Preface

CRoNe, the Congress on Robotics and Neuroscience, is an encounter that acts not only as a bridge but also as a fruitful land for collaboration and discussion concerning recent advances in the frontiers of artificial intelligence, robotics and neuroscience, fostering the exchange of ideas among different, and often fairly separated, scientific fields. The congress, part of the Latin American Robotics Week[1], organized by Innovación y Robótica Estudiantil UTFSM [2], is a meeting point for people from engineering, human and biological sciences promoting the development and understanding of complex intelligent systems.

At its 5^{th} version, the Congress on Robotics and Neuroscience was focused on the employment of robotics in education.

Following the convergence of areas inside the Congress, the works collected herein address open problems such as the development of robotic platforms, novel medical devices for sample acquisition, AI-based approaches for clinical evaluations, and feature extraction and analysis from EEG data. There were twelve submitted works, two works were rejected, and three works were retired by multiple reasons argued by the authors.

This number of the Congress Proceedings starts with robotics related works, the article from Robles et al. (2020) shows current state of development and improvements on the team of robots capable of playing football autonomously, in the context of the Robot Soccer World Cup, specifically on the Small Size League. Major improvements from this team since their last World Cup participation in 2018 are focused on electrical and mechanical areas.

The article from Coiro et al. (2020) presents an open-source robot designed for estimulating and fostering task scheduling for future computational thinking development abilities on preschool children, without needing resources such as physical equipment or computational tools for manipulating its desired behavior.

Within medical purposes, the work from Pizarro et al. (2020) introduces a physical device including recent techniques for improving sampling acquisition from lungs. Pizarro et al. (2020), based on recent proposals, introduces a device which condense samples of exhaled

[1] Further details in `http://www.roboticsweekla.com`.

[2] a multidisciplinary group of both, undergraduate and graduate students, focused on R&D with emphasis on robotics. More information in `http://innovacionyrobotica.usm.cl`.

air, a known non-invasive technique, separating alveolar air (containing biomarkers) with the air from the respiratory way (lacking biomarkers), allowing to acquire cleaner samples and reacher samples. With similar purposes, clinical cataloging, Salinas et al. (2020) proposes a machine learning architecture for identifying metacarpophalangeal deviations, related with several pathologies affecting the functionality of the hand, such as rheumatoid arthritis or fractures. In this context, Salinas et al. (2020) describes a novel machine learning architecture including computational vision and deep learning, which analyses pictures of hands extracting relevant features for clinical assessments.

In other medical application, Castro et al. (2020) presents the use of image processing and convolutional neural networks to detect intracranial hemorrhage in computed tomography images. Castro et al. (2020) used two network architectures, the CNN4 proposed by the authors and the popular VGG16 architecture, performing outstanding performance over traditional methods of binary classification of hemorrhage or non-hemorrhage. The results in Castro et al. (2020) also show the influence of the selection of the training and test sets.

Montilla-Trochez et al. (2020) evaluates three neural network architectures for the classification of cognitive tasks from EEG activity measurements. The purpose of the classification is for monitoring subjects. The tested architectures by Montilla-Trochez et al. (2020) are a feed-forward neural network, the widely used VGG16 convolutional neural network architecture and a novel hybrid convolutional neural network proposed by the authors. The last architecture shows better performance in the classification of the cognitive tasks: counting, reading and rest. Also using EEG data, the work from Torres et al. (2020b) detects burst of activity called sleep spindles. The work present a detection algorithm using a single feature from the signal and the evaluated feature is inspired from its previous usage in the detection of relevant events of seismic registers. Torres et al. (2020b) also compares the performance of the detection algorithm using other signal features.

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