Predictive Analytics for Power Consumption in Home appliances Using Computational Intelligence

Ch.Samyuktha[1] M.S.L.Aishwarya[2] M.V.Srikanth[3] K.V.Sravya[4]
Mr.Shaik Nagul M.Tech (PhD)
*[*1]Associate Professor CSE Department,*
[#1, 2, 3, 4] students CSE Department, Lendi institute of engineering and technology,
VIZIANAGARAM, ANDHRA PRADESH, INDIA.

Abstract- **Predictive analytics encompasses a variety of statistical techniques from predictive modelling, machine learning, and data mining that analyse current and historical facts to make predictions about future, or otherwise unknown, events. The model is to perform optimized prediction on power consumption. We propose an optimized model using computational intelligence and it is a step by step method that follows an integrated approach which can solve several complex problems in predictive analytics. It uses multilayer perceptron Adaline feed forward neural network to predict the next values of power consumption. As an integrated method, the model uses multilayer perceptron algorithm as first step to check the data optimization, since the data is considered as an important element in data analytics. The optimized data is extracted using multilayer perceptron adaline feed forward neural network for making the prediction.**

***Keywords*— Predictive analysis, Computational intelligence, Multilayer perceptron, Adaline feed forward neural network**

I. INTRODUCTION

Predictive Analytics is an area of data mining that deals with extracting information from data and using it to predict trends and behaviour patterns. Often the unknown event of interest is in the future, but predictive analytics can be applied to any type of unknown whether it be in the past, present or future. In the past few years, predictive analytics has gone from an exotic technique practiced in just a few inches, to a competitive weapon with a rapidly expanding range of uses. The increasing adoption of predictive analytics is fuelled by converging trends. The modern analyst would say, "Give me enough data, and I can predict anything". Predictive analytics has its origin in the 1940s, when governments started using the first computational models. With non-linear programming and real-time analytics, data analytics and prescriptive analytics goes mainstream and becomes available to all organizations. With the rise of the big data technologies, we have now entered a new era of predictive analytics that will personalize and democratize data (analytics) for organizations, individuals and governments.

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II. EXISTING SYSTEM

Many proposals state numerous ways of implementing predictive analytics in power consumptions of machines, manufacturing and various industries. The focus has mostly been on logistic regression which performs linear computation and produces results which are not quite effective for the conditional implementation.

How does it work?

A. The logistic regression measures the relationship between the categorical dependent variable and one or more independent variables by estimating probabilities using a logistic function. Logistic regression can be seen as a special case of generalized linear model and thus analogous to linear regression. The model of logistic regression, however, is based on quite different assumptions (about the relationship between dependent and independent variables) from those of linear regression. In particular the key differences of these two models can be seen in the following two features of logistic regression. First, the conditional distribution is a Bernoulli distribution rather than a Gaussian distribution, because the dependent variable is binary. Second, the predicted values are probabilities and are therefore restricted to (0, 1) through the logistic distribution function because logistic regression predicts the probability of particular outcomes.

B. Drawbacks Of Existing System:

- Focuses only on linear data with probabilistic straight curves
- Internal details are not computed along with error rates
- Not applicable for analysis on non-linearity.

III. PROPOSED SYSTEM

I. Artificial Neural Network (ANN)

An artificial neuron network (ANN) is a computational model based on the structure and functions of biological neural networks. Information that flows through the network affects the structure of the ANN because a neural network changes - or learns, in a sense - based on that input and output. ANNs are considered nonlinear statistical data modelling tools where the complex relationships between inputs and outputs are modelled or patterns are found. An ANN has several advantages but one of the most recognized of these is the fact that it can actually learn from observing data sets. In this way, ANN is used as a random function approximation tool. These types of tools help estimate the most cost-effective and ideal methods for arriving at solutions while defining computing functions or distributions.

ANN takes data samples rather than entire data sets to arrive at solutions, which saves both time and money. ANNs are considered fairly simple mathematical models to enhance existing data analysis technologies. ANNs have three layers that are interconnected. The first layer consists of input neurons. Those neurons send data on to the second layer, which in turn sends the output neurons to the third layer.

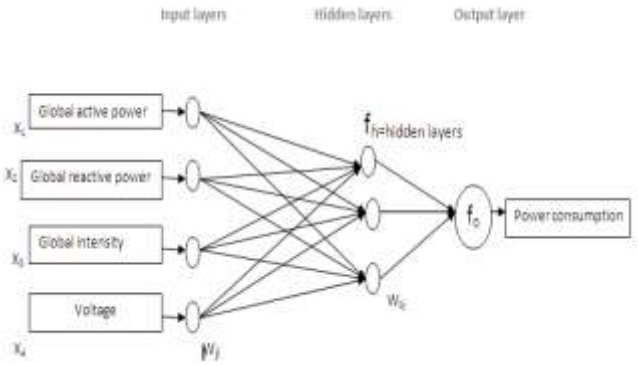


Fig: Pictorial representation of ANN

II.Back proportion (BP)

It can be said as "backward **propagation** of errors", is a common method of training artificial neural networks used in conjunction with an optimization method such as gradient descent. The method calculates the gradient of a loss function with respect to all the weights in the network.
BP has two phases:

Forward pass phase: Computes 'functional signal', feed forward propagation of input pattern signals through network
Backward pass phase: Computes 'error signal', propagates the error backwards through network starting at output units (where the error is the difference between actual and desired output values)

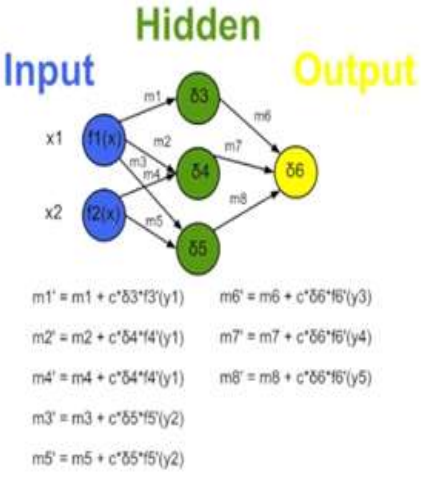
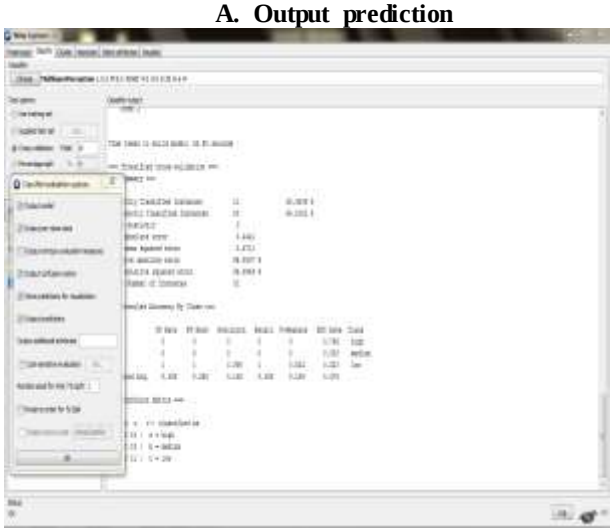
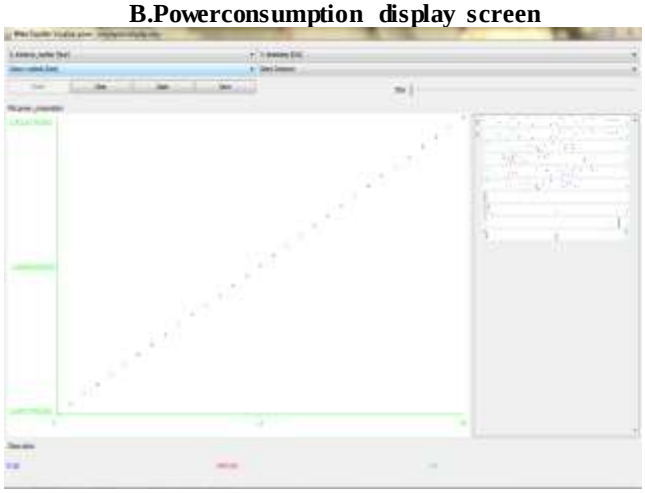


Fig: Back proportion with error

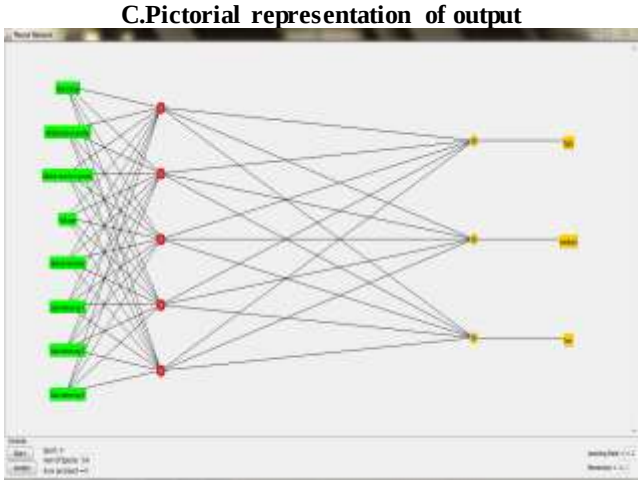
A. Output prediction



B.Powerconsumption display screen



C.Pictorial representation of output



IV. CONCLUSIONS

In this work, our approach is valid for predicting the power consumption. We have achieved a prediction completely. Our approach is intended for data mining and the methods that are included in it. Predictive models provide an extremely effective way to get more value from data and they have wide

range of applications that have not come even close to being fully exploited yet.

At the same time, predictive analytics are not appropriate or even feasible for all applications. As with any powerful technology, care must be taken to implement models pragmatically in ways that produce real value.

An important challenge to greater adoption is that, the talent needed to analyse data, create models and implement them successfully is in short supply. Organizations looking to get more value from their data assets through predictive analytics will be wise to invest in analytical training and mentoring programs.

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