Forecasting hierarchical times series

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Abstract

In many applications, there are multiple time series that are hierarchically organized and can be aggregated at several different levels in groups based on products, geography or some other features. We call these "hierarchical time series". For example, we consider Australian domestic tourism hierarchical time series based on geographical regions and purpose of travel.

These time series are commonly forecast using either a "bottom-up" or a "top-down" method. In this seminar, I will give an overview of the traditional approaches and present a new approach which provides optimal forecasts that are better than forecasts produced by either a top-down or a bottom-up approach. The method is based on independently forecasting all series at all levels of the hierarchy and then using a regression model to optimally combine and reconcile these forecasts. The resulting revised forecasts add up appropriately across the hierarchy, are unbiased and have minimum variance amongst all combination forecasts under some simple assumptions. The seminar will make references to some published research (see Hyndman et al., 2011, Athanasopoulos et al., 2009, Hyndman et al. 2013) but also some new results.

References

