Solutions to *Exploring Forecast Verification* Exercises

Joseph Fogarty

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1 Dichotomous Forecasts

1.1 Basic Dichotomous Forecast Scores

1. Which forecaster has the highest accuracy? Highest CSI? Are they the same forecaster?

   Jake had the highest accuracy, but Rachel had the highest CSI - they're not the same forecaster.

2. In general, how do the CSI scores compare to accuracy?

   CSI scores, when converted to a percentage, are lower than accuracy scores

3. Which forecasters tend to underforecast? Overforecast?

   Rachel, Val, and Jake all underforecast, while Joe overforecasts.

4. Which forecaster has the highest FAR?

   Joe had the highest FAR

5. Show that CSI, FAR, and POD are related by the following formula:

$$CSI = (POD^{-1} + (1 - FAR^{-1}) - 1)^{-1}. \tag{1}$$

   The solution simply requires a bit of algebra:

$$\begin{aligned}
CSI &= (POD^{-1} + (1 - FAR)^{-1} - 1)^{-1} \\
\frac{A}{A+B+C} &= \left(\frac{A+B}{A} + \left(1 - \frac{C}{A+C}\right)^{-1} - 1\right)^{-1} \\
\frac{A}{A+B+C} &= \left(\frac{A+B}{A} - \left(\frac{A}{A+C}\right)^{-1} - 1\right)^{-1} \\
\frac{A}{A+B+C} &= \left(\frac{A+B}{A} + \frac{A+C}{A} - \frac{A}{A}\right)^{-1} \\
\frac{A}{A+B+C} &= \left(\frac{A+B+C}{A}\right)^{-1} \\
\frac{A}{A+B+C} &= \frac{A}{A+B+C}.
\end{aligned}$$

1.2 Advanced Dichotomous Forecast Scores

1.3 Applying pandas to Dichotomous Forecast Scores