LEARNING SUNSPOT SERIES DYNAMICS BY RECURRENT NEURAL NETWORKS

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abstract

Sunspot series is a record of the activity of the surface of the sun. The sunspot series is chaotic and is a well-known challenging task for time series analysis. We apply a new smoothing technique by integrating the original sequence twice with mean correction and also normalize the smoothed sequence to [-1,1].

In this paper, we show that we can approximate the transformed sequence with a discrete-time recurrent neural net. Our approach based on the universal approximation property of recurrent neural network to trajectory in R^n. The smoothed sequence is divided into a few segments and each segment is approximated by a neuron of a discrete-time fully connected neural network.

The relation between the least square error and the network size are also discussed.