Overview of our research vision in Solar Panel Monitoring.

Solar Monitoring Facility at the ASU Research Park.
- Structure consists of 104 PV panels.
- Each with a smart monitoring device, installed atop an elevated steel frame.
- Each SMD can measure current, voltage, irradiance, and temperature of the associated panel.

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.

OVERVIEW

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.

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.

DROPOT 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.

TABLE 1: Comparison of various classifiers used for fault classification in PV Arrays.

REFERENCES

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