resources. He is a Fellow of IEEE.