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Winter 2008/2009
9.12.2008
Sheet 8

Time Series

(Due: Tu., 16.12.2008, 1:15 pm, in the exercise classes)

1. Let X_t be a stationary, gaussian AR(1)-process with mean μ, i.e.

$$(1 - \phi B)(X_t - \mu) = \varepsilon_t, \quad |\phi| < 1, \varepsilon_t \sim \mathcal{N}(0, \sigma^2)$$

   Compute the loglikelihood function

$$\log L_{X_n,\ldots,X_1}(x_1, \ldots, x_n, \phi, \mu, \sigma^2)$$

   and find a Maximum-Likelihood-Estimator for μ when ϕ and σ are known.

(5 Credits)

2. Download the data set airline.dat from the homepage and fit an SARIMA$(0,1,1) \times (0,1,1)_{12}$ model to the data set. Plot the residuals as well as the ACF of the residuals and comment on its shape.
   Thereafter use R to forecast from this model. Plot the forecasted values for 12 periods ahead together with the data. Furthermore plot (pointwise) upper and lower 95% confidence bands for the forecasted values.
   Hint: Use the R commands arima and predict to solve this exercise.

(10 Credits)

http://www.uni-ulm.de/mawi/zawa/lehre/winter2008/ts20082009.html