

Transformer Oil Quality Checking Using Digital Image Processing

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Abstract- Electrical energy is dominant part in day to day life. It is used for the nation building. The main part of electrical power system is the transformer. It is a static device that transfers electrical energy between two circuits through electromagnetic induction. The transformer oil is an oil that stable at high temperature and has excellent electrical properties. When the transformer oil gets aged then the colour of this oil changes. However, conventional method is expensive and time consuming, we use the Digital Image Processing technique to estimate the properties of image which is inexpensive and effective technique. Namely contrast, homogeneity, correlation, energy Further they compared with the help of probabilistic neural network.

Index Terms- Transformer oil, Oil analysis, Image Processing (IP).

I. INTRODUCTION

Our nations important need is an Electrical Energy which plays important role in development. A high efficient power system is required for the large demand of electricity. The transformer plays an important role in this power system. The health of transformer can be checked periodically which is depends upon the type of insulation used in the transformer. Different insulation material is used in the transformer so as the transformer oil is the used as an insulation material for all the transformers. The transformer oil is used for insulation material as well as also used for the cool down the transformer. The important property of transformer oil is it is extremely stable at high temperature and has a good electrical property. It is used in fluorescent lamp ballasts, oil-filled transformers, some types of high-voltage switches, circuit breakers and high-voltage capacitors. Its main function is to stop arcing

and suppress corona discharge, and act as an excellent coolant. The main function of transformer oil is to cool the transformer at any condition. so that it must have high chemical stability, high thermal conductivity, high dielectric strength and keep these properties constant at high temperature. To improve the cooling of high power transformers, the oil filled tanks are used from which the insulating oil get naturally circulates. The transformer oil is act as both coolant as well as insulating agent, so that the health of transformer oil is very important. The transformer oil gets aged due to the discharge of ions in the oil and the oil get damaged

II. SYSTEM OVERVIEW

In this project, we are going to get knowledge about the transformer oil properties and the basic knowledge of Digital Image Processing. In this method we are going to collect some transformer oil images samples and with help of these image sample, we analyse the quality of transformer oil. An image is that the arrangement of associate array, or a matrix, of sq. pixels organized specifically columns and rows. Image processing is the MATLAB tool, it works with help of programming. Means we create the program in MATLAB and then it execute with image processing tool.

III. PROPOSED METHOD

The digital image processing technique is used for the determine the age of the sample image. Using the artificial neural network, we can predict the properties and the state of the sample image. The main neural network used in our project is

probabilistic neural network, which is used in classification and pattern recognition problems. In the PNN algorithm, the parent probability distribution function (PDF) of each class is approximated by a Parson window and a non-parametric function. Then, using PDF of each class, the class probability of a new input data is estimated and Bayes' rule is then employed to allocate the class with highest posterior probability to new input data. By this method, the probability of miss-classification is minimized.

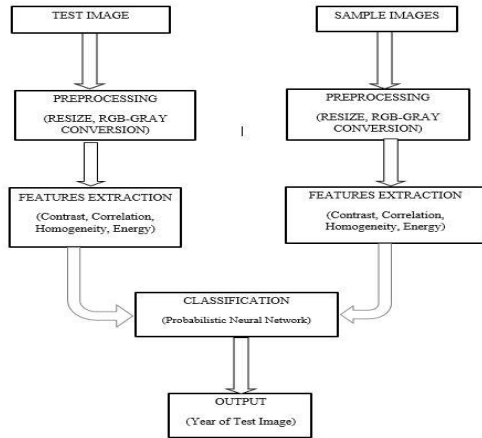


Fig. Block diagram of proposed system

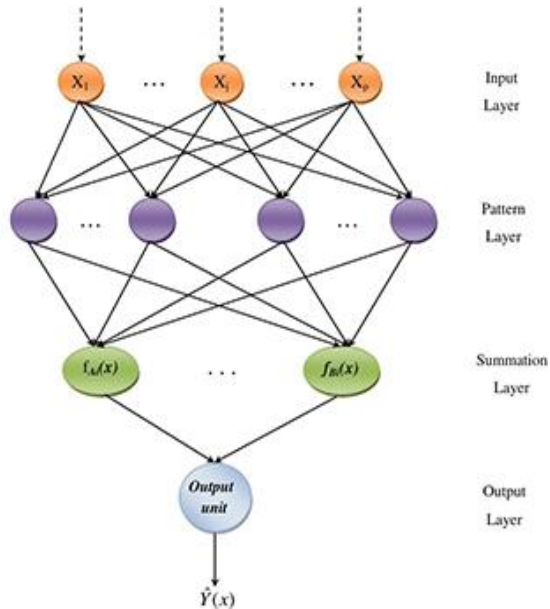


Fig. Probabilistic neural network

The PNN is used for the classification problem. It gets compares the sample image and test image and give the result from the features which are given in the program. This neural network act as classifier as well as the neural network trainer.

IV. RESULT & ANALYSIS



Fig fresh oil image



Fig grey image of fresh oil image



Fig DB Wavelet decomposition of fresh image

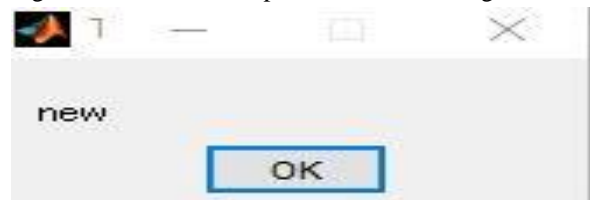


Fig result of fresh image

FEATURES	new oil image			
	sample 1	sample 2	sample 3	sample 4
CONTRAST	0	0	0	0
	0	0	0	0
	1	1	1	1
	1	1	1	1
CORRELATION	23.46377	22.84615	23.6064	23.58238
	-0.0569	-0.0477	-0.05299	-0.05094
	0.169142	0.160646	0.171797	0.173282
	0.491054	0.489893	0.493093	0.495892
ENERGY	21.89389	21.98415	21.89683	22.82889
	0.029882	0.028494	0.034046	0.010522
	0.178852	0.178008	0.18393	0.184921
	0.530889	0.529839	0.535297	0.52542
HOMOGENIETY	21.95079	21.6943	22.19231	22.55015
	0.019811	0.024109	0.020345	-0.00292
	0.177497	0.172111	0.184612	0.178051
	0.526622	0.524183	0.530848	0.517843

Table 1 Feature Extraction Matrix of Fresh Oil

V. CONCLUSION

For the analysis of the transformer oil the image processing technique is used which is software based analytic technique and it is very fast, user friendly and reliable. The quality of image can be enhanced for the better visibility to determine the performance of transformer. Image features namely image contrast, correlation, homogeneity, Energy is much better when compared with conventional practices. Subsequently, image processing provides an easy and fast method to check the transformer health from the image of transformer oil.

This proposed system can be built on the windows, Linux, Raspberry-Pi and also on android platform. The standard data can be used for the calculating of the different oil parameters. New experimentation can be done on this system and make this system cheap, reliable and user friendly.

REFERENCES

- [1] Sidram,M,H.andHegde,S.,(2014) “A Novel Approach of Transformer Oil Quality Analysis Using Image Processing,” IOSR Journal of Computer Science
- [2] Transformer Oil Quality Analysis Using Image Processing, International Engineering Research Journal Pradnya V. Rakibe, PallaviD.Butala, TinaJ.Bhange, Prof.Anubha Panchal
- [3] Quality Analysis of Transformer Oil using Novel Approach in Image Processing Technique International Journal of Innovative Research in Computer and Communication Engineering Amit Kumar Pugalia1, Dr.V. N.Nitnaware.
- [4] Transformer Oil Quality Analysis using Digital Image Processing International Engineering Research (IERJ) Waniya Reena Roben,WKirti Nagesh, Prof.H.A.Warkar.