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Permalink

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 40(0)

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Publication Date

2018

A deep learning approach to training a brain activity-based trial-by-trial classifier for rapid serial visual presentation imagery

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Abstract

Image classification aided by brain activity measured during rapid serial visual presentation (RSVP) shows promise to aid human viewers to quickly triage large volumes of images with support of an EEG technology. Fast perceptual responses are parsed with a brain-activity classifier operating on EEG signals to select an image subset containing visual information similar to the viewers target. However, current processes for training brain activity classifiers are experimentally and computationally expensive. We propose a deep learning model that classifies images based off of brain-activity. Using the satellite visual images and EEG data provided from Bigdely-Shamlo et al. (2007), we compare different machine learning (Support Vector Machines) and deep learning (Convolutional Neural Networks and Recurrent Neural Networks) approaches along with different data manipulation styles for classifying the satellite images. This initial report summarizes the efforts to establish benchmarks for deep learning, exploring the potential to streamline and improve brain-activity based classification.