

Demand energy forecasting using genetic algorithm to guarantee safety on electrical transportation system

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Abstract

Demand estimation models are used for energy planning activities. Their primary function is focused on securing energy supply to final users using available resources in generation, transport and interconnection. Long-term planning models typically use non-linear optimization techniques considering an error not exceeding 5%. The reference model used by UPME in Colombia is limited to an average error of 1.6% considering non-linear modeling estimation techniques. However, they are limited in their ability to anticipate uncharacteristic variations in curves or externalities, which increases the probability of an erroneous prediction. Therefore, this research proposes a model to forecast electricity demand using neural networks in order to anticipate non-characteristic variations. The study first documents current methodologies for the prediction of maximum power demand, as well as the current deficiencies in the used forecasts, A new model is then formulated with the application of neural networks using the algorithm Cascade-Forward Back propagation using MATLAB R2017a. During the model comparison process, it was identified that the data obtained reflects the characteristics of demand behavior with an acceptable margin error equal to 0.5%.

keywords

Cascade-forward back propagation, Long-term demand estimation model, Neural networks, Peak power demand forecast.