

Application of Neuro-fuzzy Model in Prediction of Mean Arterial Pressure Time Series

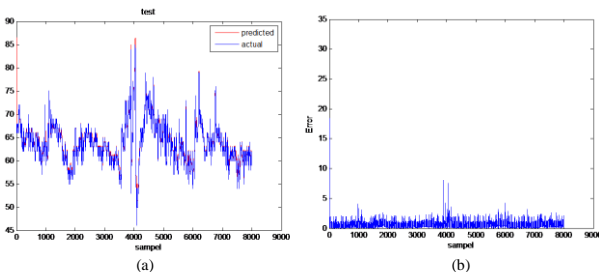
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Predicting the future behavior of human's biosignals can help clinicians to prevent occurrence of physiological disorders such as hypotension, hypertension, epilepsy and etc. Either this prediction helps clinicians to buy time in order to select a more effective treatment for physiological disorders without exposing the patient to additional risks of delaying treatment.

Recently neuro-fuzzy modeling has been employed to predict nonlinear chaotic time series such as solar activity time series and other time series such as financial time series. In this paper we use local linear neuro-fuzzy network to predict mean arterial pressure (MAP) and the local linear model tree (LoLiMoT) algorithm is used to train this neuro-fuzzy network. In this method the input space is divided to small linear subspaces and each of them has fuzzy validity function and a local linear model which can be described as a fuzzy neuron. The final output of the network is weighted sum of neurons output. To assess the accuracy of prediction we choose Normalized Mean Square Error (NMSE) as an error index.

We use 10 mean arterial pressure signals from 10 patients (1 hour from each patient) in training and test process. Mean of NMSE for prediction of these signals was 0.023 in training process and 0.05 in test process. In the following figure actual and predicted values of a mean arterial pressure time series and the absolute prediction error is shown.



(a) Actual and predicted value of mean arterial pressure time series

(b) Absolute prediction error