

# Neural Network for Bayesfor

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We consider the problem of predicting the variable  $y$  when the predictor variable  $x$  is known. The easiest case will be a linear regression, but we can generalize the problem finding a solution for a statistical model of this form:

$$y_l = \sigma_l\left(\sum_{k=1}^L w_{2kl}\sigma_k\left(\sum_{j=1}^K w_{1jk}x_j + \theta_j\right) + \theta_k\right) \quad (1)$$

In this example we fit a neural network with 10 hidden layer a single outer layer. In other words, we find a solution for  $y$  based only on the knowledge of a single variable  $x$ .

The technique used is a sequential Monte Carlo method. You can find the documentation and the original matlab code at this address:

<http://www.cs.ubc.ca/%7Enando/software.html>

Figure 1 shows the time series of the predictor variable and the true  $y$ . Figure 2 shows the one-step forecast of  $y$  based on  $x$  and the forecast error.

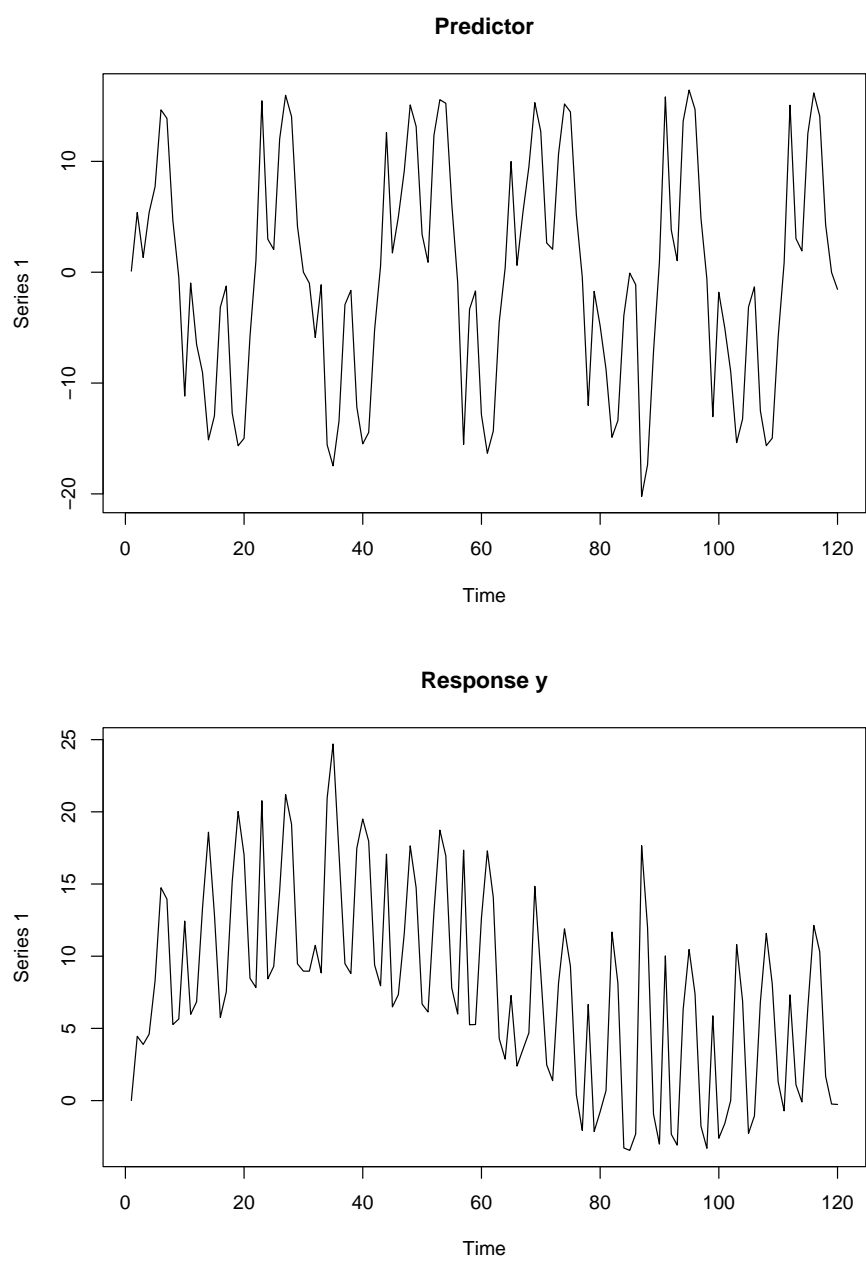


Figure 1: Up panel: predictor  $x$  time series. Low panel: target variable

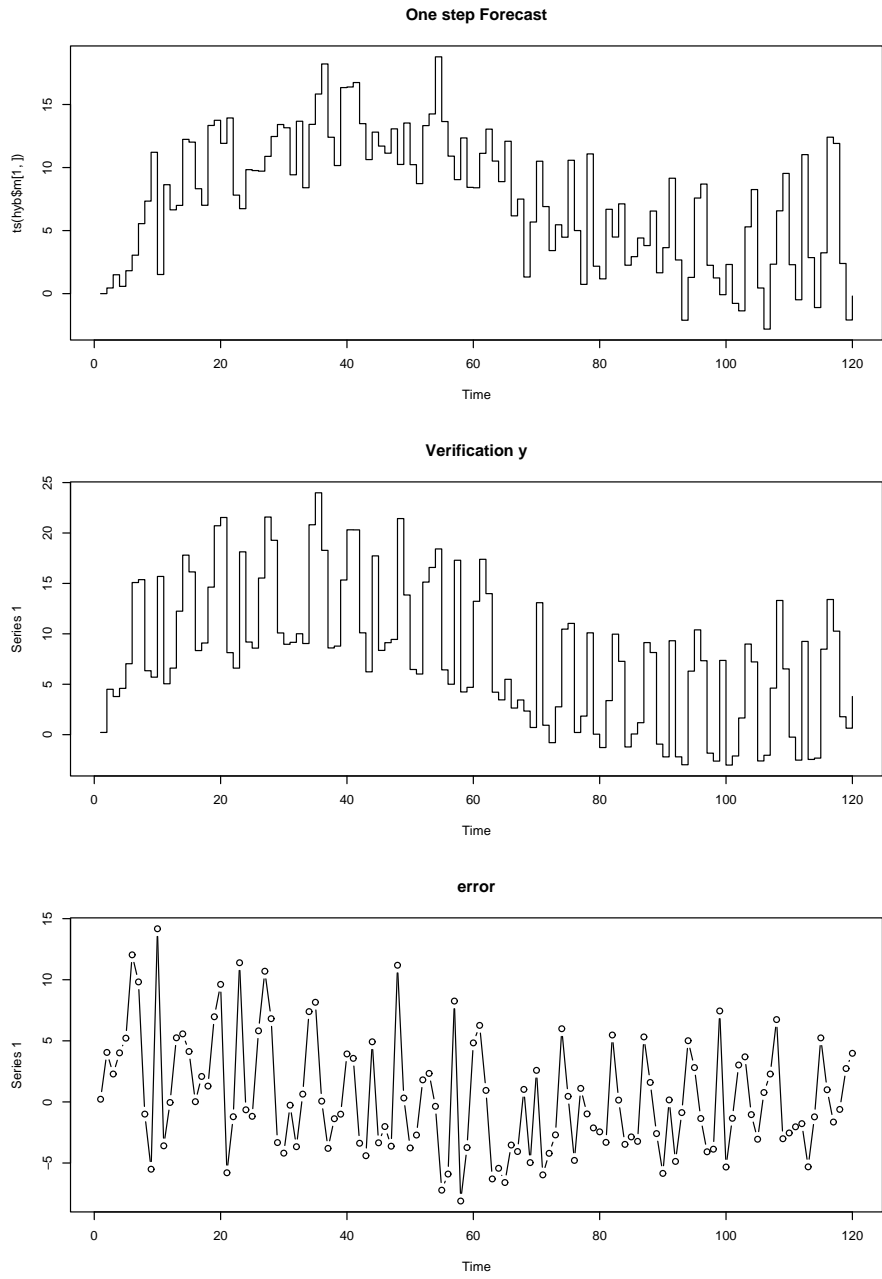


Figure 2: Up panel: One step forecast. Middle panel: true  $y$ . Low panel: error