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

Unsupervised Anomaly Detection for Identifying Arcing Hazards on Power Distribution Systems

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Abstract: Wildfires caused by electric equipment have become major concern for utilities in vulnerable regions. Part of the challenge in preventing such events is a lack of effective ways for monitoring equipment condition. It has been found that even routine inspections of equipment are not sufficient to detect potential issues. In the meantime, high-resolution, high-fidelity sensor measurements can be used to detect unique signatures of equipment malfunction and anomalies such as arcing faults that can potentially cause outages and wildfires. This talk will discuss identifying anomalies in synchrophasor measurements by unsupervised learning. The identified anomalies are further classified into different clusters based on the similarity between them. With clustering and inspection of the events, normal operation signatures such as capacitor bank switching were identified as well as faults that cause protective device actions or potential arcing events. We will also discuss the use of point-on-wave measurements for further identifying arcing faults.

Bio: Dr. Jhi-Young Joo is Distribution Automation Lead Engineer at Lawrence Livermore National Laboratory. Her research is focused on data analytics for distribution system operation and planning, and optimization and control of distributed energy resources. Before joining LLNL in 2018, she worked as a research scientist at Lawrence Berkeley National Laboratory, and as a tenure-track faculty member at Missouri University of Science and Technology. In her current and prior positions, she has led various research projects in the area of power systems engineering, sponsored by DOE, CEC, NASA, among others. She received her Ph.D. from Carnegie Mellon University, and M.S. and B.S. from Seoul National University, all in Electrical and Computer Engineering.

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