DEVELOPMENT OF A COMPUTATIONAL INTELLIGENT SYSTEM FOR SHORT-TERM ELECTRIC LOAD FORECASTING

By

ABIMBOLA RASHIDAT FALEYE

B.Sc. (Computer Engineering), Ife

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A B S T R A C T

This study elicited information related to Short-Term Electric Load Forecasting (STELF) and developed an intelligent system based on the information. This was with a view to setting the basis for implementing a commercial software for electric load forecasting.

Historical data on Short-Term Electric Load Forecasting for three years ranging from 2004 to 2006 (being the available data) and information on the process involved in Short-Term Electric Load Forecasting were collected from the National Control Centre, Osogbo using interview, observation and contextual inquiries as well as user diary (system logbook). The knowledge embedded in the data and information collected were elicited and represented using fuzzy logic based rules. The fuzzy knowledge space was developed using fuzzy logic tool in Matlab 7 and Fuzzy Decision Tree software (FID 3.4). The data for the year 2004 and 2005 was used to develop the system. In order to evaluate the performance of the proposed model, electric load forecasting was performed on National Control Centre data. The randomly selected data from 2004 and 2005 was used for model validation while the data for 2006 was used for model verification.

An intelligent system was developed and used to produce a 24-hour ahead forecasting of electric load. The prediction results from the proposed model (Fload) and that of the conventional model (F) were compared with the actual load based on fractional errors computed. The fractional errors were the variations from the actual load. The average fractional errors for Fload and F for the different periods are: January 1st 2004 (0.12 and 0.45), June 5th 2004 (24.91 and 42.95), March 2nd 2005 (0.14 and 1.10), September 4th 2005 (0.22 and 0.88) and January Ist 2006 (0.22 and 0.78). The

average fractional forecast errors for the proposed model were less than that of the conventional model to validate the effectiveness of the proposed approach.

The study concluded that the use of fuzzy logic in short-term electric load forecasting gave more accurate results than using the conventional model, hence the advantage of the proposed model over the conventional model.