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A Review Transformer soft Computing Ann, Svm and Genetic Algorithem

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***Abstract* – Transformer soft computing has a very important in the power system such as energy consumption demand Soft computing (ECDF) and peak Transformer Soft computing (PLF). It is a useful tool for a unit commitment and fuel reserve planning in power system. The Transformer demand is depended many variables like industrial index, consumer price index, fuel price, salary index, money exchange, temperature, humidity, and wind speed. Transformer forecast can be classified into four differential types. Very short term Transformer soft computing have period time in a minute, it is importance for real time operation. Short-term Transformer soft computing have period time in a minute to three months, it is importance for unit commitment and operation. Mid-term Transformer soft computing have period time in three months to three years, it is importance for fuel reserve planning and unit commitment. Finally, Long- term Transformer Soft computing have period time in three years to not over fifteen years, it is importance for generation and power plant planning. In this research will offer the energy consumption demand forecasts. It is a very important for fuel reserve planning and unit commitment in power system.**

***Keywords*- ANFIS (Adaptive Neuro Fuzzy Inference System), forecasting, renewable energy, medium term.etc.**

I. INTRODUCTION

Several Soft computing strategies are enforced for electrical device Soft computing like applied mathematics methodology: statistic, exponential smoothing, and autoregressive integrated moving average (Box-jenkins). For the current, there are a unit several algorithms for electrical device Soft computing within the computation intelligence like formal logic neural network. several analysis purposed the article for electrical device Soft computing in the ability system field short term electrical device Soft computing mistreatment autoregressive integrated moving average (ARIMA) and artificial neural network (ANN) technique.

supported non-linear electrical device [7], a completely unique technique approach to electrical device Soft computing mistreatment regressive model and artificial neural network (ANN model) [6], the mixture of artificial neural network (ANN), Genetic rule, and formal logic (Fs) technique area unit projected for adjusting short electrical device Soft computing of electrical system [5,19]. Genetic rule is employed for choosing higher rules and back propagation rule is additionally for this network, papers show that a lot of accuracy results and quicker processor than different Soft computing strategies.

The factors area unit wedged as well as on the mid-term electrical device demand: industrial index, shopper indicator, temperature, humidity, rainfall, and wind speed variable. Economic variables area unit typically influenced to a trend element whereas weather factors area unit typically influenced to a alternating element.
This analysis aims to develop a mid-term electrical device Soft computing for yearly energy consumption demand soft computing in Thailand.

This forecast technique uses neural network rule supported feed forward back propagation rule. 2 years ahead electrical device Soft computing have 2 patterns model that area unit model no.1 and model no.2 that have four inputs and twelve inputs, severally. 3 years ahead mid-term electrical device Soft computing have 2 patterns like model no.1 and model no.2 that have four inputs and 4 inputs, severally. This analysis is targeted on the pattern input before taking the feature inputs into neural network model.

This paper is organized as follows. In section II describes the energy consumption demand and variables. In section III presents artificial neural network. In section IV shows case study and test results. Finally, the conclusions are drawn in section V. All these contents will be presented in following.

II. MOTIVATION

Although the second harmonic restraint principle is wide employed in industrial application for several years, it usually encounters some issues like long restrain time

once a protracted line is connected to the protected electrical device. within the ancient methodology the altitude of second harmonic and elementary ar computed by separate Fourier remodel (DFT) and therefore the magnitude relation is employed to guage whether or not the present is influx or internal fault one.

however it's acknowledge that DFT isn't correct if the present is contaminated by harmonics that aren't whole number multiples of the basic, particularly once the computation window is incredibly short and DFT solely accounts for frequency analysis however doesn't provide info within the time domain. whereas DFT assumes a periodic signal, influx current and fault currents ar non-stationary signals.

Mechanical forces build up beneath giant influx current condition among the electrical device coils compared to those occurring at contact that is that the reason for harm of huge power electrical device. giant influx currents additionally have an effect on the facility quality by adding harmonics.

Additionally the presence of huge amount of harmonics within the influx current will cause harm to power issue correction electrical device by exciting resonant overvoltage. therefore steps taken to mitigate the electrical device influx current by controlled switch and use of low loss amorphous core materials in fashionable power electrical device that turn out influx current with low second and fifth harmonic contents.

III.ISSUES OF OLD ARTICLES

In the literature of power transformer protection, the key issue lies in discriminating between transformer magnetizing inrush current and internal fault current. It is natural that relay should be initiated in response to internal fault but not to inrush current or over-excitation/external fault current [4].

Early methods were based on desensitizing or delaying the relay to overcome the transients [5]. These methods are unsatisfactory since the transformer may be exposed for a long unprotected time. Yet another method based on the second harmonic content with respect to the fundamental one was introduced, known as harmonic restraint differential protection [8], which improved security and dependability was appreciated. However, some researchers have reported the existence of a significant amount of the second harmonic in some winding faults [7, 8].

In addition, the new generations of power transformers use of low-loss amorphous material in their core, which can produce inrush current with lower harmonic contents and higher magnitudes [8]. In such cases, some authors have modified the ratio of second harmonic to fundamental restraining criterion by using other ratios defined at a higher frequency [9]. While other researchers proposed wave comparison and error estimation method [10], fuzzy logic based techniques [7], principal component analysis [11], and correlation analysis method [12] to discriminate internal fault condition from non-fault condition.

Power flow through the transformer is also be used as an index to detect inrush current. Zero average power during energization and large power consumption during internal fault was the identification key in [13]. However, all the preceding approaches share the same feature, i.e. they depend on a single index. Furthermore, to choose a proper threshold for discrimination is not easy.Artificial Neural Networks (ANN) is extremely used particularly in the field of power system protection since 1994 as this problem is subclass of pattern recognition of current waveforms. It is to be noted that ANNs were primarily used in different areas such as pattern recognition, image processing, load forecasting, power quality analysis, and data compression. The main advantage of the ANN method over the conventional method is the non-algorithmic parallel distributed architecture for information processing and inherent ability to take intelligent decision.

In recent years, few works which investigate the feasibility of using ANN for power transformer differential protection has also been reported [14].However, the ANNs in these existing studies are specific to particular transformer systems, and would have to be retrained again for other systems. Moreover, the employed feature extraction techniques are based on either time or frequency domain signals, or not both time and frequency features of the signal; this is very important for accurately distinguishing between an internal fault and inrush current.

The wavelet transform is a relatively new and powerful tool in the analysis of the power transformer transient phenomenon because of its ability to extract information from the transient signals simultaneously in the time and frequency domain, rather than conventional Fourier Transform which can only give the information in the frequency domain. Recently, the wavelet transforms have been applied to analyses the power system transients [2], power quality [3], as well as fault location and detection problems [4].

In reference [5], the wavelet transform for analyzing the transient phenomena in a power transformer under conditions of faults and magnetizing inrush currents was presented, and simulated results have shown that it is possible to use certain wavelet components to discriminate between internal faults and magnetizing inrush currents.

IV.ENHANCEMENT PARAMETERS IN SOFT COMPUTING TECHNIQUE

The Transformer demand as a function of time has a complex nonlinear behavior. It depends on a number of complex factors such as seasonal weather, and national economic growth [9].

1. Energy Consumption Demand

Monthly energy consumption demand (Unit in GWh) data is recorded form Electricity Generating Authority of Thailand (EGAT) from 1997 to 2007. Fig.1 shows the relationship between energy consumption demand and time series [9].

We consider the period from 1997 to 2007 to establish the parameters in forecast model. The original signal (behavior) of energy consumption demand. It grew the higher demand every year. The maximum demand is occurred on mid-year or between on March to June. Minimum demand is occurred between on December to January approximately.

2. Variables correlation

In the power systems, several influencing variables can be affected to the behavior of the energy consumption demand. The influence variables are the weather variables and the economic variables of the country. The weather variables have been affected in short-term, mid-term, and long-term Transformer forecasting: maximum temperature, minimum temperature, humidity, rainfall, and wind speed. The economic variables have been affected in mid- term and long-term Transformer forecasting: industrial index and consumer price index.

V.COMPARATIVELLY ANALYSIS OF VARIOUS SOFT COMPUTING ALGORITHEM

1. Artificial Neural Network-The neural network purposes in this paper. It has Three-layers based on feed-forward back propagation algorithm (FFBP). The fundamental structure of this algorithm. An artificial neural network consists of input layer, hidden layer, and output layer. It can be varied a hidden neuron for finding the optimal weight and bias before simulating or Soft computing the Transformer demand. The activation functions or transfer functions of the network in each layerconsumption demand Soft computing model as the following:

- Many variables are selected from the database: temperature, humidity, wind speed, rainfall, industrial index, and consumer price index.
- All input variables are transformed to relative differences.
- All input variables are limited thought the correlation by using MATLAB or SPSS program
- Each factor is normalized by using equation (4).
- Definition of neuron in hidden layer, epoch, and goal of neural network.
- Random initial weight and bias.
- Compute the output based on feed forward back propagation algorithm and MSE by using equation (5).
- Adjusts weight and bias.
- Store weight and bias that compute minimum MSE.

2.Support Vector Machines-Medium term Transformer forecasting, using recursive time - series prediction strategy with Support Vector Machines (SVMs) is presented in this paper. The soft computing is performed for electrical maximum daily Transformer for the period of one month. The dataconsidered for soft computing consist of half hour daily Transformers and daily average temperatures for period of one year. An analysis of available data was performed and themost adequate set of features for our model are chosen.

For evaluation of prediction accuracy we used data obtained from electricity Transformer Soft computing competition on the EUNITE network. Some drawn conclusions from the results are that the temperature significantly effects on Transformer demand, but absence of future temperature information can be overcome with time - series concept. Also, it was shown that size and structure of the training set for SVM May significantly affect the accuracy of Transformer forecasting.

SVMs are developed based on statistical learning theory given by Vapnik [8] in 1995 to resolve the issue of data classification. Two years later, the version of SVMis proposed that can be successfully applied to the data regression problem. This method is called Support Vector Regression (SVR) and it is the most common form of SVMs that is applied in practice [9].

SVMs are based on the principle of structural risk minimization (SRM), which is proved to be more efficient than the empirical risk minimization (ERM), which is used in neural networks. SRM minimizes an upper bound of expected risk asopposed to ERM that minimizes the error on the training data [10].

3.Genetic Algorithms-Genetic algorithms are biologically impressed techniques used for improvement. GAs was formally introduced by Johan Netherlands at university of Michigan, US, in 70s [1, 13]. they're less liable to stick in native minima. In GAs an answer to the matter is given (as a chromosome). The GAs then creates populations of answer to use genetic operators as crossover and mutation to evolve the new potential answer [1, 13]. It finds the fitness perform for potential solutions and finds the optimum one.

Following is that the Pseudo code of GAs. In crossover operator a crossover purpose is chosen in parent body. All information on the far side that time in parent body is swapped between the 2 parent chromosomes. The ensuing chromosomes ar known as kids. Crossover operation is diagrammatically illustrated in Genetic

algorithms ar a numerical improvement technique. additional specifically, they're parameter search procedures primarily based upon the mechanics of natural genetic science. They mix a Darwinian survival-of-the-fittest strategy with a random, nonetheless structured info exchange among a population of artificial "chromosomes". this method has gained quality in recent years as a sturdy improvement tool for a spread of issues in engineering, science, economics, finance, etc.

GA accommodate all the sides of soppy computing, specifically uncertainty, inexactitude, non-linearity, and hardiness. a number of the enticing options is summarized here within the next paragraph. Learning: GA are the best known and widely used global search techniques with an ability to explore and exploit a given operating space using available performance (or learning) measures. Generic Code Structure: GA operates on an encoded parameter string and not directly on the parameters.

This enables the user to treat any aspect of the problem as an optimizable variable. .Optimality of the Solutions: In many problems, there is no guarantee of smoothness and unimodality. Traditional search techniques often fail miserably on such search spaces. GA are known to be capable of finding near optimal solutions in complex search spaces. Advanced Operators: This includes techniques such as niching (for discovering multiple solutions), combinations of Neural, Fuzzy, and chaos theory, and multiple-objective optimization

VI.CONCLUSION

This paper presents the application of GA, SVM and ANN algorithms for long term TransformerSoft computing in power systems. The problem is formulated as an optimization problem. Thesolution framework was implemented and tested using actual recorded data. Three different models were used and the quadratic model was proven to be the best one that representsthe data available. This model is then used with the actual recorded data to test the performance of the three algorithms. The forecast using the GA method has been compared with those obtained with other methods. Soft computing results using GA were found to be the best. This indicates that the GAs approach is quite promising and deserves serious attention because of its robustness and suitability for parallel implementation.

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