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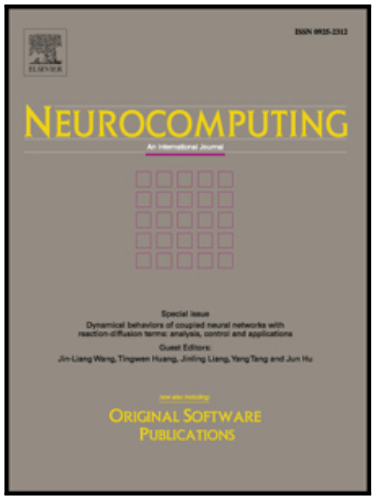

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Coherent Averaging Estimation Autoencoders applied to Evoked Potentials Processing

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Abstract

The success of machine learning algorithms strongly depends on the feature extraction and data representation stages. Classification and estimation of small repetitive signals masked by relatively large noise usually requires recording and processing several different realizations of the signal of interest. This is one of the main signal processing problems to solve when estimating or classifying P300 evoked potentials in brain-computer interfaces. To cope with this issue we propose a novel autoencoder variation, called Coherent Averaging Estimation Autoencoder with a new multiobjective cost function. We illustrate its use and analyze its performance in the problem of event related potentials processing. Experimental results showing the advantages of the proposed approach are finally presented.

Keywords: Coherent Averaging, Artificial Neural Networks, Event Related Potentials, Brain Computer Interfaces, Autoencoders

1. Introduction

Coherent averaging (CA) is a widely used technique to recover a repetitive response masked by uncorrelated noise. It dates back to the early 50's [1] and it

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