Electric Load Forecasting Using Neural Networks and Fuzzy Logic Systems

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Master (Msc) Thesis , 2006

Abstract

In this thesis, a proposed technique for electric load forecasting is developed after introducing real time effects on the forecast. The most important factors affecting the medium term forecasting are: Temperature variations, Number of air conditioners and Number of households. Other factors include: Population, Gross National Product, Index of Industrial Product and Climatic changes. For the electric load forecasting, two types of techniques are introduced, the first is of statistical type including Regression, Exponential Smoothing and ARIMA models, and the second type includes Neural Networks and Fuzzy Logic Systems. Statistical techniques are used to consider the electric load as univariant time series; this technique was modified to take in consideration the abovementioned factors as additional variables in the time series. The same is applied to the ARIMA models, neural networks and fuzzy logic systems. A comparison is carried out between the models with and without introducing the effects based on three statistical indexes. Accordingly, it is demonstrated that based on these indexes, the neural network model has yielded the best results. Moreover, it is shown that by introducing the effects, the overall electric load forecast has improved and the prediction values showed high accuracy and very low deviation from the real load values for all the models. Finally, this thesis has proposed the Neuro-Fuzzy technique as an additional technique, which relates the neural networks with the fuzzy systems to implement the features of the forecasting technique to be able to face the unanticipated changes in load demand.

Keywords

Electric Load Forecasting ,