Fault Classification in PV Arrays using Machine Learning

Sunil Rao, Cihan Tepedelenlioglu, Devarajan Srinivasan*, and Andreas Spanias,
School of ECEE, SenSIP Center and Industry Consortium, Arizona State University;
*Poundra, Tempe, USA.

OVERVIEW

Overview of our research vision in Solar Panel Monitoring.

SMART MONITORING DEVICE

Smart Monitoring Device (SMD). An app to visualize data.

- Each SMD communicates wirelessly and provides analytics to an access point located at one of the PV panels.
- This access point in turn communicates with a central gateway which connects to the ASU Network.
- The app has a graphical user interface.

SIMULINK MODEL

Simulation model used for Data generation.

- Simulink Model used for data generation.
- 4 configurations simulated using Simulink.
- Data obtained used for training and testing.

MACHINE LEARNING RESULTS

- Use of Clustering algorithms to identify faults in PV arrays.
- K-means and GMM used for clustering.

NEURAL NETWORK RESULTS

- Use neural nets to identify faults.
- Fully connected neural network used.

DROPOUT NEURAL NETWORKS

- Real dataset from PV Watts.
- Dropout Neural Networks with different probabilities used.
- Concrete Dropout architecture used to prevent overfitting.
- Monte Carlo simulation and K-fold cross validation performed.

REFERENCES


ACKNOWLEDGEMENTS

This work is supported in part by the NSF CPS award 1646542, Poundra LLC.