

# Feature Analysis for PV Fault Detection Neural Network

NSF IRES  
Research Project

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## ABSTRACT

- Using unsupervised neural network with 10 data features to classify solar array faults
  - soiled, shaded, degraded, short circuit
- Using Linear PCA and random forest to reduce redundant data. [1]

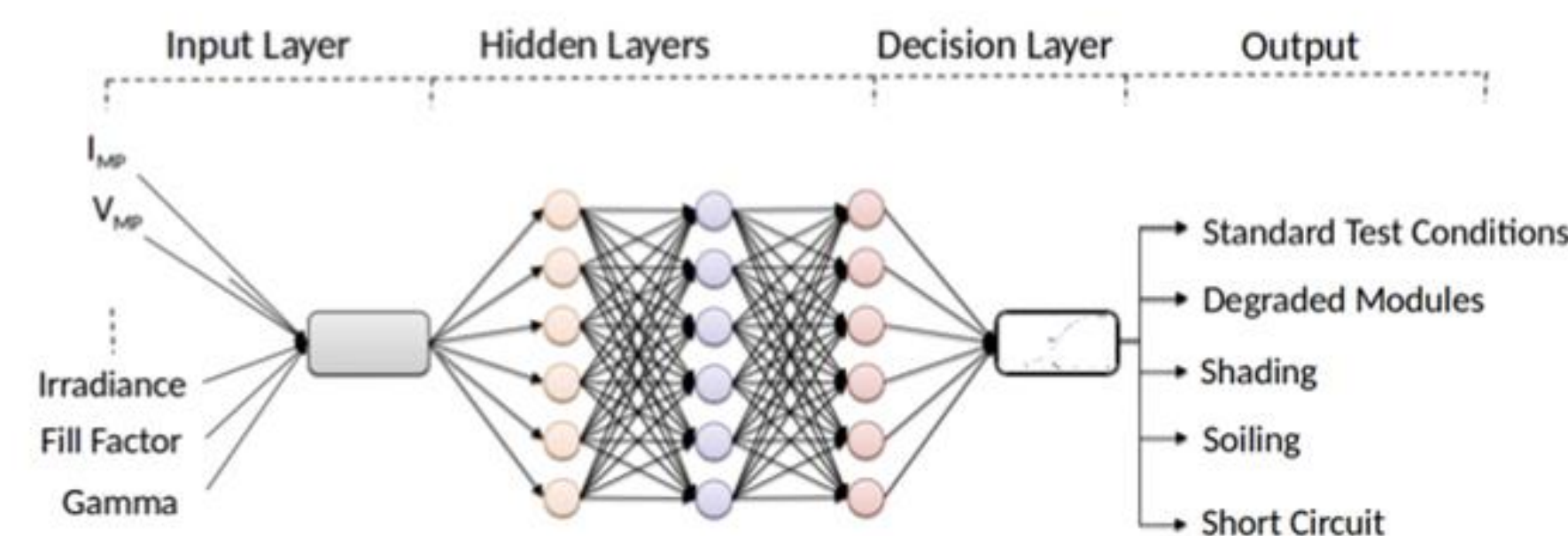
## MOTIVATION

Solar farms benefit from cost efficient sensor monitoring systems with the capacity to detect array faults and anomalies.



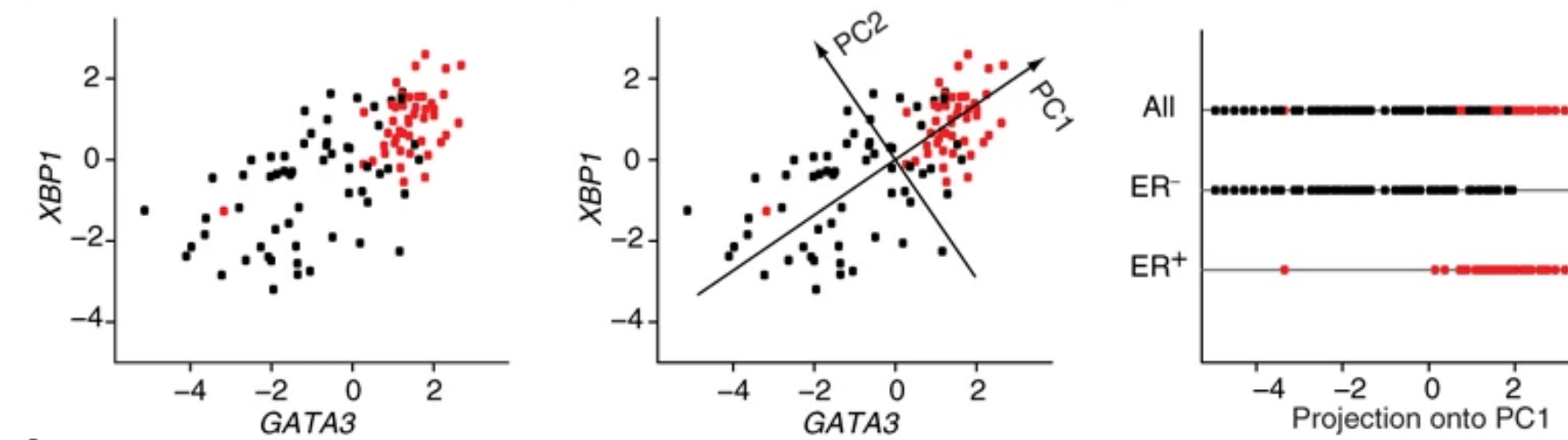
## PROBLEM STATEMENT

- Identify which input features provide the most information about solar array faults.

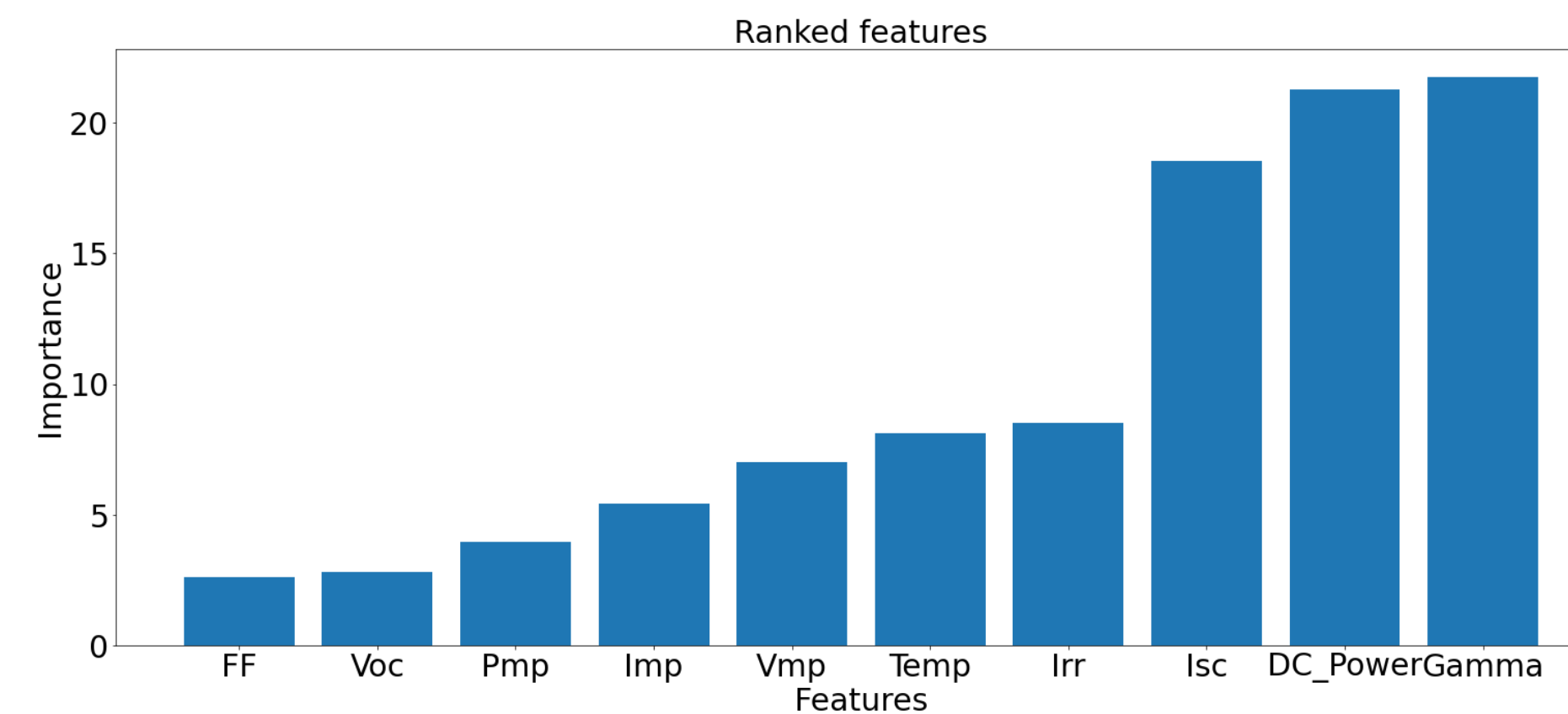
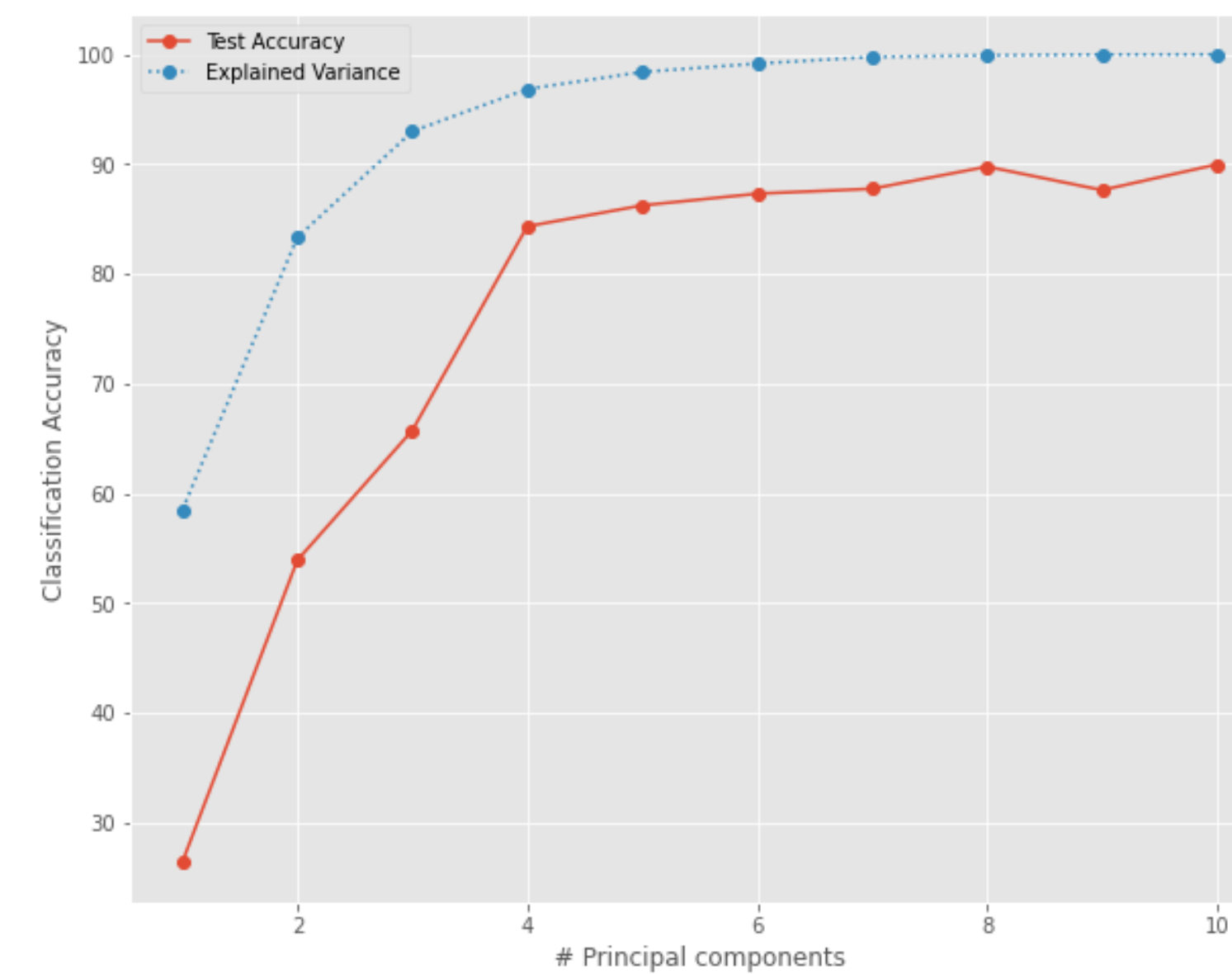


## EXPERIMENTAL METHODS: SENSORS

- Reducing data features with Principal component analysis and random forest techniques.

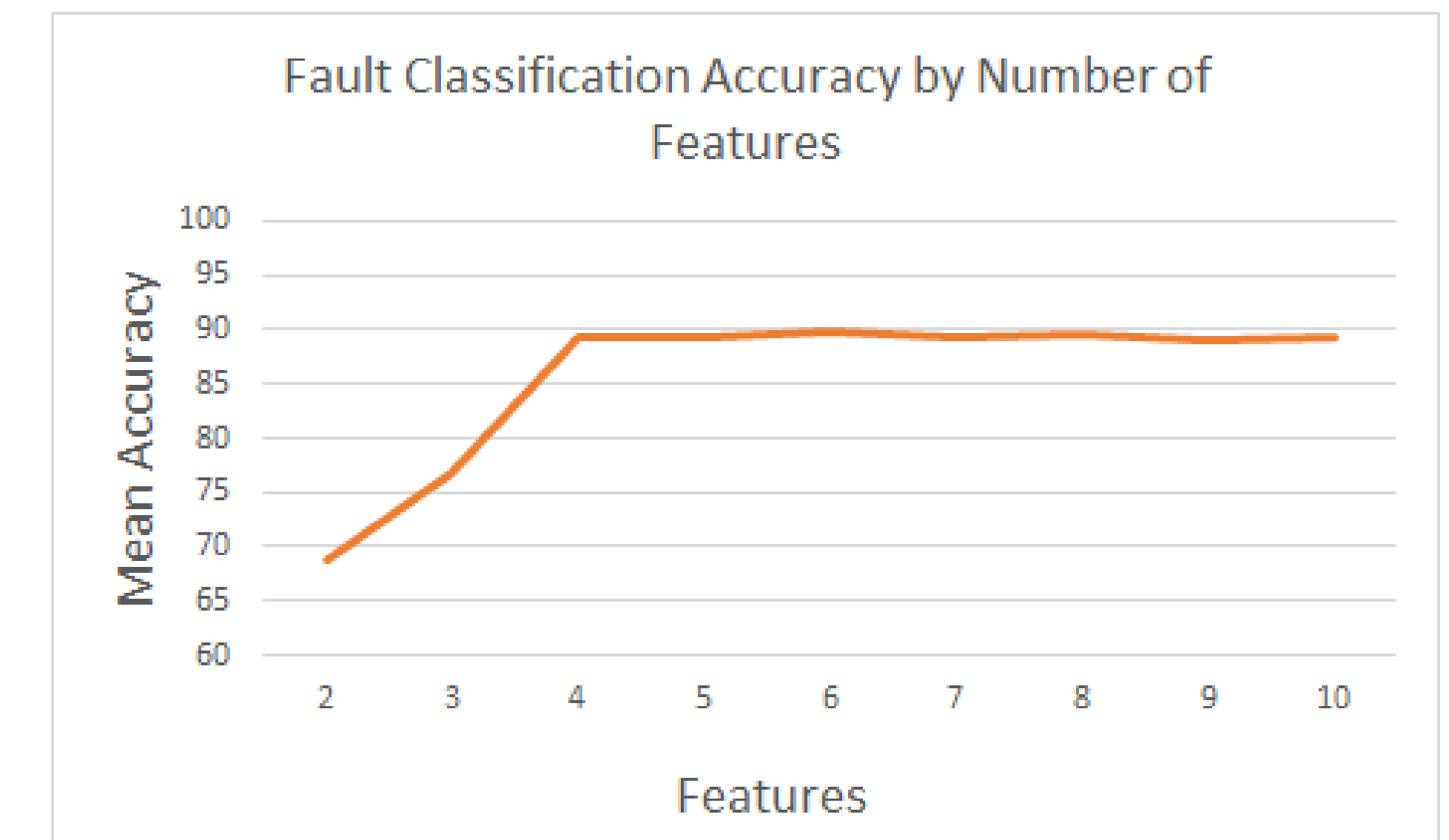


Shown above, example PCA of a gene expression data set. [2]



## PRELIMINARY RESULTS

- The first 4 features: gamma, DC power, isc and temp are most important, as the neural network was able to reach peak classification accuracy with them.



## REFERENCES

- [1] S. Rao, S. Katoch, V. Narayanaswamy, G. Muniraju, C. Tepedelenlioglu, A. Spanias, P. Turaga, R. Ayyanar, and D. Srinivasan, "Machine learning for solar array monitoring, optimization, and control," *Synthesis Lectures on Power Electronics*, vol. 7, no. 1, pp. 1–91, 2020.
- [2] M. Ringner, "What is principal component analysis?" *Nature biotechnology*, vol. 26, no. 3, pp. 303–304, 2008.

## ACKNOWLEDGEMENT

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