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Review on Fault Identification in Power System Network by using Rule Based Fuzzy Logic

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Abstract: ***In this study, the fuzzy logic is employed to Fault Identification in grid Network by Using Rule-based mathematical logic. Power reliability of power supply is generally stricken by the occurrence of faults within the transmission or distribution network. Recent advances within the field of fuzzy logic systems and variety of successful applications in electric power (wattage) systems show that logic is efficiently applied to house imprecision, ambiguity and probabilistic information in the input file to scale back the time of power outages and for the immediate restoration, the fault identification method must be very effective. Under faulty condition system operator receives very complex information difficult to form the choice on restoring a tripped feeder to normal operation. Hence, to create the decision-making ability effectively, the Fuzzy logic-based fault diagnosis method is presented during this project. This method can classify and identify the kinds of faults that occur to Radial topology of transmission or distribution network. In that method uses three-phase feeder current, phase voltage and neutral current as input to the fuzzy-inference system (FIS).***

Keywords: Distribution system network, fault diagnosis, and Rule based fuzzy logic.

I. INTRODUCTION

Fault analysis may be a crucial consideration in installation planning, protection equipment selection, and overall system reliability assessment. At the middle of today's power generation and distribution are high voltage transmission and distribution networks. The fault analysis of an influence system is required so on produce information for the selection of switchgear, setting of relays and stability of system operation. an influence system isn't static but changes during operation (switching on or off of generators and transmission lines) and thru planning (addition of generators and transmission lines). Thus fault studies must be routinely performed by utility engineers. Nowadays, the substantive increase in complexity and style of the consuming market, the electrical grid has been demanding considerable updating and also a significant improvement in the monitoring, control and protection equipment. On the distribution system, the fault's location is typically estimated at the data provided by the consumers and also by the accumulated experience of the technical areas, which aids the direction and support teams to the suspicious places. The faults of the flexibility system affect the performance of the flexibility system. The factor like lightning, equipment damage, tree, animal, natural disaster and humans affect the flexibility system operation. These factors don't seem to be predictable. When outages occur, fast and proper restoration of the feeder is incredibly important to require care of the good power quality and customer satisfaction. Hence, to cut back the time of outages and immediate restoration, the expert systems are needed to identify the faults of the grid. [2] The use of the logic enables the fault detection system to accommodate uncertainties that occur during the fault in electrical distribution networks. In, the proposed fault detection technique used the fuzzy logic-based algorithm to 10 kinds of faults during a radial, unbalanced distribution system. A system approach of neuro-fuzzy based learning and fault classification approach supported the online learning system was proposed in. during this work, the way of fault supported the standard offline neuro controller approach is compared with the suggested system approach for learning and convergent time evaluation for distributed systems.[1] The proposed technique can improve accuracy of the classification of faults by using two different fuzzy classifiers. This paper describes the employment of mathematical logic approach to distinctly identify the character of fault. Samples of three-phase post fault current are being considered for the classification of the fault. Simulation has been performed considering a good sort of conditions to satisfy the validity of the proposed method. The generated fault data from the simulation has been wont to feed the "Fuzzy logic toolbox" of MATLAB.[4] The idea is to implement a fuzzy-based fault identification algorithm in secondary substations. The system of rules should be ready to identify the sort and direction of a fault to produce the grid operator with further information. The localization of a fault are improved the more secondary substations are equipped with this logic.[5] This work focuses on the identification of faults within the distribution network of an influence system. Fault detection is achieved by a fault analysis and thus the determination of positive, negative, and zeo sequence currents and voltages of the ability network.

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Thereafter, a fuzzy controller is included within the network to spot the fault type on the occurrence of a fault. additionally, a neuro fuzzy-based fault location model is developed. the following discussion starts with a computational model, describes the methodology employed within the study, and rounds off with insights drawn from the results obtained.

II. METHODOLOGY

A. *Review-Fuzzy Logic*

To successfully design a fault detection system using a logical system, an understanding of the basic components of a fuzzy decision system is extremely important. These include logic concepts like fuzzy sets and their properties, rule base fuzzy and fuzzy inference system. The accuracy of the fuzzy-inference system method of fault type diagnosis varies with complementary analytical tools employed to strengthen the capabilities of the system. in Reference[6] reported is 78% accuracy in fault-type identification when the fuzzy inference was accustomed analyze data derived by the tactic.

B. *Proposed Methodology*

In that method of fault detection applies the three-phase (R, Y and B) feeder currents and phase voltages because of the inputs to the fuzzy-inference system (FIS).

1) *Basic Component of Fuzzy System:* System The basic configuration of the fuzzy system employed during this paper is shown in Fig.1. There are four basic elements in an exceedingly very fuzzy system which is:-

a) *Fuzzification*: The tactic of associating crisp input values with the linguistic terms of the corresponding input linguistic variable.

b) *Fuzzy Inference Engine*: Provides the choice-making logic of the system. It maps the fuzzy inputs earlier to the fuzzy output supported the fuzzy rules and fuzzy set database by performing the following computation:

i) *Aggregation:* Computation of the IF a part of the principles (computes how appropriate each rule to this situation)

ii) *Composition:* Computation of the then a part of the principles (computes on how each rule influences the output variables) Result

iii) *Aggregation:* After the degrees of truth for the principles are computed this step determines which rules will contribute to the de-fuzzified result.

c) *Fuzzy Rule Base:* a group of linguistic rules or conditional statements within the range of "If a group of conditions is satisfied, then a gaggle of consequences is inferred". These if-then rule statements are acquainted with formulate the conditional statements that comprise fuzzy-logic.

d) *Defuzzification Interface*: Defuzzified the fuzzy outputs of the fuzzy inference system and generate a non-fuzzy (crisp) output which is that the particular output of the fuzzy.

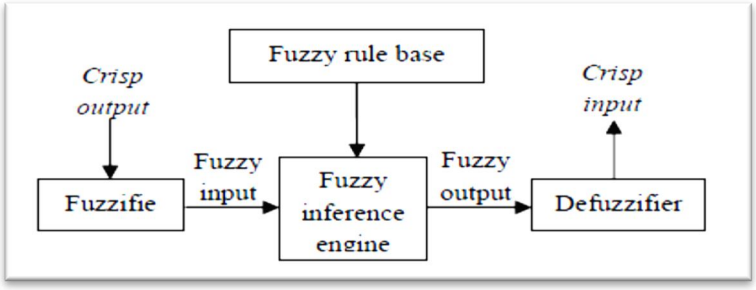

Fig.1: Basic Configuration of Fuzzy System

2) *Membership Functions:* Membership Functions Different levels of the fault currents and voltages for various fault conditions on the distribution lines are classified into different degrees of membership functions- Low, Normal, and High.

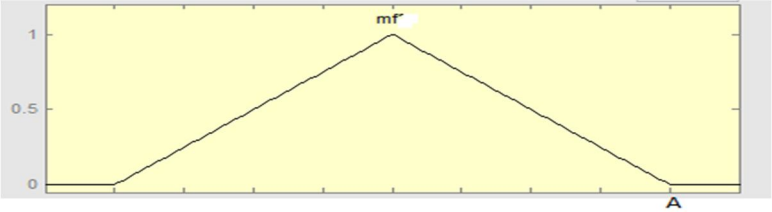

Fig 2.Example model of membership function

3) *Proposed Work:* The proposed fuzzy-based method is very suitable to detect and identify faults in typical medium-voltage feeders and is particularly ready to address the inaccuracy of measurements in secondary substations. this is often because of the probabilistic approach in type of fuzzy rules. a stimulating aspect of this method compared to the research work to date is on the one hand the introduction of rule compositions consisting of two credibility classes that simplify the adaption of expert knowledge. On the opposite hand it's the look of the output membership functions that only indicate whether a fault is probably going or not. But the identification of the fault and direction relies on a comparison of the credibility of every fault-specific rule composition. Also this approach can take any available and calculated input values under consideration and their accuracy is regarded by appropriate membership functions. Implementing this fuzzy-based method in secondary substations will supply the grid operator with further information about occurred faults and also the localization of the fault would be supported through a directional indication.

III. CONCLUSION

In this proposed research work, the fuzzy logic-based is extremely suitable for the identification and classification of the fault within the facility network. The proposed technique required considering the post fault voltage and current of all three-phase at one end of the transmission. This can be because of the probabilistic approach within the sort of fuzzy rule the identification of the fault and direction is predicated on a comparison of the credibility of every fault specific rule composition. Also, this approach can take any available and calculated input value into consideration and their accuracy is regulated by an appropriated membership function.

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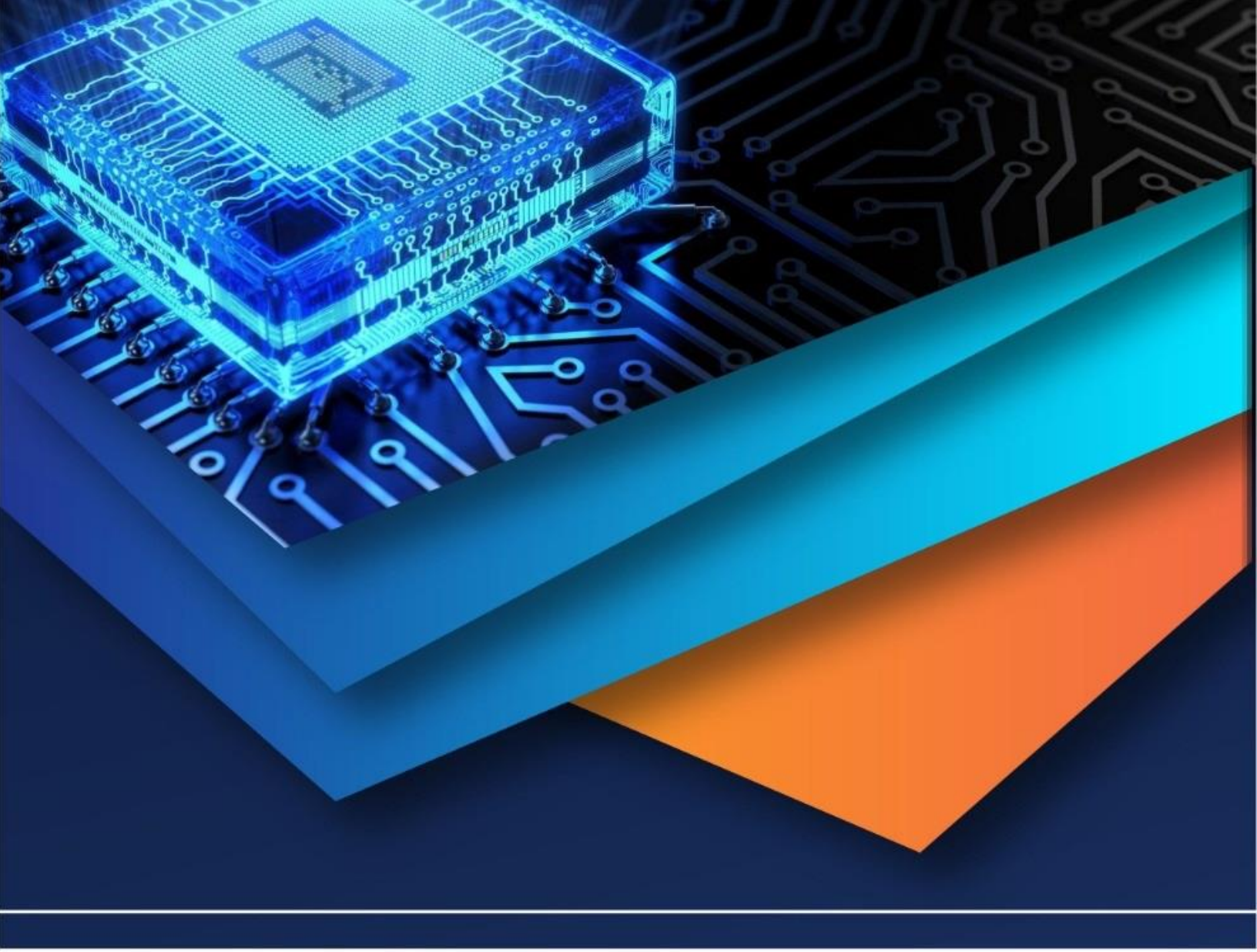

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