Beyond Bayes: Utilising Yesterday's Forecast

Ed Wheatcroft

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Abstract

In weather forecasting, multiple versions of the same model, called ensembles, are launched every six or twelve hours and simulate future weather a week or more from their launch time. These ensembles then form the basis of probabilistic forecasts of continuous variables such as the temperature. Consequently, as will be familiar to anyone who has ever planned an outdoor event, a stream of new forecast information about the same target time is constantly emerging. Commonly, however, once each new ensemble becomes available, the most up to date forecast is based only on that ensemble and all previous information is discarded. It seems plausible that combining information from the present and previous forecasts could yield improved forecast skill and thus the potential for better decision support with little additional computation.

In this talk, I will present some results from three different approaches to the combination of forecast information launched at different times. In the highly idealised scenario in which a model represents the universe perfectly, a Bayesian approach can be effective in improving forecast skill. In the more realistic scenario in which the model only gives an approximation to the real world, however, the Bayesian approach is shown to be measurably counterproductive. Two alternative approaches are described, and are shown to be effective in improving forecast skill, even when the model is imperfect. This has potential use both in weather applications and in many other short-range forecasting situations where new forecasts are made before the previous one becomes uninformative.

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