A new hybrid approach for improved accuracy Electric load forecasting by using ANN

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***Abstract*—**Electric load forecasting is an important aspect in electrical power industry. It is important to determine the future demand for power as far in advance as possible. According to the foreseen load, the company makes investments and decisions on buying energy from the generating companies, and planning for maintenance and expansion.

Electricity demand forecasting is a central and integral process for planning periodical operations and facility expansion in the electricity sector. Demand pattern is almost very complex due to the deregulation of energy markets. Therefore, finding an appropriate forecasting model for a specific electricity network is not an easy task. Although many forecasting methods were developed, none can be generalized for all demand patterns. Therefore, this paper presents a new methodology that can be used as a guide to construct Electric Power Load Forecasting model for better accuracy.

I. INTRODUCTION

In power system network load forecasting is very important part of energy management system for operation and planning purpose. Load forecasting means that the techniques for predication of electric load [2]. Load forecasting is integral and central process in the planning and operation of electric energy management system [1]. In power systems the next days ‟ power generation must be scheduled every day, day ahead Short-term load forecasting (STLF) is a necessary daily task for power dispatch. In a power system network short term load forecasting play important in non-competitive to renewable energy system[3].STLF is also used for prevent overloading in reduce occurrence of equipment of failure. STLF is a very useful tool for basic generation scheduling functions, assessing the security of power system at any time, timely dispatcher information [3].

Forecasting is the process of estimating the qualitative or quantitative future data by means of calculation. Forecasting has been applied in many areas and it is sometimes human driven due to its complexity. It could be considered one of the most difficult tasks because of the uncertainty about the future [4]. Load forecasting is a technique used by energy-providing companies to predict the power/energy needed to meet the demand and supply equilibrium. Its importance in business, economics, government, and many other fields, and guide many important decisions [5]. Therefore, good forecasts help to produce good decisions such as decisions on purchasing and generating electric power, load switching, and infrastructure development [6].

Basically, an electric load refers to the power consumed by an electric circuit at its output terminal [7]. In other words, load forecasting is way of estimating what future electric load will be for a given forecast horizon based on the available information about the state of the system [9]. In addition, forecasting is inextricably linked to building statistical models before forecast a variable of interest, also, build a model and estimate the model's parameters using observed historical data. Typically, estimated model summarizes dynamic patterns in the data [9], which is estimates model provides a statistical characterization of the links between the present and the past data.

Problem Statement

All of previous research are based on predication and accuracy but no of this doesn't work on how the predication can be used as helpful for maintaining the devices.

All of them work on present consumption of electricity and future demand but they don't focus on how maintain devices.

Proposed solution

A variety of methods including neural networks, time series, hybrid method and fuzzy logic have been developed for load forecasting. The time series techniques have been widely used because load behavior can be analyzed in a time series signal with hourly, daily, weekly, and seasonal periodicities.

Data Set Characteristics:	Multivariate, Time-Series	Number of Instances:	2075259	Area:	Physical
Attribute Characteristics:	Real	Number of Attributes:	9	Date Donated	2012-08-30

Table.1: Data Set Information

By using that NN and other method with threshold point we can provide better predication and maintains system.

Used Methodology

Data Set Information:

Measurements of electric power consumption in one household with a one-minute sampling rate over a period of almost 4 years. Different electrical quantities and some sub-metering values are available [10].

Feed-forward neural network

A feed-forward neural network is an artificial neural network wherein connections between the nodes do not form a cycle [11].

In this network, the information moves in only one direction, forward, from the input nodes, through the hidden nodes (if any) and to the output nodes. There are no cycles or loops in the network.

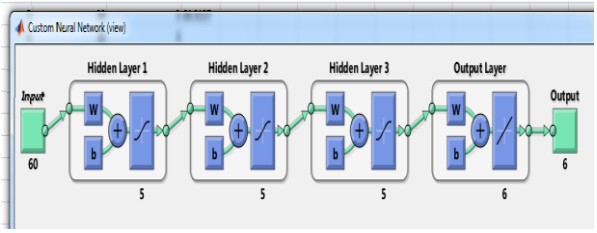

Fig.1:Neural Network

II. IMPLEMENTATION

In this research, Electric load is predicted using neural networks. All the graphs and figures are made by using matlab

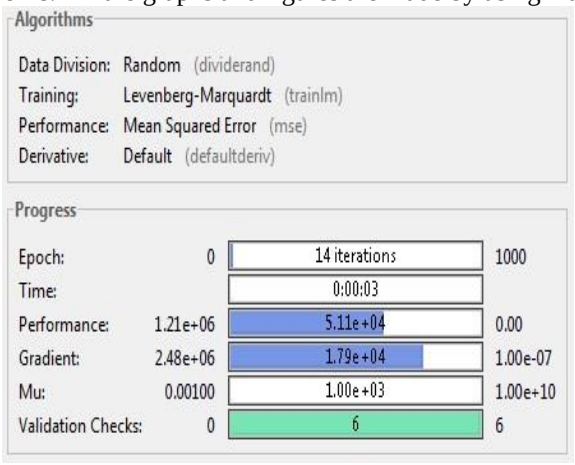

Fig.2:creation of NN in matlab

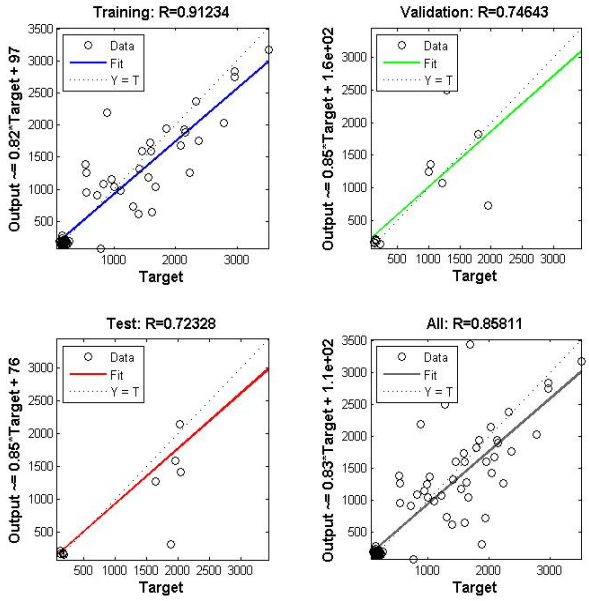

Fig.3:ANN Training regression

III. RESULTS

By using the above approach we can predicted different types of sample load with accuracy up to 99% and mean accuracy of 14 samples are valued at 82.76% in this case(as shown in the graph below). But it may increase on the basis of previous sample data size. If we take large amount of data for prediction and then predict minimum days load, then its accuracy is enhanced.

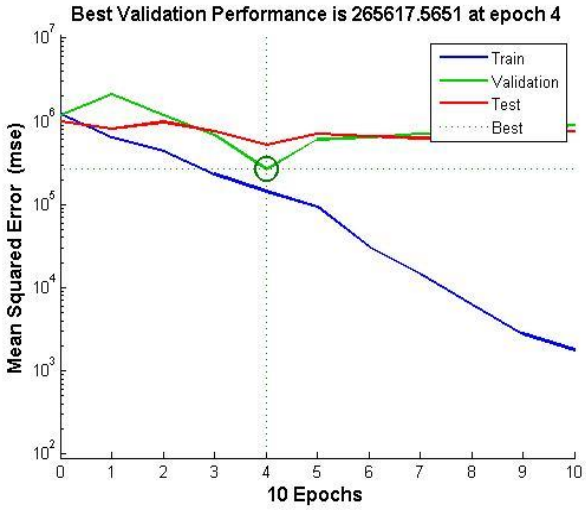

Fig.4:ANN Performance graph

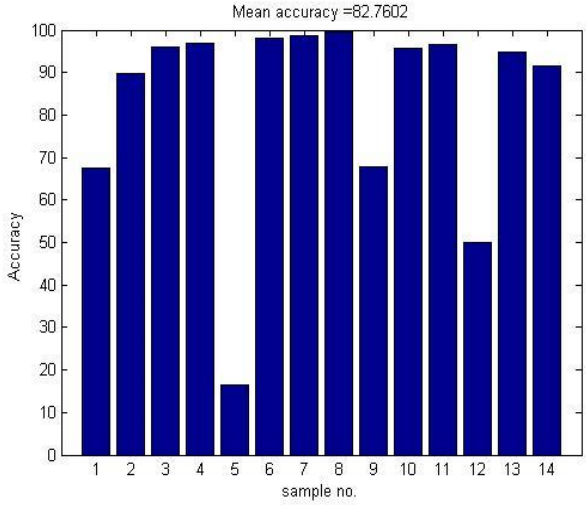

Fig.5:Show Mean accuracy

IV. CONCLUSION

By using this approach we deduced that accuracy is directly propositional to the size of data for prediction. For producing superior results we must train our ANN many number of times, so ANN becomes more capable to predict an improved accuracy.

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