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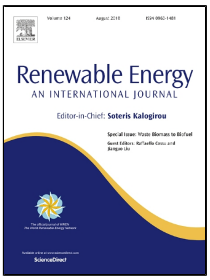

Multiclass adaptive neuro-fuzzy classifier and feature selection techniques for photovoltaic array fault detection and classification

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ACCEPTED MANUSCRIPT

Multiclass adaptive neuro-fuzzy classifier and feature selection techniques for photovoltaic array fault detection and classification

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Abstract

In this paper, a Multiclass Adaptive Neuro-Fuzzy Classifier (MC-NFC) for fault detection and classification in photovoltaic (PV) array has been developed. Firstly, to show the generalization capability in the automatic faults classification of a PV array (PVA), Fuzzy Logic (FL) classifiers have been built based on experimental datasets. Subsequently, a novel classification system based on Adaptive Neuro-fuzzy Inference System (ANFIS) has been proposed to improve the generalization performance of the FL classifiers. The experiments have been conducted on the basis of collected data from a PVA to classify five kinds of faults. Results showed the advantages of using the fuzzy approach with reduced features over using the entire original chosen features. Then, the designed MC-NFC has been compared with an Artificial Neural Networks (ANN) classifier. Results demonstrated the superiority of the MC-NFC over the ANN-classifier and suggest that further improvements in terms of classification accuracy can be achieved by the proposed classification algorithm; furthermore faults can be also considered for discrimination.

Keywords:

Photovoltaic arrays; fault detection and classification; multiclass neuro-fuzzy classifier; features reduction techniques.

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