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Artificial Neural Network Power Demand Forecasting Model for Energy Management

Load forecasting is important in electric power industry. It provides future load demand information necessary for improving decision making thus enhancing reduction of power demand. Currently many world organizations depend on technical expert's knowledge and experience to assess, evaluate and advice on energy conservation and efficiency status. These methods suffer from inaccuracies and bias leading to uncertainty in power generation, supply and high costs of energy. The current adoption and advancement of information technology, application of machines learning and artificial intelligence techniques will provide unbiased and more accurate information on energy efficiency status. The research study developed an Artificial Neural Networks Based Power Demand Forecasting Model for Energy Management (ANNPDFMEM). A Multi-Layer Feed Forward Neural Networks structure was used. The electricity load data was collected from the Kenya Power and Lighting company (KPLC) smart meters for Kabarak University in Nakuru County. The collected data set was divided into 70% training set, 15% validation set and 15% testing set. The model was trained using the Back-Propagation learning algorithm. The smallest Mean Square Error in the training iteration was selected and validated with independent set of test samples. Actual smart meter load data from KPLC was compared against the predicted load. The performance evaluation of the model was done to predict the actual load values. The results obtained a Mean Squared Error (MSE) of 9.5%, and R value of 1. The results indicated high accuracy forming the basis for recommendation for adoption of the (ANNPDFMEM) as a tool for future power demand information. This information platform is important for decision making on energy efficiency and conservation strategies for sustainability and energy management

Keywords

Load Forecasting, energy demand, Energy management

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