Statistics > Methodology

Probabilistic wind speed forecasting using Bayesian model averaging with truncated normal components

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Bayesian model averaging (BMA) is a statistical method for post-processing forecast ensembles of atmospheric variables, obtained from multiple runs of numerical weather prediction models, in order to create calibrated predictive probability density functions (PDFs). The BMA predictive PDF of the future weather quantity is the mixture of the individual PDFs corresponding to the ensemble members and the weights and model parameters are estimated using ensemble members and validating observation from a given training period.

In the present paper we introduce a BMA model for calibrating wind speed forecasts, where the components PDFs follow truncated normal distribution with cut-off at zero, and apply it to the ALADIN-HUNEPS ensemble of the Hungarian Meteorological Service. Three parameter estimation methods are proposed and each of the corresponding models outperforms the traditional gamma BMA model both in calibration and in accuracy of predictions. Moreover, since here the maximum likelihood estimation of the parameters does not require numerical optimization, modelling can be performed much faster than in case of gamma mixtures.

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