Residential Electricity Load Forecasting: Evaluation of Individual and Aggregate Forecasts (Supplementary Material)

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MASE

An experience reader might ask: *Why don't you use MASE to evaluate your forecast accuracy?* Although it is an interesting question to answer but the details is out of the scope of the main paper. Thus, we decided to answer it here, in the supplementary material.

The Mean Absolute Scaled Error (MASE) is defined as (see [1], Section 3)

$$\frac{1}{n-1}\sum_{t=2}^{n}\left(\frac{|y_t-\widehat{y}_t|}{\frac{1}{n-1}\sum_{i=2}^{n}|y_i-y_{i-1}|}\right)$$

where y_t is the value (of the time series) at time t. Note that MASE is defined to measure the effectiveness of a forecasting method against the naive forecast for the next step forecasting (or in our case, 1 hour ahead forecasting).

We do not compute the MASE because it can be inferred by dividing the NMAE of a forecasting method with the NMAE of the `benchmark` (and we do provide both values in the main paper). Note that, the `benchmark` of the 1 hour ahead forecasting is y_{i-1} (see Section 6 in the main paper).

Let the NMAE of an arbitrary forecasting method be NMAE_F and the NMAE of the `benchmark` be NMAE_B. Below, we show that MASE =

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$\text{NMAE}_F/\text{NMAE}_B$ for the 1 hour ahead (next-step) forecasting. Without loss of generality, suppose that we forecast from the second time slot to the last time slot, n. Let $\widehat{y_t}$ be the forecast for the time t using the forecasting method F. Let the NMAE of the method F be (see Section 3.2 of the main paper):

$$\text{NMAE}_F = \frac{\sum_{t=2}^{n} |y_t - \widehat{y_t}|}{\sum_{t=2}^{n} |y_t|},$$

and the NMAE of the benchmark be:

$$\text{NMAE}_B = \frac{\sum_{t=2}^{n} |y_t - y_{t-1}|}{\sum_{t=2}^{n} |y_t|}.$$

Then, we have:

$$\begin{aligned}
\text{MASE} &= \frac{1}{n-1} \sum_{t=2}^{n} \left(\frac{|y_t - \widehat{y}_t|}{\frac{1}{n-1} \sum_{i=2}^{n} |y_i - y_{i-1}|} \right) \\
&= \frac{\frac{1}{n-1} \sum_{t=2}^{n} |y_t - \widehat{y}_t|}{\frac{1}{n-1} \sum_{i=2}^{n} |y_i - y_{i-1}|} \\
&= \frac{\sum_{t=2}^{n} |y_t - \widehat{y}_t|}{\sum_{i=2}^{n} |y_i - y_{i-1}|} \\
&= \frac{\text{NMAE}_F}{\text{NMAE}_B}.
\end{aligned}$$

References

[1] R. J. Hyndman and A. Koehler, "Another look at measures of forecast accuracy," *International Journal of Forecasting*, vol. 22, no. 4, pp. 679–688, 2006.