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A Feed Forward Neural Network Model for the Energy of an Industrial IoT Network

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Abstract:- Wireless Sensor Network technologies are used in many areas of modern life. Internet of Things (IoT) technology is considered to be one of the most important areas in the future and attracts attention in many industrial areas. IoT aims to control things around us through a common infrastructure and to inform us about situations. In this study, a feed forward neural network is used to an energy analysis of the IoT network and the results and analysis are presented finally.

Keywords:- *IoT; Artificial Neural Networks; Feed Forward Neural Networks; Wireless Sensor Network; Deep Learning.*

I. INTRODUCTION

The Internet of Things (IoT), is another innovation worldview imagined as a worldwide system of machines and gadgets fit for collaborating with one another [1-2]. This grants measurands to be detected and prepared at progressively making an immediate communication stage.

Artificial neural networks are networks of basic preparing components working on their information and speaking with different components [3]. There are many kinds of neural networks model, yet the fundamentals are very smiler.

In this paper, feed forward neural network is used as a detector to gather and analyze information from various data of the IoT network.

The rest of the paper is organized as follows: Section II gives a review of Internet of Things. Section III introduces the learning procedure of Artificial Neural Network algorithm. Section IV gives a description of a feed forward neural network system model for the energy of an industrial IoT network. Section V shows the illustrative results of the proposed scheme and then conclude the article.

II. INTERNET OF THINGS

The Internet of Things is probably going to be joined into our life, for example, transportation, medical services, modern mechanization, smart home, smart cities. Since IoT based frameworks are broadly utilized in urban communities where a lot of information are produced and moved, it is hard to understand the information and give solid control activities.

Ongoing development in detecting and registering innovations has opened new roads for information preparing. Figure 2 shows computing technologies offers huge information preparing at sensors levels, endpoints in IoT frameworks, edge servers, and brought together and decentralized distributed computing frameworks [4].

III. ARTIFICIAL NEURAL NETWORK

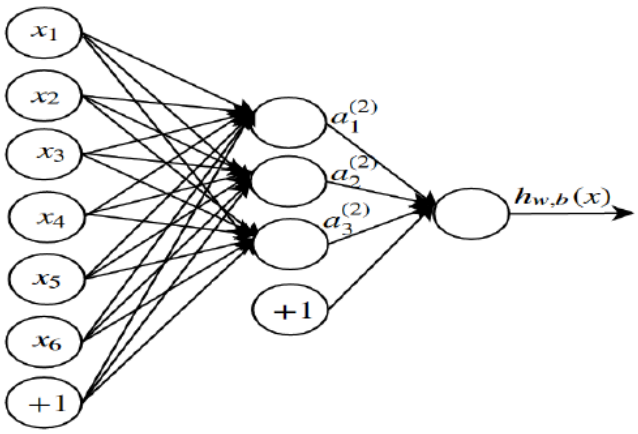

Fig 1:- Artificial neural network [2]

The neurons of the artificial neural network are utilized to shape complex theories. As the number of neurons increases, the hypothesis will be complex. Assessing the theories is finished by setting the information nodes and the event streams are engendered through the network to the yield where it is named ordinary. Gradient descents are utilized in order to drive the error in the yield hub back through the network by a back spread procedure so as to gauge the error. The gradient of the cost function would thus be able to be determined. Neural network framework experiences preparing so as to get familiar with the example made in the framework. From Figure 1 can be seen an artificial neural network example [2].

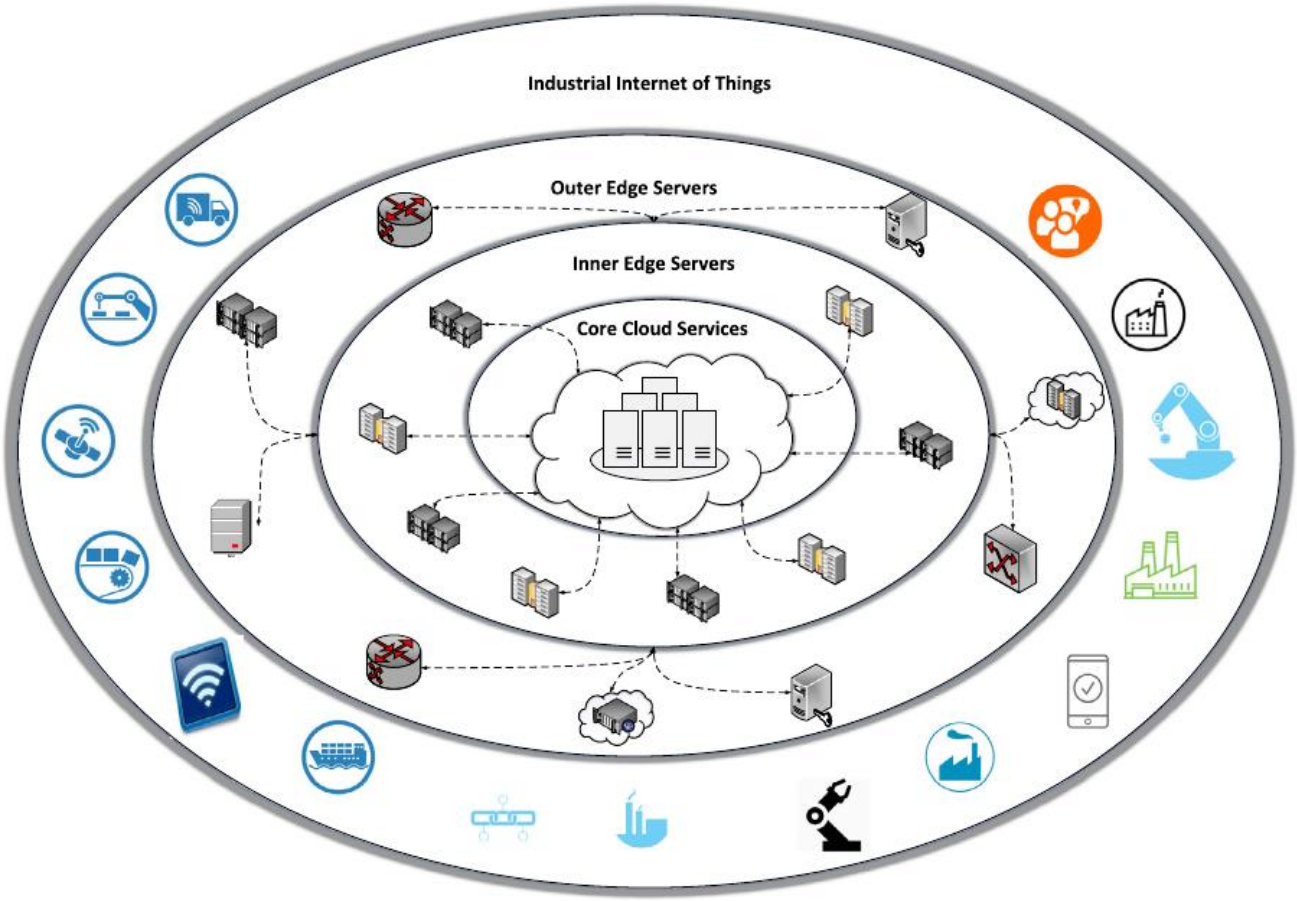

Fig 2:- Industrial IoTs [4]

IV. SYSTEM MODEL

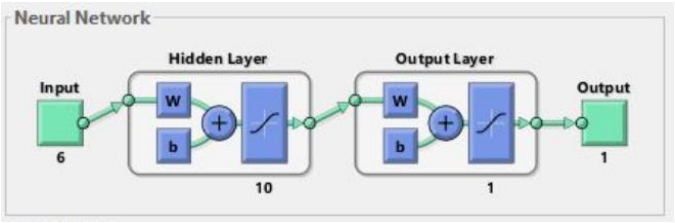

Fig 3:- System model

There are two type of training process: supervised (feed forward neural network) and unsupervised training. In supervised training, neural network knows the ideal yield and changing of weight coefficients is done in such manner. In unsupervised training, the ideal yield isn't known, the framework is furnished with a gathering of realities and after that left to itself to settle down to a steady state [3]. The feed forward neural network is used in this study. Figure 3 shows the system model.

In the neural network, random data division algorithm is used. Gradient Descent with Momentum and Adaptive Learning algorithms are used for training. Performance of the algorithms are mean squared error, and calculations are MEX type.

Industrial demand/ response IoT data was used as data set [5]. In dataset, industrial data collected using Iot devices. Demand Response, Area, Season, Cost, pair number and distance are entered to inputs of neural network system. The target of the neural network system is the energy values.

V. RESULTS

Industrial demand/ response IoT data was trained to the feed forward neural network and test results are given in this section. Performance of feed forward neural network is shown in Figure 4. State of feed forward neural network is shown in Figure 5. Regression plot is illustrated in Figure 6.

VI. CONCULUTION

In this paper, a neural network based approach for energy of the industrial IoT network presented. The feed forward neural network model was validated against a simulated IoT network demonstrating. The industrial demand/response of IoT dataset was trained to the feed forward neural network. And then, results of the feed forward neural network were presented. Furthermore, other deeper neural networks will be investigated for industrial IoT network.

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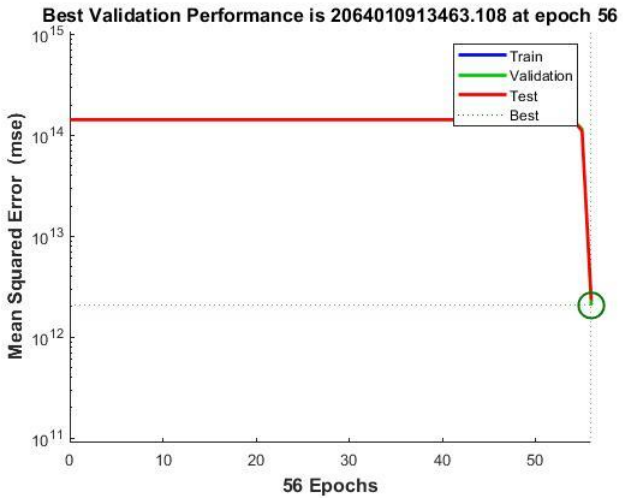

Fig 4:- Performance of feed forward neural network

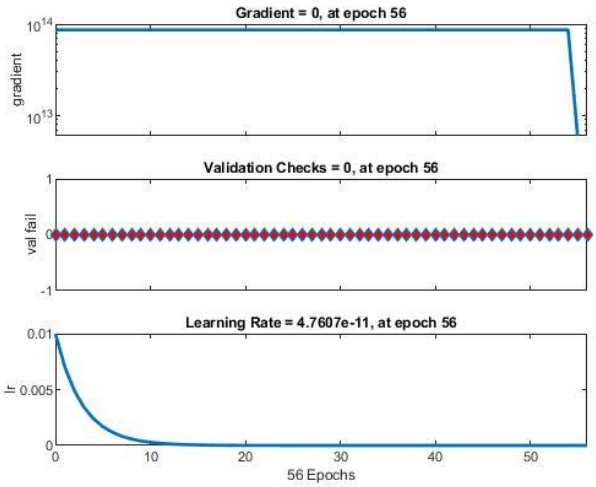

Fig 5:- State of feed forward neural network

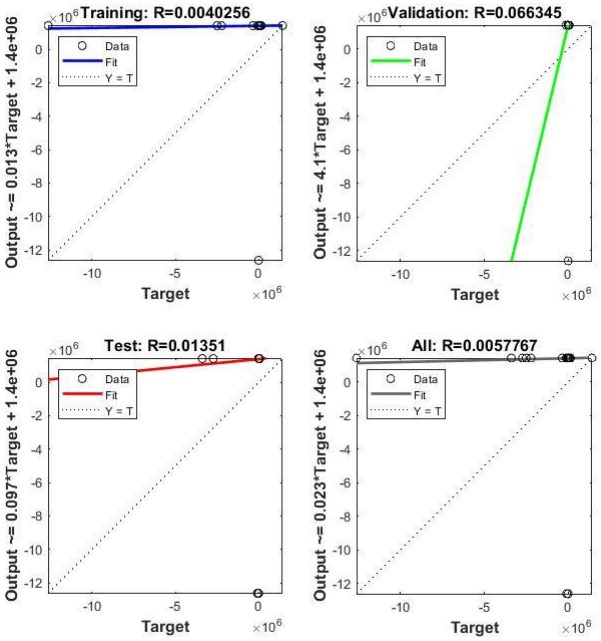

Fig 6:- Regression of feed forward neural network

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