Advanced wind speed prediction model based on combination of weibull distribution and artificial neural network

ABSTRACT

One of the most crucial prerequisites for effective wind power planning and operation in power systems is precise wind speed forecasting. Highly random fluctuations of wind influenced by the conditions of the atmosphere, weather and terrain result in difficulties of forecasting regardless of whether it is short-term or long-term. The current study has developed a method to model wind speed data predictions with dependence on seasonal wind variations over a particular time frame, usually a year, in the form of a Weibull distribution model with an artificial neural network (ANN). As a result, the essential dependencies between the wind speed and seasonal weather variation are exploited. The proposed model utilizes the ANN to predict the wind speed data, which has similar chronological and seasonal characteristics to the actual wind data. This model was applied to wind speed databases from selected sites in Malaysia, namely Mersing, Kudat, and Kuala Terengganu, to validate the proposed model. The results indicate that the proposed hybrid artificial neural network (HANN) model is capable of depicting the fluctuating wind speed during different seasons of the year at different locations.