

A Review Article Distribution Transformer Condition Monitoring System Using Ann

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Abstract - Distribution transformer is an important asset in distribution network. Its operation and control are important aspects which determine the reliability and quality of power supply. A remote condition monitoring system for distribution transformer is discussed here. Different parameters are acquired and processed in remote terminal unit. This communicates the data to the operator end using internet. According to parameter values, health index of a transformer is found out at the operator end interface. Analysis is based on health index. This system is different from power transformer condition monitoring systems in condition monitoring techniques used and communication. A cheaper system is designed which precisely evaluates the health status of a transformer. The test results are taken from a specially designed transformer.

Keywords-Distribution transformer, condition monitoring, health index, human machine interface.

I. INTRODUCTION

With the soaring development of intensity framework systems and the expansion in their unpredictability, numerous variables have turned out to be persuasive in electric power age, request or burden the board [1]. Load Distribution Transformer in one of the basic elements for financial task of intensity frameworks. Dissemination Transformer of future burdens is likewise significant for system arranging, foundation improvement, etc. Be that as it may, control framework load Distribution Transformer is a two dimensional idea: shopper based Distribution Transformer and utility based Distribution Transformer. In this way the importance of each conjecture could be taken care of incoherently. Customer based conjectures are utilized to give a few rules to upgrade system arranging and speculations, better oversee hazard and diminish operational expenses.

In fundamental tasks for a power age plant, estimates are expected to help organizers in settling on vital choices with respect to unit duty, hydro-warm co-appointment, exchange assessment, and security evaluations, etc. This kind of conjecture manages the complete power framework loads at a given time, and is ordinarily performed by service organizations. In any case, control framework load Distribution Transformer can be characterized in three classes, to be specific present moment, medium term and long haul Distribution Transformer.

II. VARIOUS ALGORITHM FOR ANALYSIS

The most popular techniques used for load Distribution Transformer are time series based models, similar-day

approach and intelligent system based models. Some of the conventional Distribution Transformer methods have major drawbacks especially their inability to map the non-linear characteristic of the load, thus a substitute of classical methods with intelligent system based models is to a great extent essential. Most Distribution Transformer models use statistical techniques or artificial intelligence algorithms such as regression, neural networks, fuzzy logic, and expert systems [2-7].

Amongst all other intelligent techniques, the use of ANN in MTLF-LTDT is very predominant. Most recent load Distribution Transformer works are based on Artificial Neural Networks, and a majority of these papers presented good estimates. Because ANNs are capable of generalization and learning non-linear relationships between variables, ANN-based approaches are often favored for LTDT problems [8-11]. The other important feature of ANNs is their capability to iteratively adjust the synoptic weights between layers. Conventional methods on the other hand require static complex mathematical equations and but still perform poorly in comparison to intelligent-based approaches. Another leading load Distribution Transformer method is Fuzzy logic. Its application in load Distribution Transformer is based on periodical similarity of electric load, where the input variables, output variables and the governing rules are the key points.

III. LOAD DISTRIBUTION TRANSFORMER

This research work focuses on a specific area of load Distribution Transformer, Medium-term and Long term load Distribution Transformer. The forecasts are achieved

by using Artificial Neural Network (ANN) based models, i.e. feed-forward and recurrent networks developed in MATLAB and Simulink environment.. The application of the models to factual data is done merely as case study to validate the approach. Figure 1.1 below attempts to clarify the focus of this research.

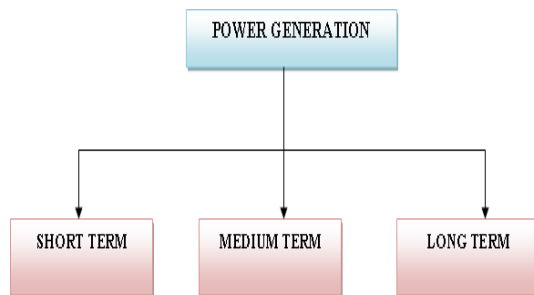


Fig. 1 Types of load Distribution Transformer and focus of the research.

A great deal of effort is required to maintain an electric power supply within the requirements of the various types of customers served. Some of the requirements for power supply are readily recognized by most consumers, such as proper voltage, availability of power on demand, reliability and reasonable cost. By availability of power on demand, we mean to say that power must be available to the consumer in any amount that he may require from time to time.

Stated yet in another way, motors may be started or shut down, fans and lights may be turned on or off, without giving any advance warning or notice to the electric power supply company. It is this random behavior of consumers coupled with nature-controlled demographic and weather factors alongside econometric factors that has posed the greatest challenges like the amount of energy to generate, the load (circuits) to switch on or off at a point in time on the part of power utility company. Hence, a power system must be well planned so as to ensure adequate and reliable power supply to meet the estimated load demand in both near and distant future.

IV.LITERATURE REVIEW

1.KaisIbraheem-In this paper, they proposed a cross breed calculation to conjecture enrolment dependent on fluffy time arrangement and hereditary calculations, the proposed calculations displays a decent Distribution Transformer result with higher exactness rate. Recorded enrolment of the University of Alabama from year 1948 to 2017 is utilized in this investigation to show the Distribution Transformer process. They proposed a half and half calculation to figure enrolment of the University of Alabama dependent on fluffy time arrangement and hereditary calculations. The Distribution Transformer

strategy comprises of two different ways; the main way is utilized to decide the best interim with less wellness work.

2. Simaneka Amakali-Optimal day by day activity of electric power producing plants is exceptionally basic for any power utility association to lessen information costs and perhaps the costs of power when all is said in done. For a non-renewable energy source – terminated power plant for instance, the advantages of intensity age streamlining (for example produce what is sensibly required) stretches out even to ecological issues, for example, the ensuing decrease in air contamination. Presently to create "what is sensibly required" one needs conjecture the future power requests.

Since power age depends vigorously on the power request, the buyers are likewise basically required to carefully deal with their heaps to unite the power utility's ideal power age endeavors. In this way, for the two cases, exact and solid electric burden Distribution Transformer frameworks are completely required. Until this point, there are various Distribution Transformer strategies grown essentially for electric burden Distribution Transformer.

The saw papers delineate an assortment of answers for burden Distribution Transformer related issues utilizing Different strategies, especially for momentary burden Distribution Transformer, consequently a general qualification with respect to inadequacies of different methods have been drawn and the proposed methodology could be a predominant endeavor. Writing demonstrates that various analysts utilize various strategies to address a heap Distribution Transformer.

3. Sharif-Presented a multi-layer feed-forward neural system model with the mean to look at the Distribution Transformer exactness of a period arrangement and a GA-based model. The GA-based model gave sensible outcomes.

4. Chen-The effect of power costs in a heap Distribution Transformer model. This evaluation would commonly be reasonable for zones where abrupt power levy increments are experienced as it significantly influences the Distribution Transformer exactness.

5. Adepoju-have utilized a directed neural system – based model to estimate the heap in the Nigerian power framework. The examination anyway did not think about the impacts because of climate conditions, in this way the exactness could be improved.

6. Satish-have examined the impact of the temperature on the heap pattern utilizing an incorporated GA - based technique. The investigation inferred that the incorporated

model brought about less blunder of forecast. Among other climate factors, just the temperature was fused in the model, in this way a thought of different variables would significantly improve the outcome.

7. Rashid-Presented a feed forward and input multi-setting fake neural system (FFFB – MCANN) as a handy methodology for burden Distribution Transformer. They have proposed the utilization of the rate esteems as opposed to the total to deliver better precision.

8.Al-Saba- Illustrated the application of the GA to long-term load Distribution Transformer. The model forecasted the annual peak demand of a Middle Eastern utility and repeated the process using a time-series approach. The study established that theGA -based model produces better forecast rather classical methods (ARMA etc).

9.Ganzalez -have used a feedback GA -based model to predict energy consumption in buildings with high precision. The model was train by means of hybrid algorithm. The optimal network structure was not evidently achieved.

10. Srinivasan-has used a dominant back propagation GA -based model and genetic algorithm as an attempt to evolve the optimal neural network structure. This approach is powerful despite the fact that the model is unable to detect sudden load changes, thus the approach still needs further development.

11.Madal- Presented a comparison of a classical load Distribution Transformer technique with an GA -based model using actual load data. The models were used to forecast the load one-to-six hours ahead and again the MAPE showed that the GA -based model provides reliable forecasts. Again, the optimal network structure for better forecast was never achieved.

12.Topalli -A recurrent neural network method using hybrid learning scheme to offline learning with real-time to forecast Turkey's total load one day in advance. The study reported an average error of 1.6%. The Distribution Transformer accuracy could be achieved by employing good network training.

13.Kandil - Explored the GA capability to predict the load without necessary using the historical load trend, but only temperature instead. The study reports that using estimated load values may lead to a great degree of inaccuracy in the forecast, thus only the temperature was used as an input. Because of the ANN's input-output mapping ability, this approach could be efficient. However, the better results could be achieved by selecting other importance input variables and better network training parameters.

14.Xiao- Introduced the rough set and its ability to study and remember the relationship between the inputs and outputs. A multi-layer back propagation neural network was used in the study and momentum method was also applied to decrease the sensitivity of local parts of error curve surface. This approach requires further development to attribute deduction threshold.

15.Lauret- Used a model called Bayesian neural network as an attempt to design an optimal network for short-term load Distribution Transformer. The Bayesian GA model is a new proposed methodology but also requires derivation of better noise models and uncertainties consideration.

V.CONCLUSION

The research presented in this research focused on validation and implementation of the neuro-fuzzy fault detection engine on large substation transformers. This validation was accomplished through the design of a diagnostic module, which could non-invasively collect data that has been shown to provide diagnostic information about the health of transformers. This data was then transferred to the neuro-fuzzy detection engine via a modem. From this point in the research, there are several areas for possible future work.

The major areas of study are given below. This research focused on the implementation of the diagnostic module on three single-phase transformers of the same age and type. However, in order for the neural network to provide more accurate identification for many different types of transformers, a larger database with data from many different models and years of operation is required. For this reason, one area of possible future research is to implement the system described in this thesis on many more transformers. Through this, it is hoped that the system will actually witness different failures and be able to train itself to different types of behavior, normal and abnormal.

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