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# The Responsible Emboldening Of Probability Forecasts

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## Abstract

Probability forecasts are essential to inform decision making in medicine, economics, image classification, sports analytics, entertainment, and many other fields. Ideally, probability forecasts are (i) well calibrated, (ii) accurate, and (iii) bold, that is, spread out enough to be informative for decision making. However, there is a fundamental tension between calibration and boldness, since calibration metrics can be high when predictions are overly cautious, that is, non-bold. The purpose of this work is to develop a Bayesian model selection-based approach to assess calibration, and a strategy for boldness-recalibration that enables practitioners to responsibly embolden predictions subject to their required level of calibration. Specifically, we allow the user to pre-specify their desired posterior probability of calibration, then maximally embolden predictions subject to this constraint. We demonstrate the method with a case study on hockey home team win probabilities and then verify the performance of our procedures via simulation. We find that very slight relaxation of calibration probability (e.g., from 0.99 to 0.95) can often substantially embolden predictions when they are well calibrated and accurate (e.g., widening hockey predictions' range from 26%–78% to 10%–91%).