Forecasting accuracy. New evidences based on the Má-competition

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Abstract

Forecasting availability has widely increased, suggesting the need of analyzing the adequacy of different alternative methods. One of the main empirical researches in this field is the M-Competition developed by Makridakis and Hibon, whose last edition (M3) is referred to 2000.

The M3 Competition is based in 3003 time series and 24 forecasting techniques, including naive procedures, explicit trend models, decomposition methods, ARIMA model, expert systems and neural networks, and leading to some interesting results (which are quite similar to those obtained in previous editions). Furthermore, this investigation confirms two interesting facts: first, more sophisticated procedures do not necessarily improve the quality of the obtained results and second, the accuracy of the combined forecasts increases with regard to the individual procedures.

Since the M3-Competition only includes five different accuracy measures, in this paper we propose the use of new indicators, including the Theil index (U) and some other measures based on the Information Theory.

More specifically, given a variable Y we focus on the quadratic unquietness of Y defined by R. Pérez (1985) as follows:

$$H(Y) = \frac{2}{T} \sum_t \left(\frac{E(Y)}{Y} - 1 \right)$$

and we propose the quadratic information related to the forecasts as a measure of the forecasting adequacy defined as follows:

$$IC(Y, \hat{Y}) = H(Y) - H\left(Y/[\hat{Y}]\right)\left(1 - r_{Y,\hat{Y}}\right)$$

where $r_{Y,\hat{Y}}$ is the linear correlation coefficient between actual and forecasted values and $H\left(Y/[\hat{Y}]\right)$ is the quadratic unquietness conditioned to the forecasting intervals, given by the expression:

$$H\left(Y/[\hat{Y}]\right) = \sum_j p\left([\hat{Y}_j]\right) \frac{E(Y)}{E[\hat{Y}_j]} H\left(Y/[\hat{Y}_j]\right)$$

The application of these measures to the M3 Competition database leads to some interesting results about the forecasting accuracy of the considered procedures.

Keywords

Forecasting, M-competition, Theil index, Quadratic information.

References

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