TEXAS A&M UNIVERSITY
Department of Electrical & Computer Engineering

TRANSFORMING ENGINEERING EDUCATION

ENERGY & POWER SEMINAR

Line-Post Insulator Fault Classification Model Using Deep Convolutional GAN-based Synthetic Images

Abstract

Due to thermal, electrical, mechanical, and chemical stresses, line-post insulators in the power system may degrade over time. The degradation process continuously gets exacerbated by the above-mentioned factors. Therefore, condition monitoring of line insulators must be frequently carried out. Optical cameras are considered the most accurate among existing technologies for detecting such defects. Computer vision techniques aided by optical cameras could automate faulty insulator identification. However, there is a limited size of the training data set obtained from real-world optical camera images. In this paper, we propose a generative approach to creating a massive amount of line-post insulator fault images through Deep Convolutional Generative Adversarial Networks (DCGAN). The additional training data obtained from DCGAN-based approach is shown to improve the accuracy of the insulator fault classification. In the case study, we show that with an increasing number of synthetic images created by DCGAN, the accuracy of the fault classification continuously improves. The ability to classify true faulty insulators has increased from 56\% to 94\%. The performance of the DCGAN-based approach is also compared with the random oversampling approach. The numerical results suggest that the DCGAN-based approach has the advantage of detection accuracy and a lower false positive rate.

Dongjoo Kim
PhD Student
Department of Electrical & Computer Engineering
Texas A&M University

Friday, October 6
11:30 am - 12:20 pm
244 ZACH

Biography

I received the B.S. and M.S. degrees in electrical engineering from Korea University, Seoul, Korea, in 2013 and 2015, respectively. I have been working as a Senior Research with the Smart Power Distribution Laboratory, Korea Power Electric Corporation (KEPCO) Research Institute, Daejeon, Korea, since 2016, and started my PhD degree in electrical engineering with the Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, USA, from this fall semester. My research interests include energy economics, energy policies, energy data analysis, and renewable energy resources.

FACULTY CONTACT:
Adam Birchfield
abirchfield@tamu.edu