Fault detection and classification of VSC-HVDC transmission lines using a deep intelligent algorithm

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Abstract

Considering the sensitivity of HVDC-transmission system protection and the difficulty in identifying high-resistance earth-faults,this paper presents three methods for fault location and classification in VSC-HVDC transmission lines.These methods are evaluated in terms of efficiency and reliability.The current and voltage signals obtained from the network are pre-processed by performing DWT,and then using feature extraction methods,special and unique features are extracted for different states of the signals,and then using these features and proposed algorithms,network learning was performed to detect faults.In addition,the effectiveness of the proposed plan has been confirmed for different fault scenarios related to extensive changes in fault resistance,fault starting angle and fault location.These algorithms were also investigated in unwanted noise-conditions and the reliability of these algorithms was confirmed.In this article methods,k nearest neighbor(KNN),support vector machine(SVM) and deep-neural network(DNN) have been investigated.The strength of this research is use of a new method of extracting features from the fractal dimension,which has been able to provide outstanding capabilities that can lead to improved diagnosis with a small number of study data and different conditions.The main advantages of proposed-method are higher speed and accuracy than conventional methods.The test results show that the proposed method can reliably and accurately identify and classify high-impedance faults.

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