

Application of Bayesian Model Averaging and Geostatistical Output Perturbation to Generate Calibrated Ensemble Weather Forecast

Authors : Muhammad Luthfi, Sutikno Sutikno, Purhadi Purhadi

Abstract : Weather forecast has necessarily been improved to provide the communities an accurate and objective prediction as well. To overcome such issue, the numerical-based weather forecast was extensively developed to reduce the subjectivity of forecast. Yet the Numerical Weather Predictions (NWP) outputs are unfortunately issued without taking dynamical weather behavior and local terrain features into account. Thus, NWP outputs are not able to accurately forecast the weather quantities, particularly for medium and long range forecast. The aim of this research is to aid and extend the development of ensemble forecast for Meteorology, Climatology, and Geophysics Agency of Indonesia. Ensemble method is an approach combining various deterministic forecast to produce more reliable one. However, such forecast is biased and uncalibrated due to its underdispersive or overdispersive nature. As one of the parametric methods, Bayesian Model Averaging (BMA) generates the calibrated ensemble forecast and constructs predictive PDF for specified period. Such method is able to utilize ensemble of any size but does not take spatial correlation into account. Whereas space dependencies involve the site of interest and nearby site, influenced by dynamic weather behavior. Meanwhile, Geostatistical Output Perturbation (GOP) reckons the spatial correlation to generate future weather quantities, though merely built by a single deterministic forecast, and is able to generate an ensemble of any size as well. This research conducts both BMA and GOP to generate the calibrated ensemble forecast for the daily temperature at few meteorological sites nearby Indonesia international airport.

Keywords : Bayesian Model Averaging, ensemble forecast, geostatistical output perturbation, numerical weather prediction, temperature

Conference Title : ICSSG 2017 : International Conference on Spatial Statistics and Geostatistics

Conference Location : Singapore, Singapore

Conference Dates : May 04-05, 2017