Can deep learning improve fault detection and classification in smart grids?

Deep learning emerges as a promising tool for enhancing fault detection and classification within smart grids, offering significant performance improvements.

Is autonomous smart grid fault detection possible?

A case study is introduced as a preliminary study for autonomous smart grid fault detection. In addition, we highlight relevant directions for future research. Smart grid plays a crucial role for the smart society and the upcoming carbon neutral society.

Can computational intelligence detect islanding phenomenon in smart distributed grids?

The importance of computational intelligence to detect islanding phenomenon in smart distributed grids , , , . Those works present a probabilistic Neural Network (NN) and Support Vector Machine (SVM) as powerful self-adapted machine learning techniques for fault detection.

Why is localization and classification important in smart grid?

Localization,classification,and fault detection are essential for addressing any problems immediatelyand resuming the smart grid as soon as possible. Simultaneously,the capacity to swiftly identify smart grid issues utilizing sensor data and easily accessible frequency and voltage data from PMU devices is a prerequisite of this task.

What is a fault detection system (SG)?

The process of identifying/classifying faultsbased on the data information exchanged among relays and Phasor Measurement Unitss (PMUs),is accomplished into a centralized and dynamic infrastructure. SG demands real-time state estimation utilizing synchronized PMU at high sampling rates .

What are fault detection and classification techniques?

Fault detection,classification,and location techniques can be either data-driven or model-driven,as noted in [16,17]. Data-driven techniques use data mining and machine learning algorithms to analyze large amounts of data to detect and classify faults.

FAULT DETECTION IN SMART GRID MAURITIUS

The fault detection is the essential factor to the reliability of the smart grid, which also provides the smart grid with the ability to self-heal and isolate to avoid or limit negative

Smart grid monitoring in IoT environments demands robust fault tolerance mechanisms to ensure uninterrupted operation and data accuracy. The integration of advanced machine learning with fault-tolerant strategies in the proposed Intelligent FaultEdge framework represents a significant innovation. Unlike traditional reactive systems, Intelligent FaultEdge adopts a proactive ???

Smart grid plays a crucial role for the smart society and the upcoming carbon neutral society. Achieving autonomous smart grid fault detection is critical for smart grid system state awareness, maintenance and operation. This paper focuses on fault monitoring in smart grid and discusses the inherent technical challenges and solutions. In particular, we first present ???

FAULT DETECTION IN SMART GRID MAURITIUS

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Section 5 aggregates concepts and procedures associated with the SG faults detection and location in the Smart City context. Next, Section 6 describe lessons learned and future research directions in FD/L-SG. Finally, Section 7 offers the main conclusions. Smart grid fault detection using locally optimum unknown or estimated direction

A microgrid constitutes an integral component of the modern smart grid. Microgrid (MG) integrates several distributed energy sources and loads that behave with the grid as a single controllable entity and operate within predetermined electrical parameters. Pradhan R, and Jena P. Advanced fault detection technique for AC microgrid protection

FAULT DETECTION IN SMART GRID MAURITIUS

Timely detection of electrical faults is of paramount importance for efficient operation of the smart grid. To better equip the power grid operators to prevent grid-wide cascading failures, the detection of fault occurrence and its type must be accompanied by accurately locating the fault.

make fault detection and location more reliable and reduce the danger for grid customers. Figure 1: RMS voltage in grid with intermittent earth fault III. MEASUREMENT INFRASTRUCTURE Real-time monitoring schemes requires high-resolution measurements that are reported with a low time delay (latency) to a centralized computing unit.

This data will be crucial for optimizing grid operations by improving fault detection, load management, and predictive maintenance. The smart grid indicators are designed to complement existing frameworks, integrating seamlessly with current monitoring systems. This integration will provide a comprehensive view of the grid's health

FAULT DETECTION IN SMART GRID MAURITIUS

In: 2018 IEEE power & energy society innovative smart grid technologies conference (ISGT), Washington, DC, pp 1???5. Google Scholar Jamil M, Sharma SK, Singh R (2015) Fault detection and classification in electrical power transmission system using artificial neural network. Springerplus 4:334

the smart grid and smart grid fault detection. A. Overview of Smart Grid and Fault Detection The key components of smart grid system is shown in Fig.1. From the perspectives of power transmis-sion, power distribution and power consumption, au-tonomous smart grid fault detection is needed. 1) Power Transmission: As UHV AC and DC transmis-

While Machine Learning approaches have been applied in smart grids for fault detection, the robustness and security of these systems need thorough exploration. Thanks to the advancements in the field provided by the smart grid, several data-driven approaches have been proposed in the literature to tackle fault prediction tasks. Implementing

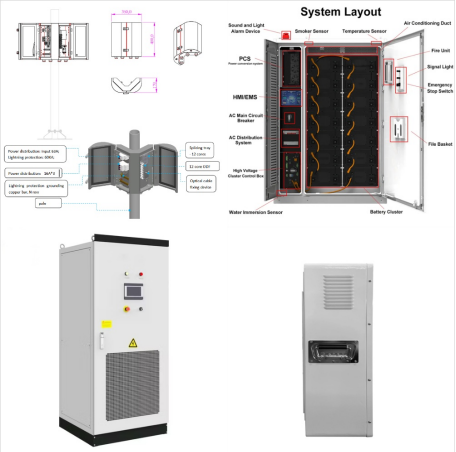
FAULT DETECTION IN SMART GRID MAURITIUS

This manuscript addresses the critical challenge of fault classification and localization within smart distribution networks, exacerbated by the complex integration of distributed energy resources and the dynamic nature of modern power systems. Traditional methods fall short in accurately and efficiently managing these tasks due to their reliance on ???

Fault detection and location give to smart grid the ability to self-healing and isolating the fault in order to limit the negative consequences. In the literature, several techniques are proposed

Development of smart fault diagnosis models (detection, classification, and either location or section identification) employing feedforward neural networks. Smart grid fault diagnosis under load and renewable energy uncertainty. Power Syst Fault Diagn (2022), pp. 293-346, 10.1016/B978-0-323-88429-7.00006-0.

FAULT DETECTION IN SMART GRID MAURITIUS



This article proposes a deep learning (DL) model made of Long Short Term Memory (LSTM) and Adaptive Neuro Fuzzy Inference System (ANFIS) to detect fault in smart distribution grid assisted by communication systems using smart meter data. In smart grid, data analysis for fault identification and detection is crucial for grid monitoring.

This research proposes an innovative simulation-based model for fault detection and correction in a smart grid environment by the integration of UPS (uninterrupted power supply). This approach adopted the development of MATLAB codes to identify faults which were demonstrated as voltage drops in the simulation outputs. Following voltage drop, the grid manifested self-healing ???

1. Autonomous smart grid fault detection is critical for system awareness, maintenance, and operation of complex modern power systems but faces challenges from new power equipment, renewable energy sources, and carbon neutrality goals. 2. These factors require more accurate real-time sensing of equipment status under variable conditions, development of condition ???

FAULT DETECTION IN SMART GRID MAURITIUS

Effective fault detection, classification, and localization are vital for smart grid self-healing and fault mitigation. Deep learning has the capability to autonomously extract fault characteristics and discern fault categories from ???

1. Autonomous smart grid fault detection is critical for system awareness, maintenance, and operation of complex modern power systems but faces challenges from new power equipment, renewable energy sources, and ???

ABSTRACT Fault detection and location give to smart grid the ability to self-healing and isolating the fault in order to limit the negative consequences. In the literature, several techniques are proposed for detection and classification of faults using artificial intelligence algorithms. This paper proposes a novel method using fuzzy logic and neural networks for ???

FAULT DETECTION IN SMART GRID MAURITIUS

Using DIgSILENT, a smart-grid case study was designed for data collection, followed by feature extraction using FFT and DWT. Post-extraction, feature selection. CNN-based and extensive machine learning techniques were then applied for fault detection. - ???

Request PDF | Faults in smart grid systems: Monitoring, detection and classification | Smart Grid (SG) is a multidisciplinary concept related to the power system update and improvement. SG implies

Researchers in [28] introduced a fault detection technique using tunable photon counting (??-OTDR) to identify fiber optics faults in PONs. This method filters out and reduces the coherent noise and enhances fault detection through a feedback loop linking a Field-Programmable Gate Array (FPGA) based acquisition unit and the filter.

FAULT DETECTION IN SMART GRID MAURITIUS

Real-time smart grid monitoring is critical to enhancing resiliency and operational efficiency of power equipment. Cloud-based and edge-based fault detection systems integrating deep learning have been proposed recently to monitor the grid in real time.

A brief summary of faults in smart grid infrastructure is provided by Hlalele et al. (2019). ey distinguish between faults related to power distribution, photovoltaic and e authors provide 65 faults detection and location approaches that were discussed Table 1 Related works Year Article Focus Results 2021 Sarathkumar et al. (2021) Faults