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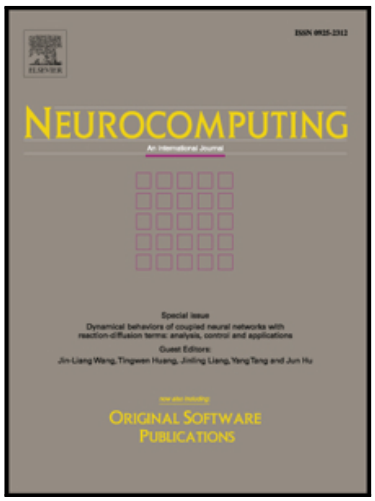

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PII: S0925-2312(17)30755-5
DOI: 10.1016/j.neucom.2016.12.088
Reference: NEUCOM 18379

To appear in: *Neurocomputing*

Received date: 8 July 2016
Revised date: 29 November 2016
Accepted date: 12 December 2016

Please cite this article as: Eleni Tsironi, Pablo Barros, Cornelius Weber, Stefan Wermter, An Analysis of Convolutional Long-Short Term Memory Recurrent Neural Networks for Gesture Recognition, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2016.12.088

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An Analysis of Convolutional Long-Short Term Memory Recurrent Neural Networks for Gesture Recognition

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Abstract

In this research we analyze a Convolutional Long Short-Term Memory recurrent Neural Network (CNNLSTM) in the context of gesture recognition. CNNLSTMs are able to successfully learn gestures of varying duration and complexity. For this reason, we analyse the architecture by presenting a qualitative evaluation of the model, based on the visualization of the internal representations of the convolutional layers and on the examination of the temporal classification outputs at a frame level, in order to check if they match the cognitive perception of a gesture. We show that CNNLSTM learns the temporal evolution of the gestures classifying correctly their meaningful part, known as Kendon's stroke phase. With the visualization, for which we use the deconvolution process that maps specific feature map activations to original image pixels, we show that the network learns to detect the most intense body motion. Finally, we show that CNNLSTM outperforms both plain CNN and LSTM in gesture recognition.

Keywords: Gesture recognition, CNN, LSTM, CNN visualization

[1]The authors gratefully acknowledge partial support from the CAPES Brazilian Federal Agency for the Support and Evaluation of Graduate Education (p.n.5951-13-5), the German Research Foundation DFG under project CML (TRR 169) and the Hamburg Landesforschungsförderungsprojekt.

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