Test on 'Econometric forecasting'

May 2009

1. A time series of five observations is given as $(1, 2, 3, 4, 5)$.

   (a) Apply SES (*single exponential smoothing*) with the assumptions $\hat{x}_1 = x_1$, $\alpha = 0.5$. First determine $\hat{x}_2$, ..., $\hat{x}_5$. [Hint: The formula for SES is: $\hat{x}_t = \alpha x_t + (1 - \alpha)\,\hat{x}_{t-1}$]

   (b) Determine $\hat{x}_5\,(1)$ and $\hat{x}_5\,(2)$, i.e. the prediction for the unknown values x_6, x_7.

2. You assume that the time series given in # 1 was generated by an ARIMA process

$$X_t = X_{t-1} + \varepsilon_t - 0.5\varepsilon_{t-1},$$

   for $t = 2, \ldots, 5$, and you also assume $\mathrm{E}\,(\varepsilon_t | \varepsilon_{t-1}, \ldots) = 0$. You assume for simplicity $\varepsilon_1 = 0$. Note that the coefficient value is assumed as known.

   (a) Evaluate the conditional forecasts $\hat{X}_j\,(1)$, $j = 1, \ldots, 5$, as the conditional expectations $\mathrm{E}\,(X_{j+1} | X_j)$. [Hint: first determine ε_2, then proceed until you have ε_5. All numbers are given, the answer is 5 numbers, not a formula.]

   (b) Comparing the results of problems # 1 and # 2a, what do you note? Comment on this feature.

3. Consider the data set given in problem # 1:

   (a) Do you think that the technique assumed in problem #1 is adequate for the given data? Do you have any suggestions how to improve upon it within the framework of model-free procedures?

   (b) Do you think that the technique assumed in problem #2 is adequate for the given data? Do you have any suggestions how to improve upon it within the framework of model-based procedures?