What might multiple probability forecasts for the same event tell us?

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Abstract

Consider the situation where one is given several probability forecasts for the same outcome, each generated by a different procedure (simulation modelling from different ensemble prediction systems, expert judgement, data-based empirical models . . .). These forecast systems are not "independent", and while each of them has more skill than a forecast of climatology, not one of them provides forecasts consistent with the output having been drawn from the corresponding forecast probability density function (PDF). How might one use this collection of forecasts in decision making? What are the role(s) of probability in tasks like this? Can examining the forecast systems from a "many-worlds" perspective clarify the limited of even perfect probability forecasts, and lead to a definition of "luck"? These questions are explored in an empirical setting: real time forecasting of the outcome of every National Football League (NFL) game in the 2018 regular season. Many of the insights obtained apply immediately to forecasts of precipitation, hurricane formation, freezing conditions, and so on.