



Time Series Decomposition for Improving the Forecasting Performance of Convolutional Neural Networks*

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Abstract—Time Series forecasting is of high interest in the Big Data ecosystem. A larger data volume accessible in industry and science, and a higher profit from more accurate predictions have generated a growing application of Deep Learning techniques in the Time Series forecasting. In this work, the improvement of the forecasting capacity of Convolutional Neural Networks and Recurrent Neural Networks when using as input the trend, seasonal and remainder time series generated by the Seasonal and Trend decomposition using Loess, instead of the original time series observations, is evaluated. The benchmark used in this work is composed of eight seasonal time series with different lengths and origins. Besides, Convolutional Neural Networks and Recurrent Neural Networks, comparisons with Multilayer Perceptrons are also undertaken. As a consequence, an improvement in the forecasting capacity when replacing the original observations by their decomposition in Convolutional Neural Networks-based forecasting is stated.

Index Terms—Time Series Analysis, Deep Learning, Forecasting, Convolutional Neural Networks, Recurrent Neural Networks, Seasonal and Trend Decomposition using Loess