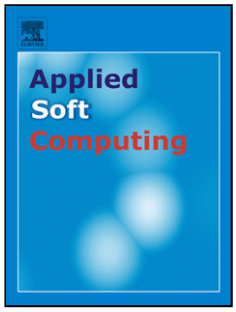

Title: MULTINODAL LOAD FORECASTING FOR DISTRIBUTION SYSTEMS USING A FUZZY-ARTMAP NEURAL NETWORK

Authors: Thays Abreu, Aline J. Amorim, Carlos R. Santos Junior, Anna D.P. Lotufo, Carlos R. Minussi

PII: S1568-4946(18)30373-9
DOI: https://doi.org/10.1016/j.asoc.2018.06.039
Reference: ASOC 4955

To appear in: *Applied Soft Computing*

Received date: 22-12-2017
Revised date: 16-5-2018
Accepted date: 25-6-2018

Please cite this article as: Abreu T, Amorim AJ, Santos CR, Lotufo ADP, Minussi CR, MULTINODAL LOAD FORECASTING FOR DISTRIBUTION SYSTEMS USING A FUZZY-ARTMAP NEURAL NETWORK, *Applied Soft Computing Journal* (2018), https://doi.org/10.1016/j.asoc.2018.06.039

MULTINODAL LOAD FORECASTING FOR DISTRIBUTION SYSTEMS USING A FUZZY-ARTMAP NEURAL NETWORK

Thays Abreu, Aline J. Amorim, Carlos R. Santos Junior, Anna D. P. Lotufo, Carlos R. Minussi

Electrical Engineering Department, UNESP - São Paulo State University

Av. Brasil 56–PO Box 31 - CEP: 15385-000 Ilha Solteira (SP), Brazil

* Corresponding author: Tel.: (+55) 1837431222; Fax: (+55) 1837431163.

E-mail address: thays7abreu@gmail.com

Highlights

- A predictor system (multinodal forecasting) is proposed considering several points of the electrical network, such as substations, transformers, and feeders.
- The processing time is equivalent to the processing required for global forecasting (i.e., the additional processing time is quite low).
- The proposed method is developed based on the use of the fuzzy-ARTMAP neural network and the global load participation factor concept.
- The convergence is significantly faster than backpropagation neural networks (improved benchmark in precision).

ABSTRACT

This work proposes a predictor system (multinodal forecasting) considering several points of an electrical network, such as substations, transformers, and feeders, based on an adaptive resonance theory (ART) neural network family. It is a problem similar to global forecasting, with the main difference being the strategy to align the input and output of the data with several parallel neural modules. Considering that multinodal prediction is more complex compared to global prediction, the multinodal prediction will use a fuzzy-ARTMAP neural network and a global load participation factor. The advantages of this approach are as follows: (1) the processing time is equivalent to the processing required for global forecasting (i.e., the additional time processing is quite low); and (2) Fuzzy-ARTMAP neural networks converge significantly faster than backpropagation neural networks (improved benchmark in precision). The preference for neural networks of the ART family is due to the characteristic stability and plasticity that these architectures have to provide