Application of neural network and clustering techniques for short term electricity demand forecasting

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Abstract: Many researchers around the world have investigated short term load forecasting (STLF) models based on various forecasting techniques to prepare a better generation plan. They investigated traditional techniques and then moved to modified traditional techniques and at present, soft computing techniques are being investigated. This research, with its focus on short-term load forecasting, aims to fill this gap by implementing a new cluster-based technique as well as artificial neural networks (ANNs) on a set of real time data of a period of five years, provided by Ceylon Electricity Board gathered for the period of 01-01-2009 to 31-12-2014 were taken at each half an hour. Both methodologies were applied with respect to each half hourly series and 48 numbers of predictions were obtained for the next 24 hours from each half hourly series. In clustering, the demand of a day was categorized as Low, Medium and High demands and then the category of the next day demand was observed by a probability-based method. Then the next day demand was computed by applying Gaussian mixture models. The data of first four years (70% of the dataset) were used to train the algorithm and last year (30% of the dataset) were used for testing. The models' applicability and accuracy were compared with the predictions obtained by each of the two approaches. In the newly introduced clustering technique, the half hourly electricity demand of next 24 hours was computed by considering probability and based on Gaussian mixture models. The predictions provided by clustering technique consisted of less accuracy compared to those of ANN models.

Keywords: ANN, Clustering, Half Hourly Electricity Demand, STLF