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Review

Review on Artificial Intelligence-Based Fault Location Methods in Power Distribution Networks

Hamed Rezapour [1], Sadegh Jamali [1,*] and Alireza Bahmanyar [2,*]

[1] Centre of Excellence for Power System Automation and Operation, School of Electrical Engineering, Iran University of Science and Technology, Tehran 16846-13114, Iran; h_rezapour@elec.iust.ac.ir
[2] Department of Electrical Engineering, Computer Science Montefiore Institute, University of Liège, 4000 Liège, Belgium
* Correspondence: sjamali@iust.ac.ir (S.J.); abahmanyar@uliege.be (A.B.); Tel.: +98-21-7322-5669 (S.J.)

Abstract: This paper provides a comprehensive and systematic review of fault localization methods based on artificial intelligence (AI) in power distribution networks described in the literature. The review is organized into several sections that cover different aspects of the methods proposed. It first discusses the advantages and disadvantages of various techniques used, including neural networks, fuzzy logic, and reinforcement learning. The paper then compares the types of input and output data generated by these algorithms. The review also analyzes the data-gathering systems, including the sensors and measurement equipment used to collect data for fault diagnosis. In addition, it discusses fault type and DG considerations, which, together with the data-gathering systems, determine the applicability range of the methods. Finally, the paper concludes with a discussion of future trends and research gaps in the field of AI-based fault location methods. Highlighting the advantages, limitations, and requirements of current AI-based methods, this review can serve the researchers working in the field of fault location in power systems to select the most appropriate method based on their distribution system and requirements, and to identify the key areas for future research.

Keywords: fault location; artificial intelligence; power distribution networks

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1. Introduction

Following to a short-circuit fault in distribution networks, the fault should be located and isolated before restoring the supply. A fast and accurate fault location method can help to improve the continuity of supply considerably. In general, the distribution-network fault location methods can be categorized into impedance-based methods, state estimation-based methods, traveling wave-based methods, and artificial intelligence-based (AI-based) methods.

The impedance-based methods determine the location of faults by measuring the apparent impedance seen from one or more measurement points. These methods estimate the fault location by comparing the measured impedance for the probable fault paths in the network with the measured one [1–5]. These methods can provide fault location estimations with acceptable accuracy, although they might estimate several candidate locations in the networks with several laterals. They require detailed data about the network topology, line impedances, and loads and are, hence, very sensitive to network-model inaccuracies.

State estimation-based methods consider a fault as bad data and try to locate it using the data collected from different measurement points of the network [6–8]. Similar to the impedance-based methods, these techniques need the distribution-network data. While they are less sensitive to input data inaccuracies, they can only be applied to networks with considerable measurement infrastructures.

Traveling wave-based methods estimate the fault location by calculating the sweep-duration of the wave traveling from the measurement point to the fault location [9–12].

Review Of Fault Location Methods For Distribution Power System

Yi-Tong Ma

Review Of Fault Location Methods For Distribution Power System:

Advanced Technologies, Systems, and Applications III Samir Avdaković,2018-11-03 This book introduces innovative and interdisciplinary applications of advanced technologies Featuring the papers from the 10th DAYS OF BHAAAS Bosnian Herzegovinian American Academy of Arts and Sciences held in Jahorina Bosnia and Herzegovina on June 21 24 2018 it discusses a wide variety of engineering and scientific applications of the different techniques Researchers from academic and industry present their work and ideas techniques and applications in the field of power systems mechanical engineering computer modelling and simulations civil engineering robotics and biomedical engineering information and communication technologies computer science and applied mathematics **Artificial Intelligence Applications in Electrical Transmission and Distribution Systems Protection** Almoataz Y. Abdelaziz,Shady Hossam Eldeen Abdel Aleem,Anamika Yadav,2021-10-21 Artificial intelligence AI can successfully help in solving real world problems in power transmission and distribution systems because AI based schemes are fast adaptive and robust and are applicable without any knowledge of the system parameters This book considers the application of AI methods for the protection of different types and topologies of transmission and distribution lines It explains the latest pattern recognition based methods as applicable to detection classification and location of a fault in the transmission and distribution lines and to manage smart power systems including all the pertinent aspects FEATURES Provides essential insight on uses of different AI techniques for pattern recognition classification prediction and estimation exclusive to power system protection issues Presents an introduction to enhanced electricity system analysis using decision making tools Covers AI applications in different protective relaying functions Discusses issues and challenges in the protection of transmission and distribution systems Includes a dedicated chapter on case studies and applications This book is aimed at graduate students researchers and professionals in electrical power system protection stability and smart grids **Power System Fault Diagnosis** Md Shafiullah,M. A. Abido,A. H. Al-Mohammed,2022-01-14 Power System Fault Diagnosis A Wide Area Measurement Based Intelligent Approach is a comprehensive overview of the growing interests in efficient diagnosis of power system faults to reduce outage duration and revenue losses by expediting the restoration process This book illustrates intelligent fault diagnosis schemes for power system networks at both transmission and distribution levels using data acquired from phasor measurement units It presents the power grid modeling fault modeling feature extraction processes and various fault diagnosis techniques including artificial intelligence techniques in steps The book also incorporates uncertainty associated with line parameters fault information resistance and inception angle load demand renewable energy generation and measurement noises Provides step by step modeling of power system networks distribution and transmission and faults in MATLAB SIMULINK and real time digital simulator RTDS platforms Presents feature extraction processes using advanced signal processing techniques discrete wavelet and Stockwell transforms and an easy to understand optimal feature selection method Illustrates comprehensive

results in the graphical and tabular formats that can be easily reproduced by beginners Highlights various utility practices for fault location in transmission networks distribution systems and underground cables **Special Technical Conference: Underground Residential Distribution. Advance Proceedings of the Underground Residential Distribution Conference, St. Louis, M., April 21-23, 1964. Sponsored Jointly by IEEE Insulated Conductors and Transmission and Distribution Committees** Institute of Electrical and Electronics Engineers,1964 Eighth IEE International Conference on Developments in Power System Protection, 5-8 April, 2004, RAI Centre, Amsterdam, The Netherlands ,2004 Transactions of the American Institute of Electrical Engineers American Institute of Electrical Engineers,1963 *The Electrical Review* ,1929 *IEEE/PES Transmission and Distribution Conference and Exhibition 2002: Asia Pacific* ,2002 **Analysis techniques of diagnosis high voltage underground cables** Hussain Mahdi,2016-10-24 Thesis M A from the year 2015 in the subject Electrotechnology grade Warsaw University of Technology Electrical Engineering language English abstract This study is focused on installations and faults diagnosis of high voltage underground cables and examined on the various ways through which they can be identified and corrected It has been found that wear and tear is one of the major issues leading to electric faults like power loss There has been seen that several causes of failure which could be identified with them and analyze better ways of detecting them So it has been looked at how to detect degradation of insulation of the underground cable After a thorough analysis of fault detection techniques have been explained the pre location fault techniques is described I illustrated many methods which aid to discover the fault location I also developed a method which contributes in pre location of the fault based on Matlab simulation and mathematical slope equation This method was invented after the observation that the voltages measured at the local and remote substations after filtering and after Fourier analysis showed a linear behavior that was proportional to the respective distances between the fault location and the mentioned substations or generators Thus the developed method exploits such a linearity to estimate the fault location by interpolation assuming that the parameters of the line are previously known and that dedicated devices are located on site in both substations to provide post fault measurements of the faulted line Finally I clarify many pin pointing methods to precisely determine the fault location **Journal of the Institution of Electrical Engineers** ,1929 Proceedings of the Institution of Electrical Engineers Institution of Electrical Engineers,1930 Vols 56 61 accompanied by Institution notes no 1 40 Dec 1917 Oct 1923 v 10 and 57 each accompanied by a suppl other vols accompanied by special issues and supplements Science Abstracts ,1930 Electrical Review and Western Electrician ,1910 **Journal** ,1929 Includes annual report of its council 1941 48 in pt 1 **New York Review of the Telegraph and Telephone and Electrical Journal** ,1901 **Electric Energy Conference, Sydney, 13-17 October, 1980** Institution of Engineers Australia. National Committee on Electric Power Engineering,1980 The theme of the Conference is Distribution and Utilisation of Electric Energy The aim of the Conference is to advance practice and knowledge in the areas of distribution

and utilisation of electric energy and to provide a venue for exchanges of experience and ideas between engineers from throughout Asia and the Pacific Regions **Power Distribution Conference** ,1992 *The Engineering Index* ,1968 Transactions American Institute of Electrical Engineers,1930 List of members in v 7 15 17 19 20 **General Electric Review** General Electric Company,1945

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