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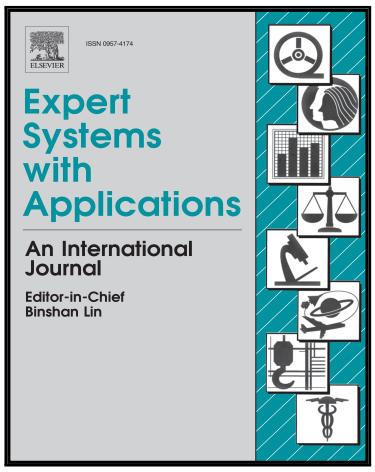

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PII: S0957-4174(16)30177-4
DOI: 10.1016/j.eswa.2016.04.011
Reference: ESWA 10631

To appear in: *Expert Systems With Applications*

Received date: 9 June 2015
Revised date: 7 April 2016
Accepted date: 8 April 2016

Please cite this article as: Alejandro A. Torres-García, Carlos A. Reyes-García, Luis Villaseñor-Pineda, Gregorio García-Aguilar, Implementing a Fuzzy Inference System in a Multi-Objective EEG Channel Selection Model for Imagined Speech Classification, *Expert Systems With Applications* (2016), doi: 10.1016/j.eswa.2016.04.011

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Implementing a Fuzzy Inference System in a Multi-Objective EEG Channel Selection Model for Imagined Speech Classification

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Abstract

One of the main purposes of brain-computer interfaces (BCI) is to provide persons of an alternative communication channel. This objective was firstly focused on handicapped subjects but nowadays its scope has increased to healthy persons. Usually, BCIs record brain activity using electroencephalograms (EEG), according to 4 main neuro-paradigms (slow cortical potentials, motor imagery, P300 component and visual evoked potentials). These analytical paradigms are not intuitive and are difficult to implement. Accordingly, this work researches an alternative neuro-paradigm called imagined speech, which refers to the internal pronunciation of words without emitting sounds or doing facial movements. Specifically, the present research is focused on the recognition of five Spanish words corresponding to the English words "up," "down," "left," "right" and "select", with which a computer cursor could be controlled. We perform an offline computer automatic classification procedure of a dataset of EEG signals from 27 subjects. The method implements a channel selection composed of two stages; the first one obtains a Pareto front and is approached as a multi-objective

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