*NSF IRES SenSIP*

# IRES Project: Feature Study for PV Fault Detection Using Nonlinear Principal Component Analysis

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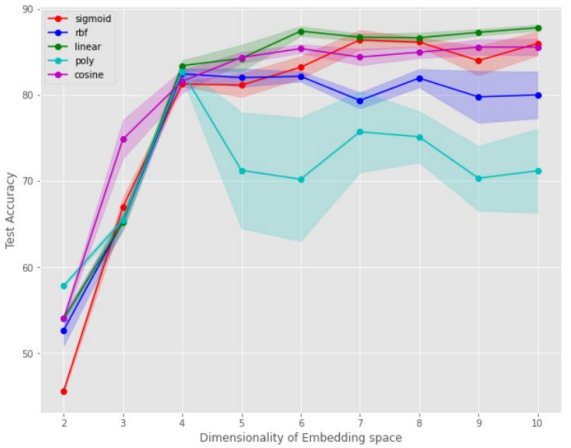
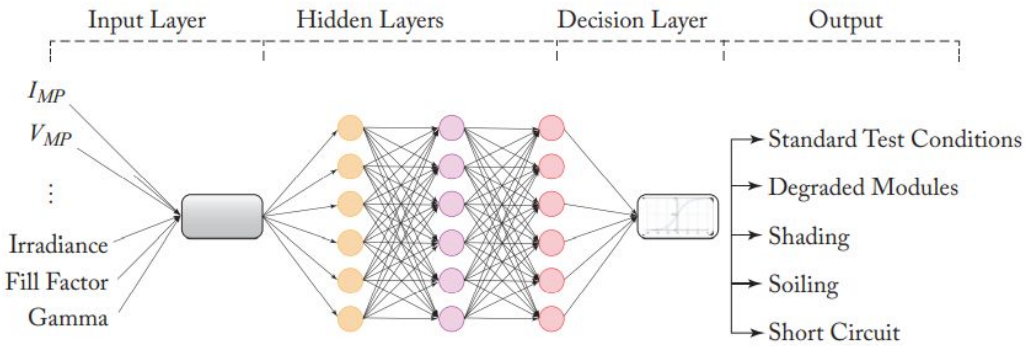
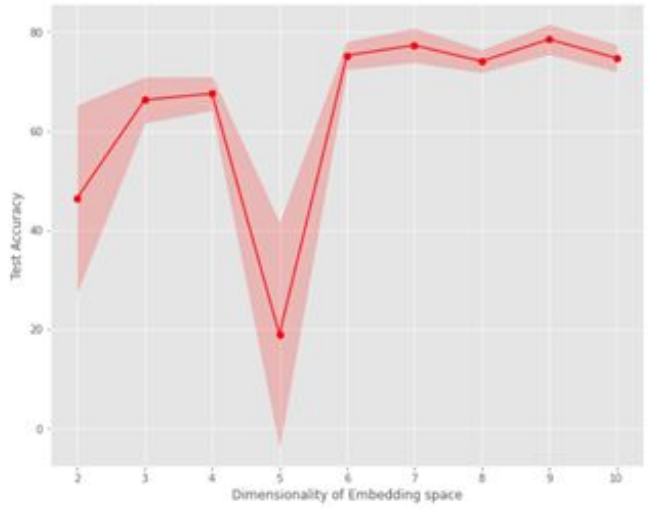
- ❑ Current PV fault detection NN's require 10 features to achieve high accuracy
- ❑ We don't know which of the 10 PV features contain most of our information
- ❑ Number of features can be reduced by nonlinear principal component analysis
- ❑ Kernel Principal Component Analysis and Autoencoders are viable methods
- ❑ Vary the number of input features and compare classification accuracy
- ❑ With KPCA the network achieves >80% accuracy with 4 components
- ❑ A linear kernel function was the most accurate
- ❑ The Autoencoder feature set achieved ~80% accuracy

ASU Solar Array with Smart Monitoring Devices

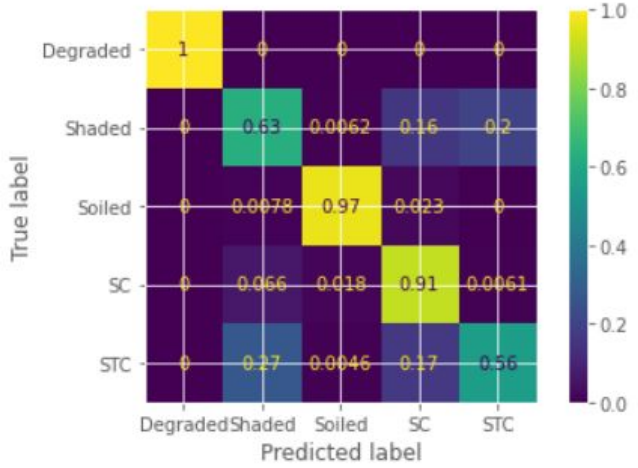



Average KPCA Network Accuracy Vs. Dimension of Embedded Space




Average Autoencoder Network Accuracy Vs. Dimension of Embedded Space




Confusion Matrix for 5 Feature Linear KPCA Neural Network

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https://sensip.engineering.asu.edu/nsf-ires-project/

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