Forecasting: principles and practice

Lab Session 11 25 September 2014

Before doing any exercises in R, load the **fpp** package using `library(fpp)`.

1. We will reconcile the forecasts for the infant deaths data. The following code can be used. Check that you understand what each step is doing. You will probably need to read the help files for some functions.

```
library(hts)
plot(infantgts)
smatrix(infantgts)

# Forecast 10-step-ahead and reconcile the forecasts
infantforecast <- forecast(infantgts, h=10)

# plot the forecasts including the last ten historical years
plot(infantforecast, include=10)

# Create a matrix of all aggregated time series
allts_infant <- aggts(infantgts)

# Forecast all series using ARIMA models
allf <- matrix(, nrow=10, ncol=ncol(allts_infant))
for(i in 1:ncol(allts_infant))
  allf[,i] <- forecast(auto.arima(allts_infant[,i]), h=10)$mean
allf <- ts(allf, start=2004)

# combine the forecasts with the group matrix to get a gts object
y.f <- combinef(allf, groups = infantgts$groups)

# set up training and testing samples
data <- window(infantgts, start=1933, end=1993)
test <- window(infantgts, start=1994, end=2003)

# Compute forecasts on training data
forecast <- forecast(data, h=10)

# calculate ME, RMSE, MAE, MAPE, MPE and MASE
accuracy.gts(forecast, test)
```

2. How would you measure overall forecast accuracy across the whole collection of time series?
3. Repeat the training/test set analysis using "bottom-up" and "top-down"forecasting. (e.g., set `method="bu"` in the `forecast` function.)
4. Does the "optimal" reconciliation method work best here?