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Adaptive Fault Detection Based on Neural Networks and Multiple Sampling Points for Distribution Networks and Microgrids

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Abstract

Smart networks such as active distribution network (ADN) and microgrid (MG) play an important role in power system operation. The design and implementation of appropriate protection systems for MG and ADN must be addressed, which imposes new technical challenges. This paper presents the implementation and validation aspects of an adaptive fault detection strategy based on neural networks (NNs) and multiple sampling points for ADN and MG. The solution is implemented on an edge device. NNs are used to derive a data-driven model that uses only local measurements to detect fault states of the network without the need for communication infrastructure. Multiple sampling points are used to derive a data-driven model, which allows the generalization considering the implementation in physical systems. The adaptive fault detector model is implemented on a Jetson Nano system, which is a single-board computer (SBC) with a small graphic processing unit (GPU) intended to run machine learning loads at the edge. The proposed method is tested in a physical, real-