



INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE
IN THE ARAB COUNTRIES

UNDER THE THEME

"MANAGING MAINTENANCE WITHIN INDUSTRY 4.0"

CONICIDE WITH THE 16TH ARAB MAINTENANCE EXHIBITION

THE EFFECT OF USING NEURAL PROGRAMMING ON MAINTENANCE MANAGEMENT IN THE ELECTRICAL SYSTEM

Mahmood .M. Ali

4.0



WHAT IS ANN?



Work on artificial neural network has been motivated right from its inception by the recognition that the human brain computes in an entirely different way from the conventional digital computer

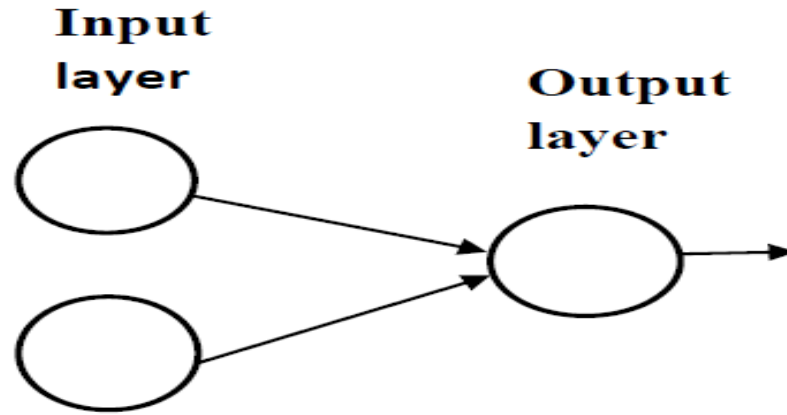
The network is implemented by using electronic components or is simulated in software on a digital computer

A neural network is a massively parallel distributed processor made up of simple processing units, which has a natural propensity for storing experimental knowledge and making it available for use.

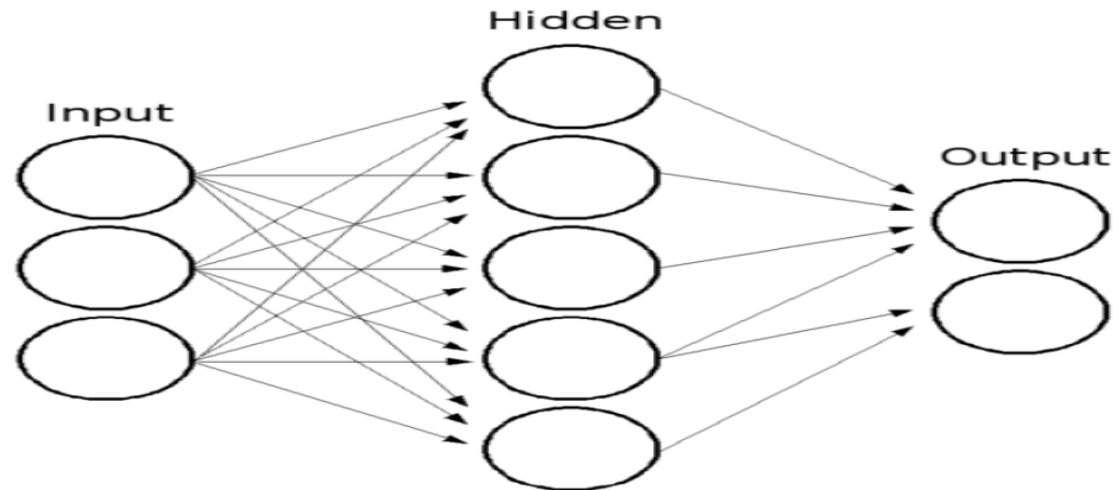
NETWORK Diagram



Single layer



Multi-layer



Peak LOAD FORECASTING USING ANN



- There is a growing tendency towards unbundling the electricity system, this is done by splitting the electricity sector to (generation, transmission, and distribution) when the demand increase a burden will be on planning management and operations of the electrical network, The operation and planning of a power utility company requires an adequate model for electric power load forecasting.
- Load forecasting plays a key role in helping an electric utility to make important decisions on power, load switching, maintenance of power plant unit.

Peak LOAD FORECASTING USING ANN



A broad spectrum of factors affect the system's load level such as weather effects, random effects like human activities, load management .

Thus the load profile is dynamic in nature with temporal, seasonal and annual variations.

The factors above reflected as inputs were fed into Artificial Neural Network (ANN) and after sufficient training were used to predict the load demand for the next day

The inputs data given are:

(Min load – previous day ,temp) + temp next day

(Max morning - previous day ,temp) + temp next day

(Max evening - previous day ,temp) + temp next day

Types of day – next day

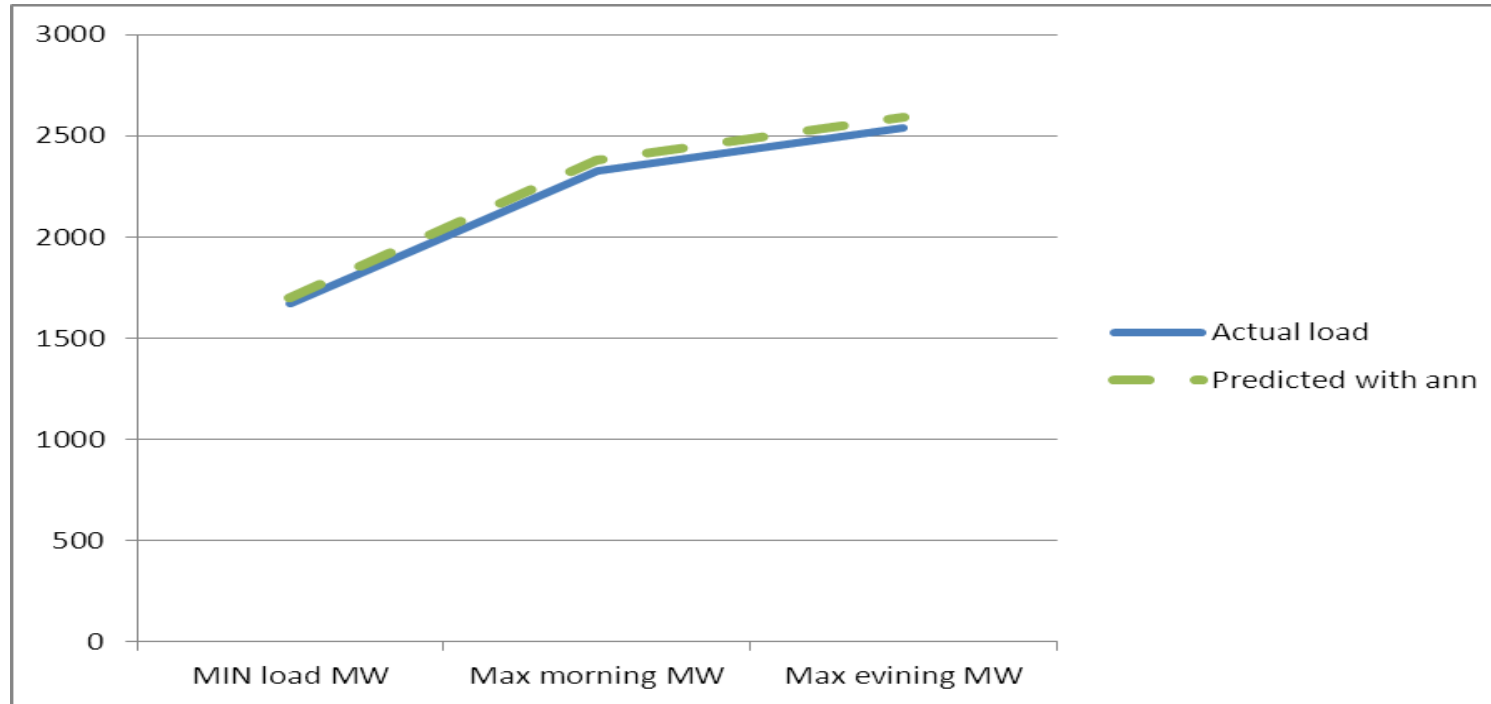
Weather condition – next day

The difference in maintenance management with ANN



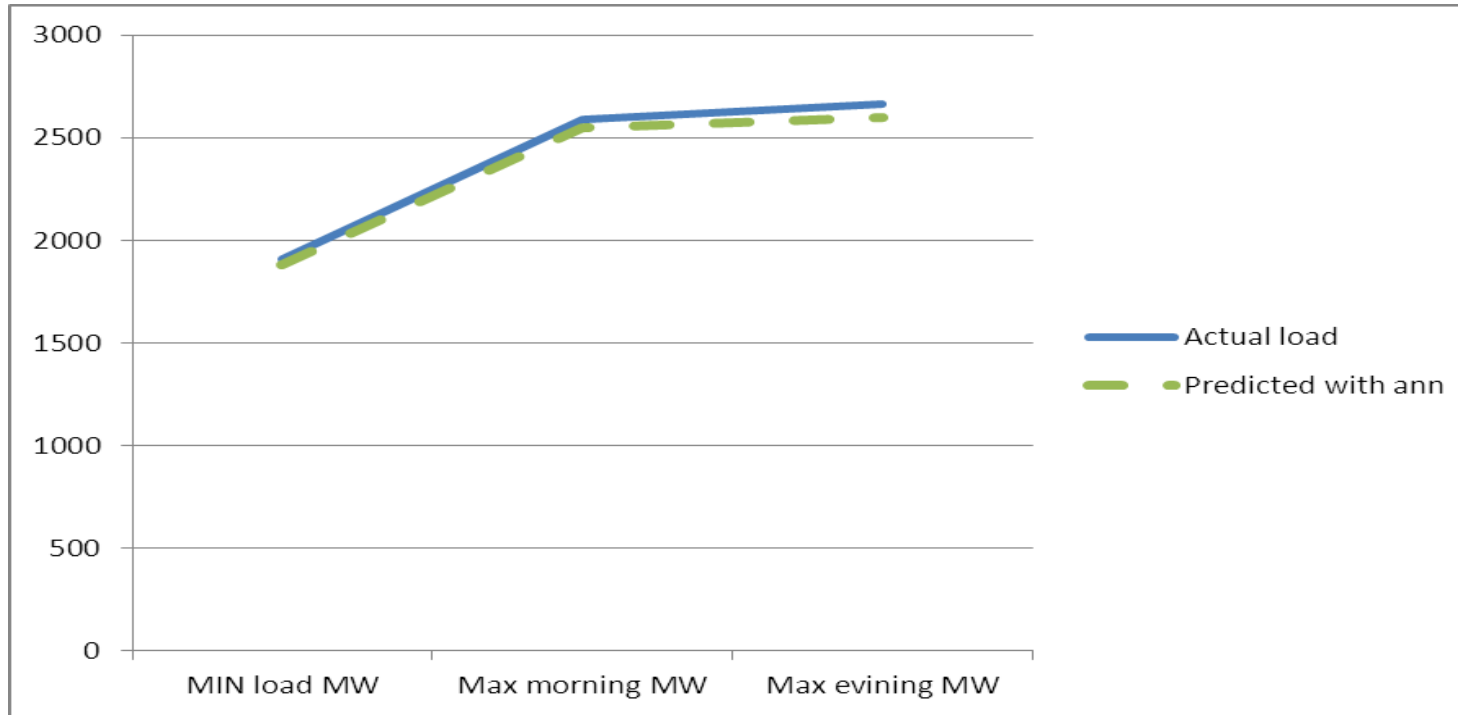
The maintenance program of the generating units shall be arranged according to the expected loads of the electrical system to arrange outages of the generating units for maintenance at the lowest cost, in addition to the absence of a deficit in generating the electrical system ,Therefore the more predictable loads the lower cost and the risk of exit of the generating units, Here we will show the economic and technical impact of the output of the generating units when using ANN.

31-8-2017 (Holiday , Eid)



	Actual load	Predicted with Ann	Difference
MIN load MW	1670	1700	1.8%
Max morning MW	2330	2380	2.1%
Max evening MW	2540	2595	2.2%

Friday (11-8-2017)



	Actual load	Predicted with Ann	Difference
MIN load MW	1910	1880	1.6 %
Max morning MW	2590	2550	1.5 %
Max evening MW	2665	2600	2.4 %



Total load impact	ANN	Actual	Def. MW
	52674	51504	1170/24=48

Generation impact	ANN	Actual	Def. -units
	13	13	0

RESULTS



- The results obtained from testing the trained neural network on new data for a day over a one-day period are presented below in graphical form. Each graph shows a plot of both the predicted and actual load in MW values against the peak hour of the day.
- The absolute error ANN (2.03%) between the predicted and actual loads for day has been calculated and presented in Table, The range of error values accepted to 3% for the network.
- This represents a high degree of accuracy in the ability of neural networks to forecast electrical load.

Conclusions



- Using ANN network model for one day ahead short term load forecast shows that ANN network has a good performance and reasonable prediction accuracy.
- Its forecasting reliabilities were evaluated by computing the absolute error between the exact and predicted values. The results suggest that ANN model with the developed structure can perform good prediction with least error and finally this neural network could be an important tool for short term load forecasting.
- Future studies on this work can incorporate additional information into the network so as to obtain a more representative forecast of future load.
- generation unit maintenance program will be more accurate, and its means decrease cost and increase the reliability of electricity generation system.



Thank you