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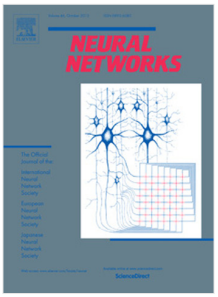

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Spiking Neural Networks applied to the Classification of Motor Tasks in EEG Signals

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Abstract

Motivated by the recent progress of Spiking Neural Network (SNN) models in pattern recognition, we report on the development and evaluation of brain signal classifiers based on SNNs. The work shows the capabilities of this type of Spiking Neurons in the recognition of motor imagery tasks from EEG signals and compares their performance with other traditional classifiers commonly used in this application. This work includes two stages: the first stage consists of comparing the performance of the SNN models against some traditional neural network models. The second stage, compares the SNN models performance in two input conditions: input features with constant values and input features with temporal information. The EEG signals employed in this work represent five motor imagery tasks: i.e. rest, left hand, right hand, foot and tongue movements. These EEG signals were obtained from a public database provided by the Technological University of Graz (Brunner et al., 2008). The feature extraction stage was performed by applying two algorithms: power spectral density and wavelet decomposition. Likewise, this work uses raw EEG signals for the second stage of the problem solution. All of the models were evaluated in the classification between two motor imagery tasks. This work demonstrates

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