Hybrid Wavelet-Adaptive Neuro-Fuzzy Inference System Model for a Greenhouse Energy Demand Prediction

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Abstract : Energy demand prediction plays a crucial role in achieving next-generation power systems for agricultural greenhouses. As a result, high prediction quality is required for efficient smart grid management and therefore low-cost energy consumption. The aim of this paper is to investigate the effectiveness of a hybrid data-driven model in day-ahead energy demand prediction. The proposed model consists of Discrete Wavelet Transform (DWT), and Adaptive Neuro-Fuzzy Inference System (ANFIS). The DWT is employed to decompose the original signal in a set of subseries and then an ANFIS is used to generate the forecast for each subseries. The proposed hybrid method (DWT-ANFIS) was evaluated using a greenhouse energy demand data for a week and compared with ANFIS. The performances of the different models were evaluated by comparing the corresponding values of Mean Absolute Percentage Error (MAPE). It was demonstrated that discret wavelet transform can improve agricultural greenhouse energy demand modeling.

Keywords : wavelet transform, ANFIS, energy consumption prediction, greenhouse

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