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A novel neural network method for wind speed forecasting using exogenous measurements from agriculture stations[☆]

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Abstract

This paper proposes a novel ANN-based wind speed forecasting method based in the introduction of low-quality measurements as exogenous information, processed by six prediction models to perform one-hour-ahead enhanced forecasting. The models evaluated are classified in two groups: first, persistence and ARIMA, which are used as references, and secondly, the remaining four, based on neural networks. Model comparison is realized by applying two procedures. On the one hand, four quality indexes are assessed (the Pearson's correlation coefficient, the index of agreement, the mean absolute error and the mean squared error), and the other hand, an ANOVA test and multiple comparison procedure are conducted. A backpropagation network with nine neurons in the hidden layer obtains improvements couples (mean absolute - mean squared error) of 23.92% - 47.48%, and 23.19% - 45.54% for the persistence and the ARIMA models, respectively. The paper provides strong practical evidence that traditional agricultural measurements are potentially

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